Technical Assessment

India: Tamil Nadu Health System Reform Program

The World Bank

1.   Country Context

1.   India has achieved substantial economic growth since 2000, but the progress in health has not been commensurate. Despite substantial reductions in maternal and child mortality, mortality rates remain above global averages for a country of India's gross domestic product (GDP) per capita. Between 2000 and 2016, infant mortality fell from 66.6 deaths per 1000 live births to 34.6 deaths per 1000 live births (Figure 1), while maternal mortality more than halved, falling from 374 to 174 deaths per 100,000. Life expectancy increased by six years – from 62.6 in 2000 to 68.6 in 2016. Moreover, nutritional outcomes are poor – almost 38 percent of children under the age of 5 are stunted in India (Figure 2).

2.   National averages, however, mask substantial variation in health outcomes across states. Infant mortality, for example, ranges from 9 deaths per 1000 live births in Manipur to 50 deaths per 1000 live births in Madhya Pradesh (Figure 1).[1,2] Meanwhile, maternal mortality ranges from 46 deaths per 100,000 in Kerala to 237 deaths per 100,000 in Assam. The difference in life expectancy between states is 11 years – 63.9 years in Assam compared to 74.9 years in Kerala.[3]

Figure 1. National and state-level infant mortality rate versus GNI per capita (US$), 2015
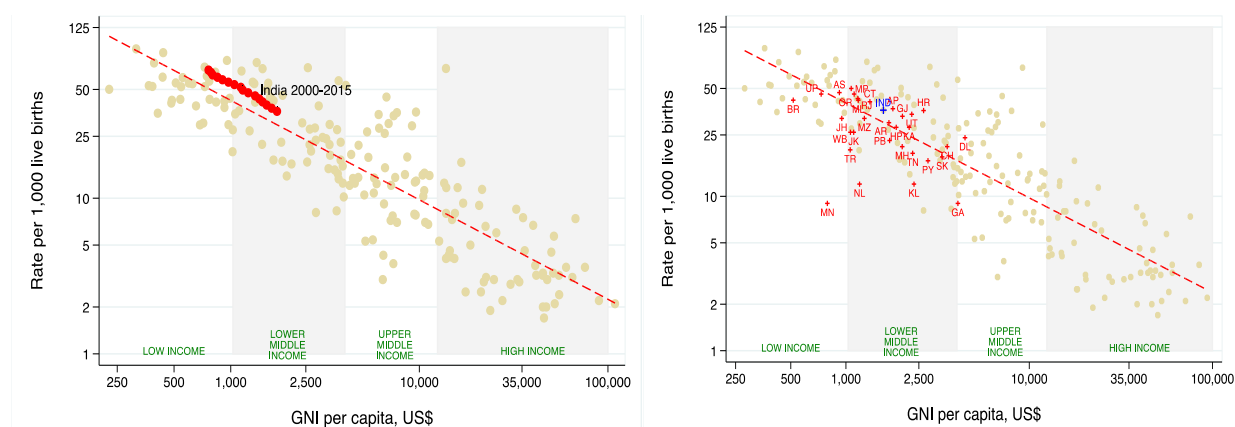
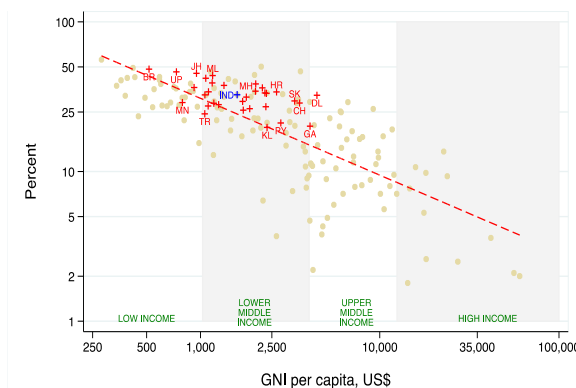Source: World Development Indicators; WHO Global Health Observatory, and Reserve Bank of India
Notes: x and y axes logged

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[1] There are some differences between the data from the Sample Registration System and the National Family Health Survey (NFHS) 2015-16. According to NFHS-4 data, Kerala has the lowest infant mortality rate of 5 deaths per 1000 live births, while Uttar Pradesh at 63.5 deaths per 1000 live births has the highest infant mortality rate.
[2] NITI Aaayog, Ministry of Health and Family Welfare, and the World Bank (2018). Health States, Progressive India: Reports on the Ranks of States and Union Territories.
[3] NITI Aaayog, Ministry of Health and Family Welfare, and the World Bank (2018).

Figure 2. National and state-level prevalence of stunting versus GNI per capita (US$) by state, 2015

Sources: World Development Indicators, National Family Health Survey, Reserve Bank of India, United Nations Children's Fund
Notes: x and y axes logged

2. State Context

3.   Tamil Nadu, with a population of 76 million, is the sixth most populous state in India. It is among the most urbanized states – 48 percent of the population resides in urban areas.[4] Tamil Nadu's population is older compared to the national average, and a larger share of the population is of working age (Figure 3). The state's dependency ratio is 43 percent compared to the national average dependency ratio of 57 percent. Between 2000 and 2010, the population grew by 15.6 percent, but the total fertility rate has declined from 2.2 in 1998-99 to 1.6 in 2015-16. According to the 2011 Census of India, Scheduled Castes (SC) represent 20 percent of Tamil Nadu's population, Scheduled tribes (ST) comprise 1.1 percent, Other Backward Classes (OBCs) form 68 percent, and other castes constitute 10.5 percent.

4.   Tamil Nadu is the second largest economy after Maharashtra and has experienced steady economic growth (7.3 percent growth rate in 2013-14). In 2015, Tamil Nadu's GDP per capita was estimated at INR 176,228 or approximately US$2,590. In addition to substantial economic growth, poverty has declined considerably and has been estimated to be around 12 percent in 2012 according to World Bank estimates.

5.   Tamil Nadu ranks among the high-performing states in India with respect to human development, attaining third rank on the Human Development Index (HDI)[5] among all states in India (2014). This achievement is reflected in high literacy (80 percent) and vastly improved health outcomes.

6.   There is, however, significant variation in development across districts. The State is comprised of 32 districts and 10 corporations.[6] Based on the state's HDI, the five worst-performing districts are: Thiruvarur (HDI of 0.568), Villupuram (0.561), Theni (0.539), Perambalur (0.447), and Ariyalur (0.282). In addition, Ramanathaparum and Virudhunagar districts have been included in the National Institution for

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[4] Ariyalur is the least urbanized district (only 11 percent of the population resides in urban settings), while Kanniyakumari has the highest proportion of urban population (83 percent of the population lives in urban areas).
[5] The Human Development Index is a composite measure of attainment in three core dimensions of well-being: education, health and income.
[6] For the management of public health services, the State is divided into 42 Health Unit Districts in addition to the Chennai Corporation.

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Transforming India (NITI) Aayog's list of 115 'aspirational districts' in India, requiring substantial improvements.[7]

Figure 3. Population pyramids for India and Tamil Nadu, 2017
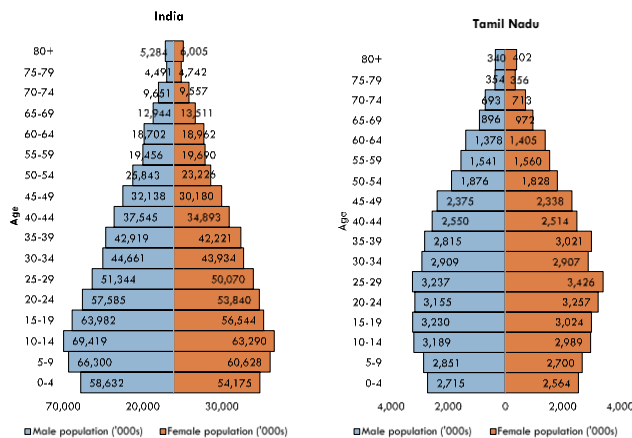
Source: Projections based on 2011 India Census

3. Sectoral and Institutional Context

7.   Tamil Nadu has made significant progress in improving reproductive and child health (RCH) outcomes. Maternal mortality has declined from 90 deaths per 100,000 births in 2005 to 79 deaths per 100,000 births in 2011-13. Latest health management information system (HMIS) data shows further declines to 62 deaths per 100,000 live births in 2015-16. Infant mortality declined from 30 deaths per 1000 live births in 2005-06 to 20 deaths per 1000 live births in 2015-16, while under 5 mortality fell from 36 to 27 deaths per 1000 live births, respectively (Figure 4). Tamil Nadu has already achieved the child-health and maternal health 2030 Sustainable Development Goals (SDGs). Despite substantial declines, child mortality in Tamil Nadu, however, is still almost four times higher than in Kerala (Figure 4). As a result of reductions in maternal and child mortality, life expectancy has increased to 70 years and is higher than the national average of 68.6 years. The achievements in health in Tamil Nadu are reflected in its third rank in the NITI Aayog Health Index. [8]

8.   Despite the impressive gains on RCH outcomes, Tamil Nadu continues to face challenges in RCH. Vaccination coverage is particularly low – only 70 percent of children 12-23 months receive all basic vaccinations. Lack of awareness about vaccination and obstacles such as child's illness and inconvenient

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[7] The aspirational districts were identified based on performance across 49 key indicators on health and nutrition, education, agriculture and water resources, financial inclusion and skill development, and basic infrastructure. Two districts were selected from each state in India.

[8] The Health Index is a joint initiative of NITI Aayog, the Ministry of Health and Family Welfare (MOHFW), and the World Bank. The objective of the Index is to measure the annual performance of states and union territories (UTs) and to rank states on the basis of incremental change to identify specific areas for improvement. The Health Index consists of 24 indicators grouped in the domains of health outcomes, governance and information, and key inputs/processes. Tamil Nadu ranked 3rd on the Health Index in 2015-16 with a composite score of 63.4 (compared to 63.3 in 2014-15). Tamil Nadu was preceded by Kerala (76.6) and Punjab (65.2). The state scored highest in the key inputs/process domain, where it was ranked at the top with a score of 78.06. Poorer performance was observed in the health outcomes domain, in which Tamil Nadu ranked 7th with a score of 62.56.

timing of vaccination appear to be the main reasons for incomplete or non-vaccination.[9,10] Furthermore, use of modern family planning methods has decreased from 60 percent to 53 percent. It is also important to note that aggregated state-level performance masks significant variation across districts. For example, full vaccination of children age 12-23 months varies from 39 percent in Nagapattinam to 93 percent in Tiruppur, while the contraceptive prevalence rate (CPR) varies from 23 percent in Virudhunagar to 65 percent in Coimbatore (NFHS-4).

Figure 4. Child mortality in Tamil Nadu (2005-06 and 2015-16) and comparator states (2015-16)
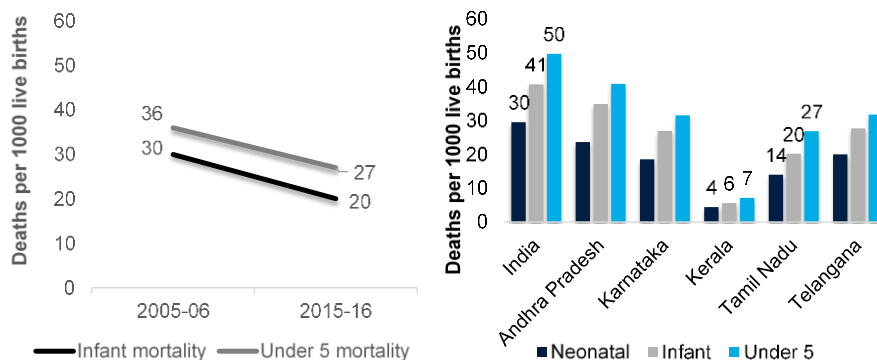
Source: NFHS-4

9.   While Tamil Nadu has made substantial strides in increasing health service utilization, it also continues to face challenges in quality of health services. Despite near universal facility delivery, and recent reduction in maternal deaths, the maternal mortality ratio (MMR) (at 62 per 100,000 live births) remains higher than MMR in countries at similar levels of development.[11] This is an indication of challenges in quality of care, as evidenced by poor quality of antenatal care (ANC). While 81 percent of women attend the recommended four or more ANC visits, only 43 percent of pregnant women receive all recommended services during ANC visits. Rates of caesarean section births stand at 34 percent, which is substantially higher than global recommendations of 15 percent. Of the 53 percent of women who use modern family planning methods, nearly all opt for sterilization. This could be a sign of women's strong preference for this method, but this could also indicate that there is room for improvement on counselling and provision of services for a wider method mix.

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[9] In a study examining the drop in age-appropriate vaccination coverage in Tamil Nadu, Murhekar et al. (2017) found that among mothers whose children were not fully vaccinated the main reason for no or partial vaccination was lack of knowledge about the immunization schedule (14 percent of women). In addition, 10 percent were unaware that they had to come back for the second and third doses. Almost 12 percent of children were inappropriately vaccinated – either before the recommended age of vaccination or the interval between the two doses was shorter than recommended. The majority of inappropriately vaccinated children in Tamil Nadu received vaccines before the recommended age (Murhekar et al., 2017).

[10] Murhekar, M. V., Kamaraj, P., Kanagasabai, K., Elavarasu, G., Rajasekar, T. D., Boopathi, K., & Mehendale, S. (2017). Coverage of childhood vaccination among children aged 12-23 months, Tamil Nadu, 2015, India. The Indian journal of medical research, 145(3), 377.

[11] West Bank and Gaza (MMR at 45 per 100,000 live births); Uzbekistan (36); Vietnam (54); and Ukraine (24) (World Development Indicators, 2018).

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Table 1. ANC in Tamil Nadu and comparator states (2015-16)

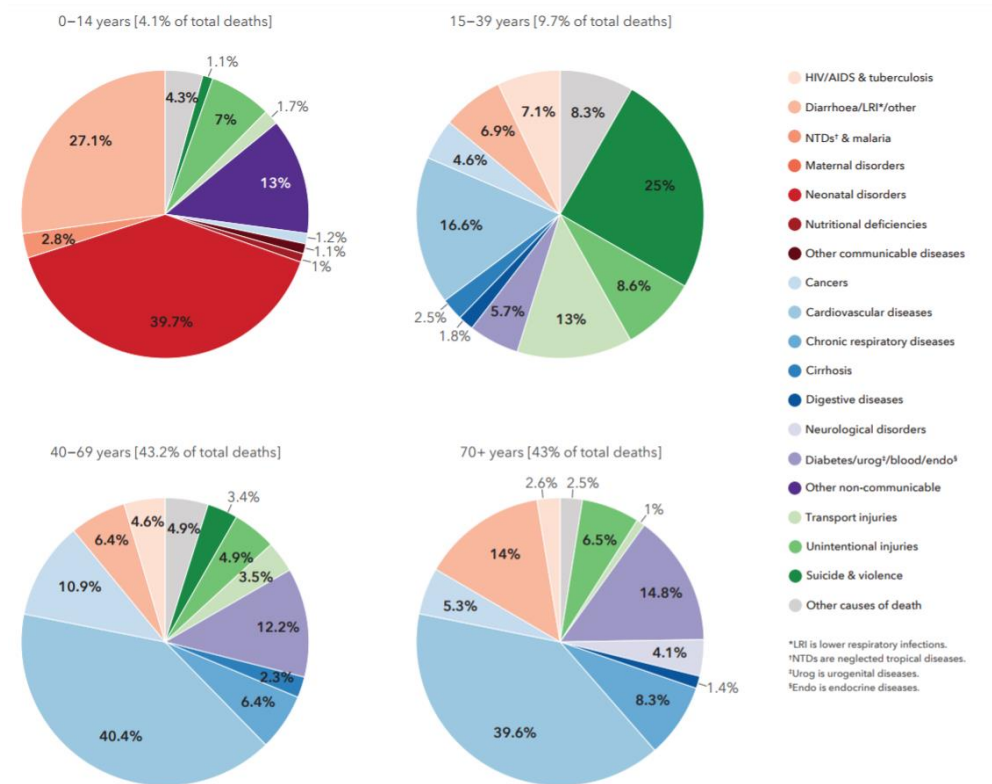|	Received at least 1 ANC Visit (%)	Received at least 4 ANC Visits (%)	Received All Types of ANC (%)*	Deliveries with Postnatal Check for Mother within 2 Days of Birth (%)
India	84	51	21	65
Andhra Pradesh	97	76	44	81
Karnataka	88	70	33	66
Kerala	99	90	61	89
Tamil Nadu	**92**	**81**	**43**	**74**
Telangana	95	75	42	83

Source: NFHS-4

Notes: *For the last live birth in the five years preceding the survey, mother received four or more antenatal checks, received at least one tetanus toxoid injection, and took iron and folic acid tablets or syrup for 100 days or more.

10.   In addition to the unfinished agenda on RCH, Tamil Nadu is dealing with a dual burden of disease as it confronts a growing burden of non-communicable diseases (NCDs). NCDs account for nearly 69 percent of deaths and 65 percent of disability-adjusted life years in Tamil Nadu.[12] An aging population also indicates evolving health care and health system requirements that will need to be met. Cardiovascular disease, diabetes, and cancer are the leading causes of death for those above the age of 40. Almost one-third of the adult population is overweight, and 12 percent of women and 10 percent of men have hypertension (NFHS-4). Furthermore, only 15 percent of women and 5 percent of men with hypertension have it under control (NFHS-4), indicating both supply and demand side challenges to the management of risk factors for NCDs as well as quality of NCD management. While in 2016, NCDs were the leading cause of death for individuals above the age of 40, suicide and violence, cardiovascular disease and transport injuries were the leading causes among ages 15-39 (Figure 5). The incidence of suicide and violence is particularly high among those aged 15-39.[13]

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[12] Indian Council of Medical Research, Public Health Foundation of India, and Institute for Health Metrics and Evaluation (2017). India: Health of the Nation's States - The India State-level Disease Burden Initiative.
[13] ICMR, PHFI, and IHME (2017).

Figure 5. Cause of Death by Age Group, 2016

0–14 years [4.1% of total deaths]

15–39 years [9.7% of total deaths]

40–69 years [43.2% of total deaths]

70+ years [43% of total deaths]

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

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

Source: Instiute for Health Metrics and Evaluation (2018).

11.	As a result of the commitment of the Government of Tamil Nadu (GoTN) to strengthening public provision of services, the majority of the population seeks care from public facilities, but there are significant differences across districts and by socio-economic status. Almost 63 percent of the state's population choose public facilities when a household member is ill (which is higher compared to other states except for Kerala), but this ranges from 42 percent in Kanniyakumari district to 82 percent in the Nilgris. Notably, the poor are more likely to seek care at public facilities – 86 percent of households in the poorest wealth quintile typically seek care at government facilities, compared to 27 percent of households in the richest wealth quintile. Rural households are also more likely to use the public sector than urban households (74 percent versus 53 percent, respectively). Poor quality of care was cited by 37 percent people and long wait times by 47 percent of people as reasons for not seeking care at a public health facility.

Figure 6. Share of Households Reporting Seeking Care at Public Facilities when a Member of the Household is Ill
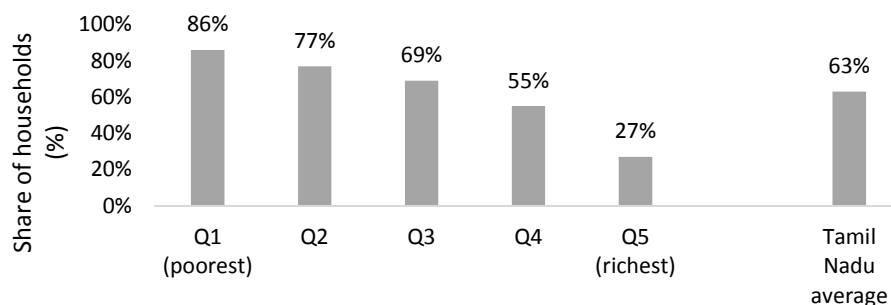
Source: NHFS-4

12.   Similar to national trends, government health spending is quite low, representing only 1 percent of the state's GDP (or approximately INR 1772 per capita, or USD 25.3 per capita). As a result of low government health spending, out-of-pocket spending represents 77 percent of total health expenditures in the state. About 13 percent of households encounter catastrophic expenditures, spending more than 25 percent of their total household expenditures on health. To alleviate the financial burden, in 2009, Tamil Nadu launched the Chief Minister's Comprehensive Health Insurance Scheme (CMCHIS)[14] – a state-sponsored health insurance scheme targeting families with an annual household income lower than INR 72,000 (or USD 1030).[15] CMCHIS provides non-contributory cashless coverage of explicitly defined diagnostic, secondary, and tertiary procedures at contracted public and private facilities up to a maximum annual amount of INR 100,000 per family (or USD 1430). The scheme covers 15.7 million families in the state.

13.   Public sector administration in Tamil Nadu's health sector has been very successful in increasing the coverage of health services for its citizens and is generally respected as one of the best in the country; however, challenges exist in achieving the next level of performance in the health sector. While Tamil Nadu's HMIS was one of the first to innovate and take a comprehensive approach to collecting and reporting data, it has now become outdated and fragmented. Data are often collected at the facility level but not aggregated automatically on a regular basis. Data are also visible in slices to relevant actors, but all data are not visible to all in the DoHFW. Similarly, the amount of data and information that is accessible by the public is limited to a selection of RCH indicators. This current data structure prevents agility of the health sector to adapt to the growing volume of data and to generate and use data for decision-making. In addition to data challenges, while the directorates and societies are focused on their specific goals and budgeted annual activity plans, they tend to work in silos with little integration and coordination. Centrally-sponsored schemes – especially very critical initiatives on cross-cutting health system strengthening – could also be better integrated into the state's health program for a more efficient approach to service delivery and sector planning. Thus, while performance on basic service delivery has been exemplary in Tamil Nadu – and even innovations on more complex challenges have been rolled out

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[14] The objectives of CMCHIS are to "… provide quality health care to eligible persons through empaneled government and private hospitals and to reduce the financial hardship for enrolled families and move towards universal health care (UHC) by effectively linking with the public health system"

[15] In addition, CMCHIS also provides coverage to families who are members of 26 welfare boards, including agriculture, construction, manual laborers, auto rickshaw drivers, artists, tribal persons, and orphans.

– institutional and systems-oriented improvements to better integrate data, service delivery and management systems would enhance state capacity to take health sector performance to the next level.

4. Government program

14.   The government health program ("p") of Tamil Nadu aims to achieve SDG 3: "to ensure healthy lives and promote well-being for all at all ages." As outlined in Vision 2023, this will require strengthening primary and secondary care centers and upgrading tertiary care hospitals. The vision states that special focus will be given to NCDs using a two-pronged strategy. This will include population-based interventions for raising awareness and preventing NCDs through lifestyle changes; and improving the infrastructure for early detection at treatment in health facilities. Trauma and disaster management systems will be strengthened to ensure a response time of less than an hour.

15.   The government program comprises the work programs implemented by seven of the departments and societies within the DoHFW with a combined estimated budget of US$8.2 billion over the next five years. The key directorates and societies most directly associated with SDG 3 are the Tamil Nadu Health Systems Project (TNHSP Society), Directorate of Public Health and Preventive Medicine (DPH), Directorate of Medical and Rural Health Services (DMRHS), Directorate of Medical Education (DME), Directorate of Indian Medicine and Homeopathy (DIMH), and Tamil Nadu Food Safety and Drug Administration (TNFSDA), and National Health Mission (NHM). Their work programs are critical to the achievement of the SDG 3 targets. The DPH oversees primary health care, while secondary and tertiary care are overseen by the DMRHS and DME, respectively. The TNHSP Society – a society established for the World Bank-funded project in 2005 – is now responsible for administering the 108 emergency ambulance scheme, the CMCHIS, and the Japan International Cooperation Agency (JICA)-funded Tamil Nadu Urban Healthcare Project (TNUHP). The NHM focuses on strengthening public health management and service delivery by providing additional flexible resources which enables innovations at the local level and addressing any gaps in the system. Key areas of focus under the NHM are reproductive, maternal, newborn, child, and adolescent health (RMNCH+A), communicable diseases, NCDs, urban health, mental health, and quality of care. The TNFSDA carries out activities related to drug safety, quality control of drugs, testing food samples, and ensuring safe food for communities. Among the responsibilities of the DIMH and the TNFSDA is the promotion of healthy lifestyles, including through yoga and behavior change campaigns. The TNFSDA is also responsible for salt reduction and tobacco control programs

State Health Policies

16.   To implement *Vision 2023*, the DoHFW develops annual health policy notes which lay out the priority areas and interventions for that year. The NHM has also recently drafted state policies for certain diseases and programs, including policies on blood safety, mental health, and trauma care.

Policy Note 2018-19

17.   The GoTN annually submits a policy note to the state assembly along with the budget. This policy note highlights key objectives of the state government and its different directorates and societies and programs/schemes to be implemented. One of the key focus areas of the 2018–19 policy note is to bridge intradistrict and interdistrict disparities. The approved budget for 2018–19 is US$1.6 billion.

State Trauma Care Policy-2017

18.   The Trauma Care Policy developed in 2017 defines the standards required to manage and operate trauma care centers (TCCs) at various levels of care and offers ways to achieve these standards within the existing health systems architecture. In line with target 3.6 of the SDGs, Tamil Nadu aims to halve the number of deaths and injuries from road traffic accidents by 2023.[16]

19.   The Tamil Nadu Trauma Care Policy identifies a number of objectives, including:

- To ensure definitive treatment for the injured within the 'golden hour'

- To identify and designate TCCs as Level-1, Level-2, or Level-3 centers in Tamil Nadu after a feasibility analysis of existing trauma care facilities with assured referral links under a hub-and-spoke model.

- To establish a State Trauma Surveillance Center with real-time reporting of accident and trauma cases to provide evidence-based decisions for policy formulation on road safety.

- To select government hospitals to function as TCCs.[17]

- To develop rehabilitation units at Level-2 designated centers for rehabilitative care for trauma victims.

- To initiate the development of a state-wide referral network for incremental level of trauma care with both public and private hospitals through empanelment of the CMCHIS.

- To deploy basic life support ambulances Level-4 using an evidence based-approach along the highways and advanced life support ambulances at TCCs for inter facility transfer.

- To initiate IEC/behavior change communication (BCC) activities for educating the public about the risk factors, reducing the incidence of road traffic accident injuries, and spreading awareness regarding injury prevention and road safety.

20.   The policy also clearly defines sources of funding for these interventions. These include funds from the NHM, MoHFW, Ministry of Road Transport and Highways, the state health budget, road safety fund, state planning commission fund, and funds from international organizations (for example, the World Bank and JICA). The proposed funding for the next five years is US$127 million (non-recurring cost of US$71 million and a recurring cost of US$56 million).

Tamil Nadu Mental Health Policy and Implementation Framework

21.   Drafted in 2017, the Mental Health Policy and Implementation Framework is designed to address: (a) access to mental health services; (b) lack of human resources for provision of mental health services; and (c) lack of data to monitor and plan for mental health in the state. The goal of the policy is "to promote mental health and ensure socioeconomic inclusion of persons affected by mental illnesses in Tamil Nadu; provide affordable, accessible treatment and facilities; and to continue to work in partnership with

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[16] Target 3.6 of the SDGs states that the number of global deaths and injuries from road traffic accidents should be halved by 2020.

[17] State government hospitals on national highways, highways connecting two capital cities, connecting major cities other than capital city, connecting ports to capital city, and those that connect industrial townships with capital city will be eligible to become TCCs.

patients and their families to facilitate recovery and reintegration through the provision of comprehensive and community-based mental health services." The framework outlines the following objectives:

- To promote awareness and improve care-seeking behavior in community through effective communication and take proactive steps to reduce stigma

- To promote early diagnosis and treatment by reducing the time taken by patients in accessing health services

- To provide adequate infrastructure and easy access to the public; ensure availability of adequate and essential drug stock throughout the year

- To ensure adequate availability of human resources and encourage training and capacity building of manpower to increase availability and quality of services

- To implement legislative measures to protect, prevent, and ensure optimal mental health and well-being of people in Tamil Nadu

22.   Among the proposed interventions is strengthening the prevention and treatment of substance abuse, including narcotic drug use and harmful use of alcohol. The policy proposes to strengthen the delivery of mental health-related services, including communication and screening at sub-health center (SHC) level, mental health clinics at PHC- and taluk-level hospitals, creation of district-level mental health units and family federations, strengthening of psychiatric department-led outreach clinics and assisted living services, and the development of regional-level specialist facilities for outpatients/inpatients. In areas with no mental health specialists, the policy promotes the adoption of the World Health Organization (WHO) Mental Health Gap Action Program (mhGAP) framework. The proposed five-year funding for the program is US$3 million. Sources of funds include the NHM and the state health budget.

National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS)

23.   The NPCDCS was launched in 2010 with focus on strengthening infrastructure, human resource development, health promotion, early diagnosis, management, and referral. Under the program, NCD cells have been established at the national, state, and district levels for program management. In addition, NCD clinics have been set up at the district and community health center (CHC) levels, to provide services for early diagnosis, treatment, and follow-up for common NCDs. The program fully covers the cost of diagnostic services and drugs for patients attending the NCD clinics. Cardiac Care Units are also being established in identified districts for the provision of emergency cardiac care, while Day Care Centers will provide cancer care. As with other national schemes,[18] 60 percent of the funds are allocated from the center, while the state contributes the remaining 40 percent.

24.   Under the NPCDCS, Tamil Nadu pursues the following strategies:

- Health promotion through behavior change with the involvement of community, civil society, community-based organizations, media, etc.

- Outreach camps for opportunistic screening at all levels in the health system (starting at the sub-center level) for early detection of diabetes, hypertension, and common cancers

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[18] Except for northeastern and hilly states, where the split is 90:10.

- Management of chronic NCDs, especially cancer, diabetes, cardiovascular diseases, and stroke through early diagnosis, treatment, and follow-up through establishment of NCD clinics

- Building capacity at various levels of health care for prevention, early diagnosis, treatment, IEC/BCC, operational research, and rehabilitation.

- Provision of support for diagnosis and cost-effective treatment at primary, secondary, and tertiary levels of health care.

- Provision of support for the development of an NCD database to monitor NCD morbidity, mortality, and risk factors.

5. The Tamil Nadu Health Systems Reform Program (TNHSRP)

25.   The proposed Program ("P") is a well-defined subset of the government program ("p") focusing on achieving SDG targets 3.4, 3.6, 3.7 and 3.8. These targets aim to reduce mortality from NCDs and injuries, ensure universal access to reproductive health services, and ensure to quality services under universal health coverage (UHC). The Program comprises interventions and activities required to achieve SDG targets 3.4, 3.6, 3.7 and 3.8.

26.   The PDO is to improve quality of care and management of NCDs and injuries, especially for the disadvantaged, in Tamil Nadu. To this end, the Program focuses on government facilities—the predominant source of care for the poor and disadvantaged in the state.

27.   The Program is aligned with the government's priorities and will contribute to the GoTN's goal of achieving SDG targets 3.4, 3.6, 3.7, and 3.8 by 2030. The interventions and activities required to achieve these targets are reflected in nine expenditure categories of the 2019-2023 work program of the seven directorates and societies: TNHSP Society, DMRHS, DME, DPH, NHM, DIMH, and the TNFSDA.

28.   The overall expenditure framework of the government program for FY2019–24 is estimated at US$8.2 billion. The total cost of the Program is US$5.277.75 billion, of which the World Bank financing is US$287 million, or 5.44 percent of total Program financing (Figure 7 and Table 2.

29.   The TNHSRP will focus on achieving three results: (a) improved quality of care; (b) enhanced management of NCDs, injuries, and mental health; and (c) reduced equity gaps in reproductive and child health. In addition, the Program will support a set of cross-cutting interventions that contribute to achieving results across the three results areas.

Figure 7. Scope of government program and Program
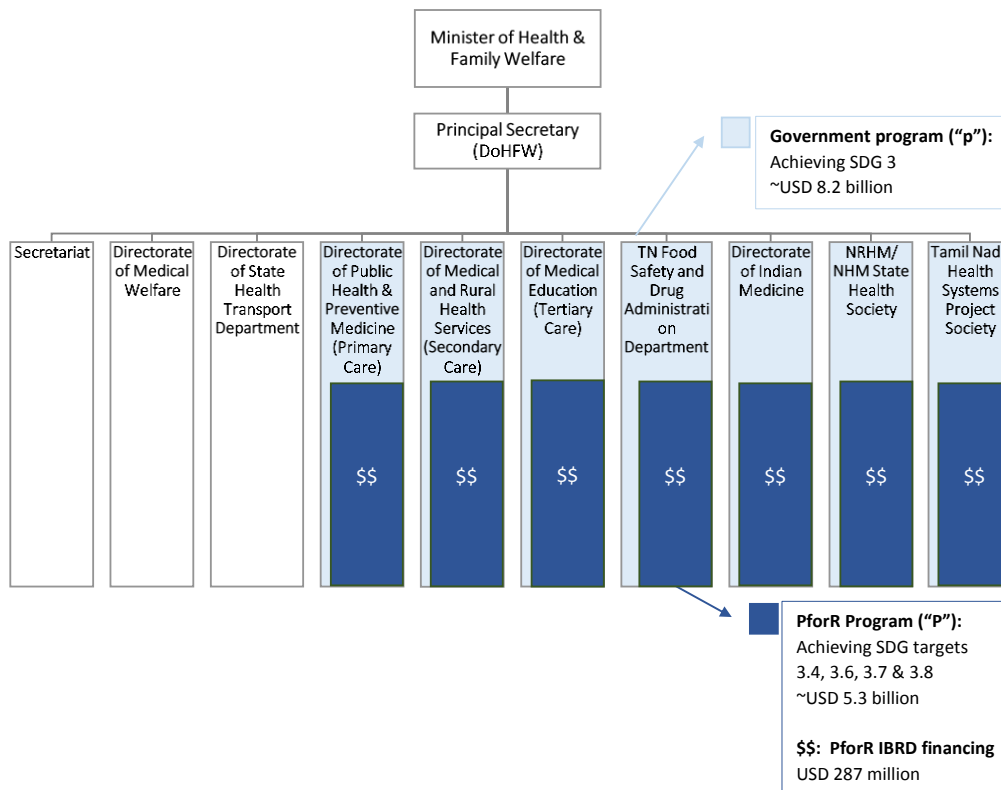
Table 2. Program Financing

Source	Amount (US$, million)	% of Total
Government	4,991	94.56
IBRD PforR loan	287	5.44
Other development partners	0	0
Total Program Costs	**5,278**	**100.0**

6. Strategic Relevance and Soundness of the Program

C1. Result 1: Improved Quality of Care

Situation

30.   The state has made concerted efforts to monitor and improve the quality of care, with a strong focus on quality accreditation of facilities. Two national accreditation programs are pursued by government health facilities: NABH (for primary and secondary care facilities) and NQAS (for tertiary level facilities, i.e. medical colleges). To achieve NQAS certification, facilities undergo periodic assessments. The assessments are based on a checklist that includes 70 standards in eight domains (service provision, patient rights, inputs, support services, clinical services, infection control, quality managements, and outcomes) (Table 3). NQAS is implemented by the NHM, which provides guidance to the DMRHS and DPH for planning and implementing quality assurance activities. State and District Quality Assurance

Committees have been established to monitor quality, and seven regional-level quality assurance units were established in 2016–17. According to the Record of Proceedings 2016–17 issued by the GoI, at least 20 percent of district hospitals and 10 percent of CHCs/block PHCs should be NQAS certified. To date, only 3 district headquarters hospitals and 4 PHCs have received full NQAS certification. No medical colleges have NABH accreditation. All hospitals in the state also participate in Kayakalp — a national-level assessment focusing on cleanliness, waste management, and infection control.

Table 3. Quality of Care Domains in NQAS and NABH

NQAS	NABH
1. Service provision	1. Access, Assessment and Continuity of Care
2. Patient rights	2. Care of Patients
3. Inputs	3. Management of Medication
4. Support services	4. Patient Rights and Education
5. Clinical care	5. Hospital Infection Control
6. Infection control	6. Continual Quality Improvement
7. Quality management	7. Responsibilities of Management
8. Outcome	8. Facility Management and Safety
	9. Human Resource Management
	10. Information Management System

31.   Available data on quality of care points to certain gaps. Although maternal mortality has declined substantially, the high rates of caesarean section in Tamil Nadu are alarming. According to NFHS-4 data, 34 percent of births were delivered by caesarean section. The share is even higher according to NQAS hospital data for state-certified district headquarter hospitals and sub-district hospitals (SDHs) (55.6 percent and 47.5 percent, respectively). While a higher caesarean section rate is expected at district headquarter hospitals given the high share of high-risk pregnancies/obstetric complications (47 percent), only 13.8 percent of pregnancies at SDHs are high risk or have complications (Table 4). A caesarean section can effectively prevent maternal and perinatal mortality and morbidity when there is a medical justification for the intervention. However, evidence shows that there are no benefits of caesarean sections for women and infants not requiring the procedure. In fact, as with other surgeries, a caesarean section increases the risk of infection and carries other longer-term risks, which are higher for women with limited access to comprehensive obstetric care.[19] According to a systematic review conducted by WHO, only 10–15 percent of deliveries should be conducted through caesarean sections.[20]

Table 4. Select Quality Indicators from NQAS State-certified District Headquarter Hospitals and SDHs, 2017–18

	District Headquarter Hospitals	SDH
Bed occupancy rate	99.0%	95.1%
Percentage of high risk pregnancies/obstetric complication	47.0%	13.8%
Caesarean section rate	55.6%	47.5%
Emergency Room death rate	2.2%	—
Referral rate	8.7%	15.2%
Major surgeries per surgeon	18.7	95.9
Average length of stay (days)	4.3	3.4
Surgical site infection rate	0.24%	—

[19] World Health Organization. (2015). WHO statement on caesarean section rates (No. WHO/RHR/15.02). World Health Organization.

[20] Betran, A. P., Torloni, M. R., Zhang, J., Ye, J., Mikolajczyk, R., Deneux-Tharaux, C., ... & Gülmezoglu, A. M. (2015). What is the optimal rate of caesarean section at population level? A systematic review of ecologic studies. Reproductive health, 12(1), 57.

14

32.   Meanwhile, the inpatient mortality rate at DME hospitals was 3.5 percent in 2017, but this ranged from 0 percent to 8.3 percent in the Government Hospital for Thoracic Medicine, Thoppur (Figure 8). Further investigation is needed to determine whether such large differences can be explained by the different case mix and risk profiles of patients.

**Figure 8. Inpatient Death Rate at DME Hospitals, 2017**
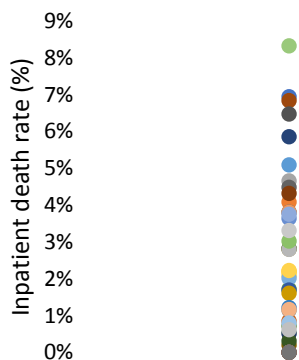
Source: DME
Notes: Each dot represents a DME hospital.

33.   The use of data in clinical decision making and for citizen empowerment remains limited. The HMIS, established under the World Bank-funded TNHSP, is highly fragmented and outdated. Facilities are not incentivized to ensure high-quality data entry, and, as a result, the available data are incomplete. In addition, while the State Health Data Resource Center (SHDRC) compiles data from the HMIS for various directorates, each directorate can only view data related to its own activities. Limited access to data hinders the ability of directorates to collaborate and jointly address identified problems. Moreover, citizens do not have access to key health systems statistics. While a new version of the HMIS is currently being developed, it remains unclear to what extent the new system will ensure integration of existing data systems, transparency, and access to data.

34.   Although the state monitors inpatient satisfaction, the scope of the questionnaire is limited and provides little information on the patient's experience with care and the system's responsiveness to the patient's needs. All district headquarters hospitals in Tamil Nadu participate in Mera Aspaatal—a national-level initiative to measure patient satisfaction at public and empaneled private hospitals. A small sample of patients is randomly selected each month to answer whether s/he was satisfied with the services provided at the hospital. If a patient was not satisfied, s/he is further asked the reasons for dissatisfaction (including long waiting time, non-availability of drugs, cleanliness, and staff behavior). Based on the results of the Mera Aspaatal survey in 2017–18, the majority of patients were satisfied with the overall experience at the hospitals (52 percent reported being very satisfied and 34 percent were satisfied).[21] Only 14 percent of patients said that they were not satisfied with the services provided. The main reason for dissatisfaction was staff behavior (27 percent), followed by cleanliness (15 percent) and cost of treatment (13 percent). Among the other reasons for dissatisfaction were long waiting time (13 percent) and inadequate information (7 percent).

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[21] Sampling for Mera Aspaatal appears to be constrained by the number of patients providing valid phone numbers. In 2017-18, of the 4,432,522 admitted patients, only 99,767 or 2% of admitted patients provided valid phone numbers. Of these, 13,127 were selected to participate in the patient satisfaction survey.

Figure 9. Reasons for Dissatisfaction: Mera Aspaatal 2017–18
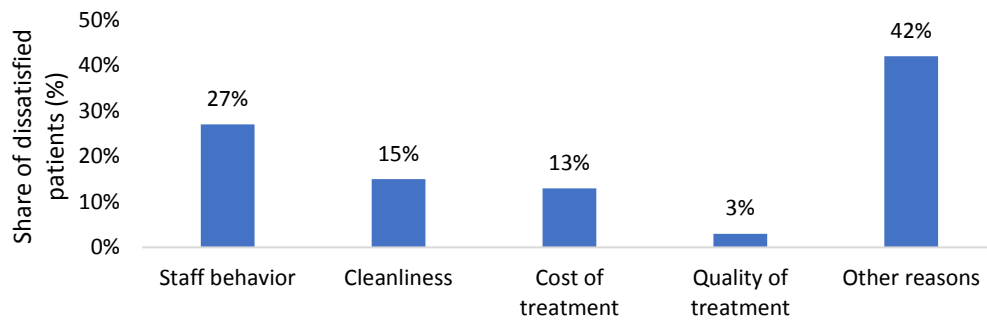
Source: Mera Aspaatal Performance Report for April 1, 2017–March 31, 2018.
Note: Other reasons include long waiting time, inadequate information, lack of amenities, lack of support, and overcrowding.

35.   Continuous medical education (CME) of providers needs to be reformed to ensure that it is in fact continuous and responsive to the changing health needs of the population. The GoTN mandates that all physicians accumulate 30 credits over a five-year period to renew their license to practice in the state. The 30-credit system applies only to physicians (not nurses or paramedics), and there are no annual credit requirements.

International Experience

36.   As highlighted in the Lancet Global Health Commission on High Quality Health Systems in the SDG Era, poor quality of care is now a bigger barrier to reducing mortality than insufficient access.[22] To address the gaps in quality, the Program focuses on a set of results and interventions related to (a) development and adoption of policies, strategies, and guidelines; (b) accreditation of facilities; (c) introduction of quality dashboards; (d) strengthening content and access to the HMIS; (e) introducing performance-based incentives; and (f) improving accountability and empowering citizens through the annual district and state health assemblies. These interventions are aligned with best global practices, and the focus on clinical processes rather than structural interventions is supported by global evidence.[23,24]

37.   Most high-income countries use accreditation to guarantee quality of care and improve patient safety, and accreditation has been shown to result in other quality-improving interventions at the facility-level.[25] While the impact of accreditation on quality of care has been mixed,[26,27,28] studies have found that

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[22] Kruk, M. E., Gage, A. D., Arsenault, C., Jordan, K., Leslie, H. H., Roder-DeWan, S., ... & English, M. (2018). High-quality health systems in the Sustainable Development Goals era: time for a revolution. The Lancet Global Health.

[23] Quality of care encompasses three dimensions: structure (that is, inputs), clinical processes (that is, interaction between health workers and patients), and patient outcomes (that is, clinical outcomes, morbidity, and mortality).

[24] Smith, O., & Nguyen, S. N. (2013). Getting better: improving health system outcomes in Europe and Central Asia. The World Bank.

[25] Desveaux, L., Mitchell, J. I., Shaw, J., & Ivers, N. M. (2017). Understanding the impact of accreditation on quality in healthcare: A grounded theory approach. International Journal for Quality in Health Care, 29(7), 941-947.

[26] Brubakk, K., Vist, G. E., Bukholm, G., Barach, P., & Tjomsland, O. (2015). A systematic review of hospital accreditation: the challenges of measuring complex intervention effects. BMC health services research, 15(1), 280.

[27] Alkhenizan, A., & Shaw, C. (2011). Impact of accreditation on the quality of healthcare services: a systematic review of the literature. Annals of Saudi medicine, 31(4), 407.

[28] Greenfield, D., & Braithwaite, J. (2008). Health sector accreditation research: a systematic review. International journal for quality in health care, 20(3), 172-183.

accreditation often leads to other quality-improving interventions at the facility level.[29] Preparation for accreditation results in significant improvements in the pre-accreditation period. While the pace of improvements plateaus post accreditation, accreditation has been found to have a residual effect—with hospitals performing significantly better three years post-accreditation than they did at baseline.[30]

38.   Publicizing performance data on hospital quality has been found to improve the quality of care by stimulating hospitals to improve their performance and to introduce quality improvement activities.[31,32,33,34] In addition, making data publicly available through quality dashboards is an important way of building trust in the health system. Through the establishment of state and district health forums, the Program also aims to achieve vertical integration of accountability by providing a platform for citizens to engage in health policy.

39.   A systematic review of interventions aimed at improving health worker performance found that while training is effective in improving quality of care, the effect is substantially larger if training is combined with supervision.[35] Implementation of protocols and guidelines has been found to be effective in improving the quality of patient care,[36,37] but evidence suggests the development and dissemination of protocols and guidelines does not automatically lead to implementation.[38] Provider buy-in is critical for ensuring adoption. To increase the chances of implementation, tools must be user friendly, and to the extent possible guideline information should be inserted into clinical processes.[39]

Soundness

40.   The Program aims to address the identified quality-of-care challenges by establishing governance for quality, redesigning service delivery, transforming the health workforce, and igniting population demand for high-quality care. As highlighted in the Lancet Global Health Commission on High Quality Health Systems in the SDG Era, governance is a critical component of high-quality systems and forms the basis of any quality interventions. The Commission recommends the development of policies and guidelines for quality and the compilation of an open-access health system dashboard for monitoring progress toward a high-quality health system.[40]

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[29] Desveaux et al., (2017)

[30] Devkaran, S., & O'Farrell, P. N. (2014). The impact of hospital accreditation on clinical documentation compliance: a life cycle explanation using interrupted time series analysis. BMJ open, 4(8), e005240.

[31] Hibbard, J. H., Stockard, J., & Tusler, M. (2003). Does publicizing hospital performance stimulate quality improvement efforts? Health Affairs, 22(2), 84-94.

[32] Lindenauer, P. K., Remus, D., Roman, S., Rothberg, M. B., Benjamin, E. M., Ma, A., & Bratzler, D. W. (2007). Public reporting and pay for performance in hospital quality improvement. New England Journal of Medicine, 356(5), 486-496.

[33] Fung, C. H., Lim, Y. W., Mattke, S., Damberg, C., & Shekelle, P. G. (2008). Systematic review: the evidence that publishing patient care performance data improves quality of care. Annals of internal medicine, 148(2), 111-123.

[34] Herrera, C. A., Lewin, S., Paulsen, E., Ciapponi, A., Opiyo, N., Pantoja, T., ... & Okwundu, C. I. (2017). Governance arrangements for health systems in low-income countries: an overview of systematic reviews. The Cochrane Library.

[35] Kruk et al. (2018)

[36] Smith and Nguyen (2013)

[37] Prabhakaran, D., Jeemon, P., Mohanan, P. P., Govindan, U., Geevar, Z., Chaturvedi, V., & Reddy, K. S. (2008). Management of acute coronary syndromes in secondary care settings in Kerala: impact of a quality improvement programme. Natl Med J India, 21(3), 107-11.

[38] Steyn, K., Lombard, C., Gwebushe, N., Fourie, J. M., Everett-Murphy, K., Zwarenstein, M., & Levitt, N. S. (2013). Implementation of national guidelines, incorporated within structured diabetes and hypertension records at primary level care in Cape Town, South Africa: a randomised controlled trial. Global health action, 6(1), 20796.
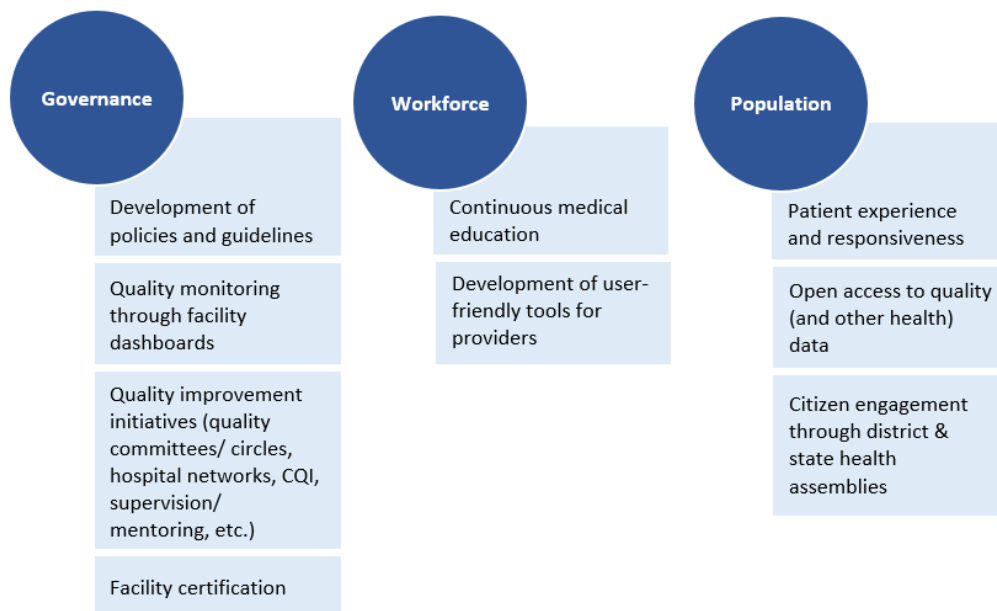
[39] Kruk et al. (2018)

[40] Ibid.

41. A national quality of care strategy will be developed at the early stage of the Program period to provide a coherent framework for quality of care interventions and guide their implementation. The proposed Program adopts a multipronged approach to quality of care. This is highly appropriate because there is no single silver bullet in improving quality of care. The proposed quality of care interventions include:

- Quality of care measurement (facility quality dashboards);
- CME/in-service training;
- Health facility accreditation;
- Use of care standards and protocols;
- Quality improvement initiatives at facility levels;
- Patient experience and involvement;
- Cross-cutting health system interventions to facilitate quality-of-care interventions (HMIS/electronic medical records, operational research, district and state health assemblies/forums, etc.)

Figure 10. Approach for Improving Quality of Care: Focusing on the Three Pillars

Note: The approach is built around the four critical areas for improving quality of care as outlined in the Lancet Global Health Commission on High Quality Health Systems in the SDG Era (Kruk et al. 2018).

42. The approach is built around some of the key universal actions for improving quality of care as outlined in the Lancet Global Health Commission on High Quality Health Systems in the SDG Era: (a) govern for quality; (b) transform the health workforce through competency-based clinical education; and (c) ignite the demand for quality in the population and improve accountability. The Program addresses each pillar through various quality improvement interventions (Figure 10).

43.   Making data publicly available through quality dashboards is an important way of building trust in the health system.[41] Through the establishment of state and district health forums, the Program aims to achieve vertical integration of accountability interventions and to provide a platform for citizens to engage in health policy.[42]

44.   The Program addresses each pillar through various quality improvement interventions. These include developing and disseminating clinical protocols/guidelines; monitoring quality of care using facility dashboards; introducing and scaling up clinical governance and other quality improvement initiatives (quality committees, hospital quality networks, continuous quality improvement or CQI, strengthened supervision/mentoring); facility accreditation; continuous medical education; clinical decision support tools; patient experience surveys; open access to health data including on quality; and citizen engagement through district and state health assemblies. These interventions are aligned with best global practices, and the focus on clinical processes rather than structural interventions is supported by global evidence.[43,44] With respect to accreditation, the Program supports national accreditation for an additional 370 primary-, secondary-, and tertiary-level health facilities in the public sector. Two types of accreditation will be sought: National Quality Assurance Standards (NQAS) for primary- and secondary-level facilities and National Accreditation Board for Hospitals & Healthcare Providers (NABH) for tertiary-level facilities (medical colleges).

45.   Implementing the activities listed above will require expenditures by DPH, DMRHS, DME, TNHSP, and NHM in the following categories: salaries, advertising and publicity, minor works, maintenance, machinery and equipment, materials and supplies, payment for professional and special services, training, computer and accessories, and grant in aid (NHM). The detailed expenditures by directorate and budget head are provided in Section 8.

C2. Result 2: Enhanced Management of Non-Communicable Diseases, Injuries, and Mental Health

Situation

Non-Communicable Diseases

46.   The state employs a two-pronged approach for NCD prevention, detection, and treatment, focusing on both population and facility-based interventions. Many of the activities that were introduced under the TNHSP have been incorporated in the NHM and scaled up across the state.

47.   Coverage of NCD screening has increased considerably, but there is still substantial room for improvement, particularly for screening of breast and cervical cancer. Almost 30 percent of individuals 30 years or older are screened for hypertension and 25.1 percent are screened of diabetes. Meanwhile, 21.8

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[41] The indicators for the quality dashboard will be developed during the Program, but potential indicators to be considered are: institutional (and during transfer) stillbirth and neonatal mortality rate, institutional (and during transfer) maternal mortality rate, perioperative mortality, hospitalizations among children for ambulatory-care sensitive conditions, hospitalizations among adults for ambulatory-care sensitive conditions, 5-year cancer survival (population-based), proportion of patients with cancer considered cured, lower limb amputation among diabetics, and inpatient suicide (Kruk et al. 2018).

[42] Fox, J., Aceron, J., & Guillán, A. (2016). Doing accountability differently. A proposal for the vertical integration of civil society monitoring and advocacy. U4 Issue. Chr. Michelsen Institute (CMI).

[43] Quality of care encompasses three dimensions: structure (that is, inputs), clinical processes (that is, interaction between health workers and patients), and patient outcomes (that is, clinical outcomes, morbidity, and mortality).

[44] Smith, O., & Nguyen, S. N. (2013). Getting better: improving health system outcomes in Europe and Central Asia. The World Bank.

percent and 17.6 percent of women ages 30 or older are screened for breast and cervical cancers, respectively (Figure 11). For comparability purposes, NFHS-4 data show that only 23 percent of women between the ages of 15 and 49 years have ever been screened for cervical cancer, comparable to the national average but substantially below Kerala's share of 61 percent. Screening of breast cancer and the oral cavity are even lower—with only 15 percent and 12 percent of women, respectively, ever screened for these diseases (NFHS-4) (Figure 12). According to data from the NCD app, 10.77 million individuals were screened for hypertension in 2017-18, of which 0.85 million (or approximately 8 percent) were diagnosed with hypertension (Figure 13).

Figure 11. Share of Target Population (30+ years) Screened for Hypertension, Diabetes, Cervical Cancer, and Breast Cancer, 2014–2018
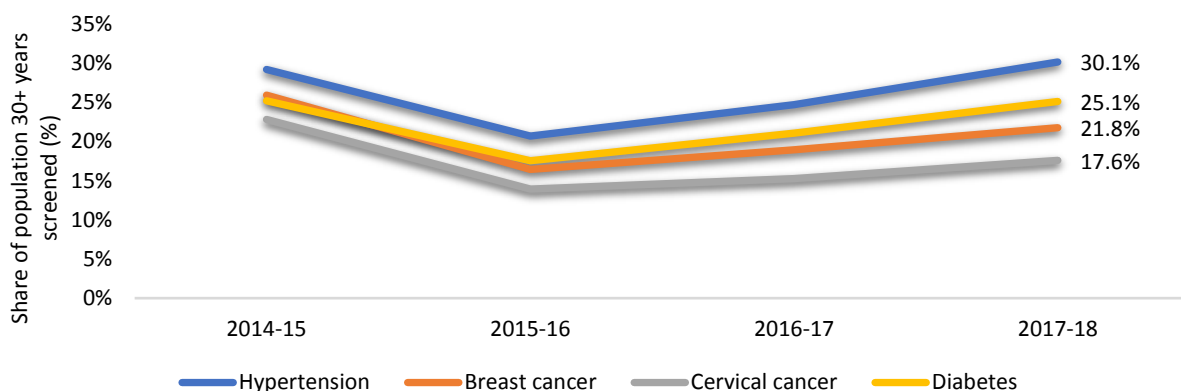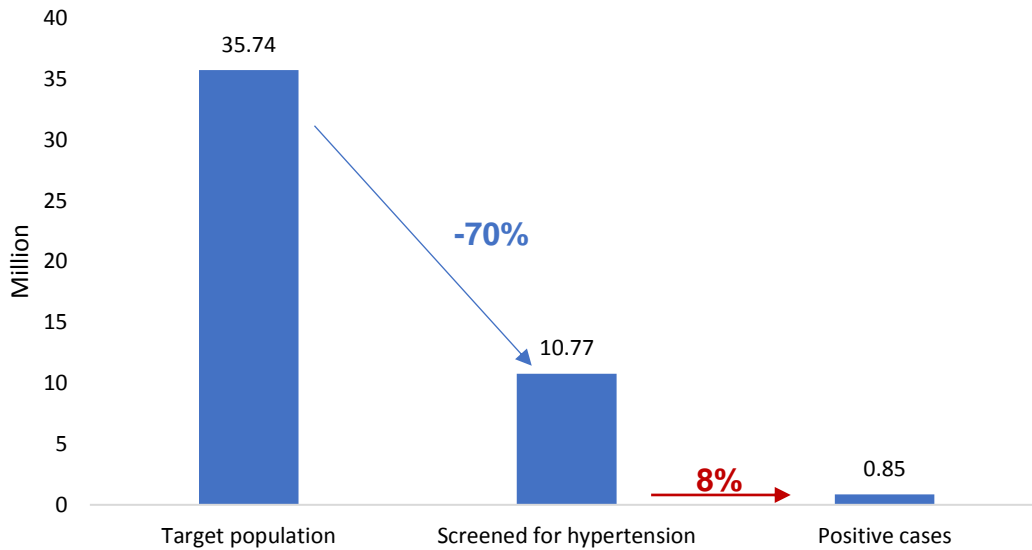

Figure 12. Percentage of Women Ages 15–49 Years Ever Screened for Cervical, Breast, or Oral Cavity Cancer, 2014–15


Source: NHFS-4

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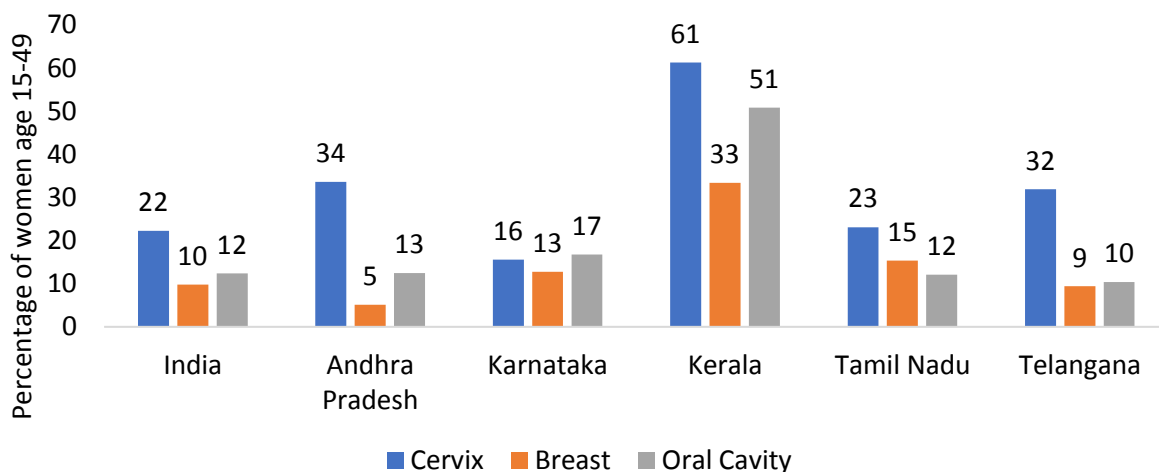
Figure 13. Cascade of Care for Hypertension, 2017–18

Source: NCD app data

48.   Data also point to gaps in the quality of NCD care. Despite recent reductions, the prevalence of smoking remains high, particularly among men. According to data from NFHS-4, while 31.7 percent of men currently use tobacco products, only slightly more than half (52 percent) of those who visited a doctor in the past 12 months were advised to quit smoking. As a comparison, in Karnataka, 80 percent of smokers who visited a doctor in the past year were advised to stop smoking. In addition, while 12 percent and 18 percent of women and men, respectively, were diagnosed with hypertension, less than 2 percent of individuals had it under control (Figure 14). This suggests that approximately 10 percent of individuals with hypertension currently have it under control.

Figure 14. Management of Hypertension Among Women and Men, 2014–15
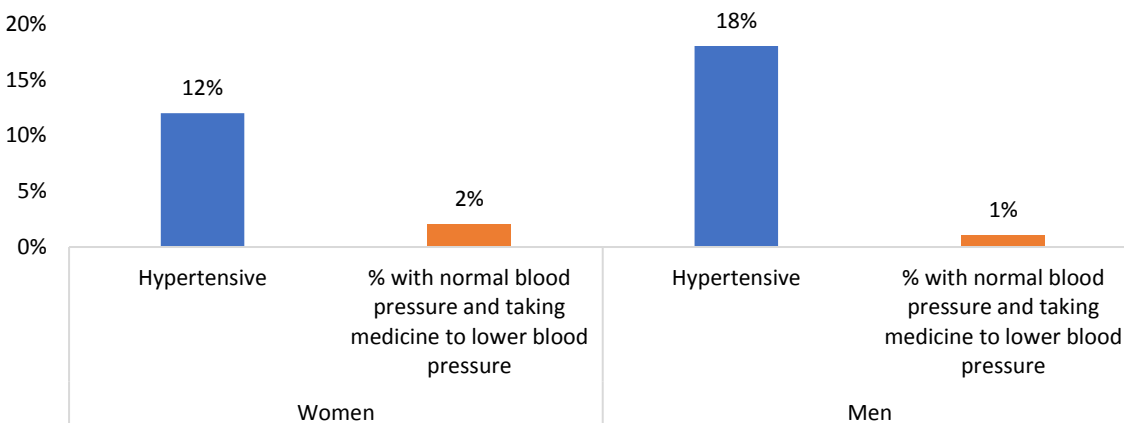
Source: NFHS-4

49.   Substantial gaps remain in the number of human resources allocated for the provision of NCD care. Overall, there are fewer than 0.79 NCD nurses per 10,000 population 30 years or older, but this ranges from 0.09 in Chennai to 1.28 in Perambalur district (Figure 15).

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Figure 15. Number of NCD Nurses per 10,000 Population 30 Years or Older, by District
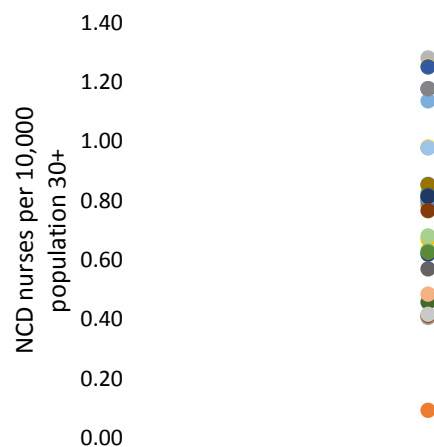

Source: NHM
Notes: Each dot represents a district in Tamil Nadu

50. Tamil Nadu is currently pursuing opportunistic screening but has plans to scale up community-based screening in 2019. All individuals ages 30 years and older attending any government health facility in the state are provided screening, treatment, and follow-up services for hypertension and diabetes mellitus. Women ages 30 or older are also offered cervical and breast cancer services. Under the NPCDCS, new guidelines have also been issued to introduce population- or community-based NCD screening through field functionaries (Accredited Social Health Activist or ASHA, Women Health Volunteers, and Anganwadi Workers. Field functionaries are expected to make house visits, raise awareness of NCDs and risk factors, screen for hypertension and diabetes, and refer to a PHC for further follow-up. Field-level functionaries maintain a record of diagnosed NCD patients to ensure routine follow-up for further tests or treatment. They are also expected to provide group counseling and form patient support groups in the community. Population-based NCD screening is currently being piloted in three districts: Pudukottai, Perambalur, and Krishnagiri, and the second phase of the pilot is expected to begin in July 2018 in Karur and Ramanathapuram districts and Tirunelveli and Coimbatore corporations. The state plans to scale up and integrate the population-based NCD screening program with the establishment of health and wellness centers in 2018–19. The state has also recently developed a user-friendly mobile app for NCD nurses to capture NCD data related to screening of hypertension, diabetes mellitus, and cervical and breast cancer. The app was initially piloted in three districts (Ariyalur, Coimbatore, and Dindigul) and was subsequently introduced in all districts in the state. The app, however, does not currently collect information on treatment and follow-up.

Injuries

51. Tamil Nadu has the highest number of road traffic accident deaths per capita in India. The number of road traffic accident cases has increased significantly since 2011–12, rising from 130,226 to 228,549 cases in 2017–18, although the number of deaths has fluctuated around 16,000 annually over this period. The mortality rate from road traffic accidents at 22.4 deaths per 100,000 population is substantially higher than the India average of 16.6 deaths per 100,000 and is also above rates observed in neighboring countries (Figure 16).

Figure 16. Mortality Rate from Road Traffic Accidents (Deaths per 100,000 Population)
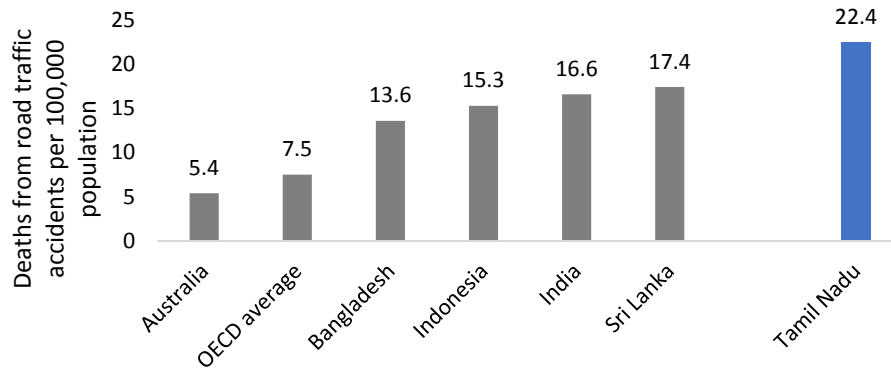
Source: WHO and TN DoHFW

52.   The state has introduced the Tamil Nadu Accident Emergency Care Initiative (TAEI), focusing on the golden hour. Several interventions are implemented in pre-hospital and in-hospital settings to ensure access to care within the golden hour to increase the chances of survival. To ensure timely and accurate response, the state has introduced global positioning system (GPS) devices in ambulances, a user app to locate the latitude and longitude of the caller, 108 Pilot Navigation App, accident grid analysis, and spatial mapping of medical facilities to ensure appropriate referral within the golden hour. Trauma care is currently provided by public hospitals under the directorates of DPH, DMS, and DME. Empaneled CMCHIS private hospitals also deliver trauma services. The Mission Director, State Health Society, NHM is the Commissioner of Trauma Care.

53.   As outlined in the Trauma Care Policy, the state will introduce a four-level trauma care system (Figure 17):

- **Level-1 TCCs** will provide emergency intervention on neuro surgery, plastic and reconstructive surgery, vascular surgery, radiology, orthopedic surgery, general surgery and anesthesiology, and critical care medicine, with a capacity of 30 inpatient beds including 10 intensive care unit (ICU) beds.

- **Level-2 TCCs** will provide emergency interventions on neuro surgery, radiology, orthopedic surgery, general surgery and anesthesiology, and critical care medicine, with a capacity of 20 inpatient beds including 10 ICU beds.

- **Level-3 TCCs** will provide emergency interventions on orthopedic surgery, general surgery and anesthesiology, radiology, and critical care medicine, with a capacity of 10 inpatient beds including 5 ICU beds.

54.   Emergency critical care (ECC) centers have been established to stabilize cases (within 20–45 minutes) before transferring patients to higher-level facilities. ECC centers have advanced life-saving equipment, including ventilators and defibrillators with multi para monitors, and essential lifesaving medicines. Each ECC center employs four emergency care trained medical officers and nurses, working on a shift basis. ECC centers are located at CHCs/SDHs on highways. ECC centers provide the following services: stabilization, triaging, rapid sequence intubation, cardiac resuscitation, fluid resuscitation, pain management, bleeding control, and wound care. ECC centers are implemented at the Government Hospital - Tambaram, PHC Padiyanallur, and Government Hospital - Injambakkam—all located along high

road traffic accident prone highway stretches. The government plans to establish 10 additional ECC centers in public hospitals that are located on the national highways.

Figure 17. Organization of Trauma Care
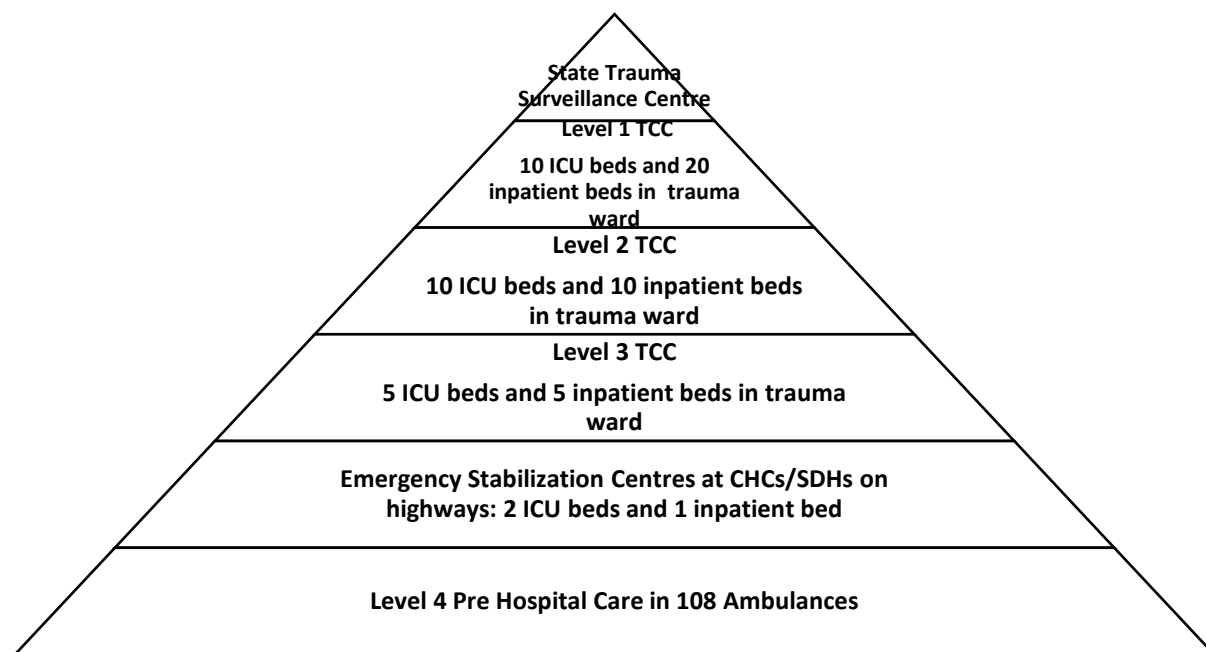
Source: Tamil Nadu Trauma Care Policy

55.   Tamil Nadu operates the 108 ambulance service through a single toll-free number for any medical emergency. Currently, 936 ambulances (equivalent to one ambulance per 77,000 population on average, although the allocation by district ranges from a low of one ambulance per 24,500 people to a high of one per 156,000 people) are operated in all districts of Tamil Nadu, providing basic life support, advanced life support, and neonatal care, and four-wheel drives for hilly, difficult, and hard to reach areas. Each ambulance has one fully trained emergency medical technician (EMT) and a driver trained to provide first aid. The emergency response care physician (ECRP) provides medical advice to the EMT based on the victim's general condition and vital signs. All ambulances are fitted with GPS devices and integrated with the 108 Emergency Response Center. The Dual Tone – Multi Frequency (DTMF) technology allows to determine the callers' location without an internet connection, ensuring precise and time-saving location mapping.

56.   The 108 system provides both pre-hospital emergency and interfacility transfer services. In 2017–18, pregnancy-related emergencies and road traffic accidents were the top two reasons for 108 ambulance services (25 percent) (Table 3.1). Importantly, approximately 41% of the total responses are dedicated to interfacilty transfers (IFTs), while 59% of the responses are pre-hospital calls (529,000 versus 758,000 respectively, for a total of 1,287,000 calls). Compared to other high-functioning EMS systems globally, the percentage of IFTs is quite high and may be an impediment to the ability of the 108 system to respond to pre-hospital emergency calls. On a per capita basis, the total number of calls is low by international standards, with an average of 17.8 calls per 1,000 population (including 7.3 IFTs and 10.5 pre-hospital calls), compared to 80-100 per capita in other systems. This suggests that there may potentially be a large number of calls to which the 108 system is currently not responding. In this respect, the 108 System dispatch center noted that it receives 17,000 calls per day on average (about 6 million annually), while only 1.3 million responses are being made.

57.   The currently available data suggests that this "response gap" is not due to the lack of ambulance availability. The most commonly used metric in this respect is Unit Hour Utilization or UHU, which measures the average number of calls that an ambulance crew does in a 24-hour period. A value of 0.4 or more is considered optimal, although anything over 0.3 is acceptable. The average for Tamil Nadu is just 0.157, ranging from a low of 0.056 to a high of 0.232 (S.D. 0.029, CV 19%). Even Chennai is under 0.2 (0.192). This suggests that there is considerable scope for additional workload without having to substantially increase the number of available ambulances or crews. It has been suggested that the low UHU may be partially due to a large number of long IFTs. While specific data in this regard has not been provided, this would further suggest the need to closely scrutinize and potentially limit the number of IFTs through the use of both more stringent transfer protocols and improved services at the local level which would reduce the need for transfers.

Table . Types of Medical Emergencies Handled by the 108 Ambulance Service (%), 2017–18

Type of Emergencies	Percentage
Pregnancy related	25.08
Road traffic accident	17.75
Acute abdominal pain	8.63
Cardiac related	5.73
Poisoning	4.24
Respiratory	4.53
Assault	3.39
Epilepsy	2.81
Neonatal	1.58
Suicides	0.43
Others	25.83
Total	**100%**

Source: 108 Ambulance

58.   Tamil Nadu employs a color-coded triage system (red/yellow/green). Patients in the emergency room are checked for airway maintenance with cervical spine control; breathing and ventilation; circulation and hemorrhage control; disability, neurological status, consciousness, and focal deficit; and exposure (poison and trauma). Once the patient is stabilized, s/he is transferred to the ICU/emergency operating theater for surgery, admitted to the inpatient ward, or transferred to a higher center for appropriate care (inter-facility transfer). Training of doctors and nurses is conducted under TAEI emphasizing the Airway, Breathing, Circulation, Disability, Exposure (ABCDE) Concept of Early Management of Trauma Reception and Resuscitation according to the existing protocols.

59.   The state's prioritization of trauma care and emergency response is evident in the relatively quick road traffic accident response times. In 2017–18, the average response time for road traffic accidents in urban areas was 11 minutes and 45 seconds and 14 minutes and 24 seconds in rural areas. Notably, the average response time has been reduced by almost 4 minutes since 2014–15 (Figure 18).

Figure 18. Average Road Traffic Accident Response Time in Tamil Nadu (2008–2018)
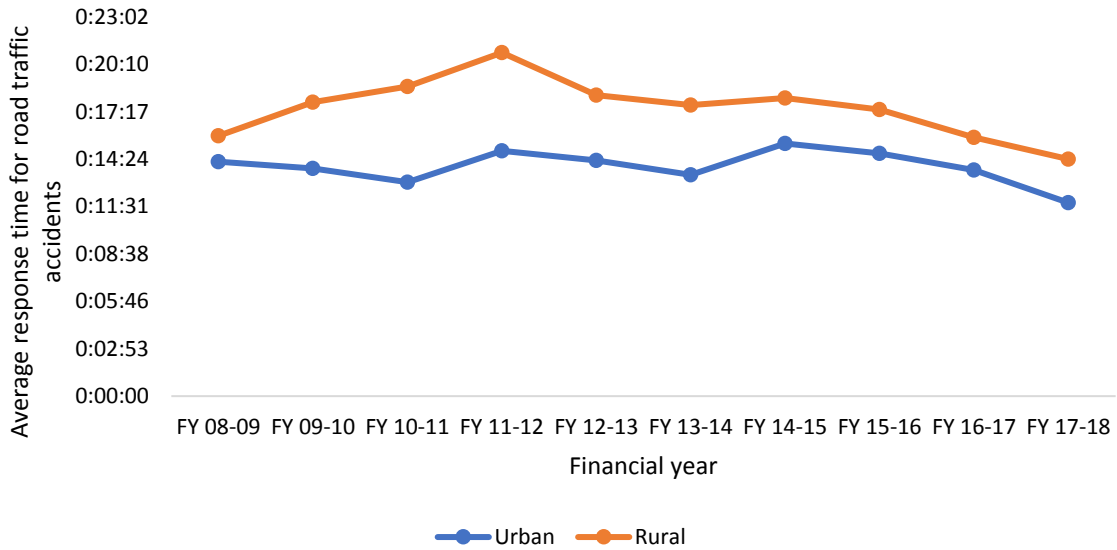
Source: 108 Ambulance

60.   There is, however, significant variation across districts, particularly in urban areas, where the response time ranges from 6 minutes 21 seconds in Kanyakumari district to 20 minutes 30 seconds in Villupuram district. The variation is smaller in rural areas across districts, where the response time ranges from 12 minutes 3 seconds in Namakkal district to 18 minutes 14 seconds in the Nilgris district (Figure 19).

Figure 19. Average Road Traffic Accident Response Time by District, Urban and Rural (FY17–18)
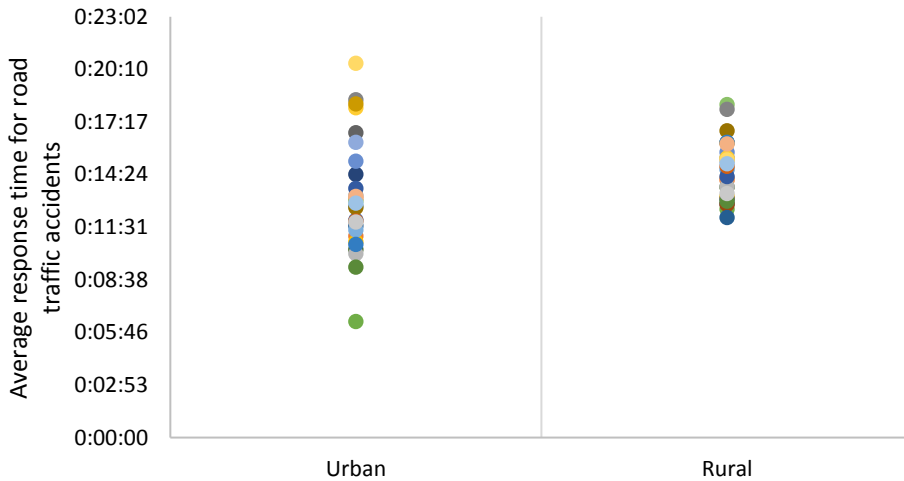
Source: 108 Ambulance
Notes: Each dot represents a district in Tamil Nadu

Mental Health

61.   The National Mental Health Survey estimates that nearly 6.7 million adults (18 years and above) and 380,000 adolescents are likely to be suffering from one or more mental health problems. More than 11 percent of the population suffers from a common mental health problem, including depression, anxiety

disorders, and substance use disorders. About 5 percent of the adult population suffers from depression, and the prevalence of depression is higher among women than men (5.9 percent compared to 2.8 percent). Schizophrenia and other psychotic disorders affect 0.4 percent of the adult population in Tamil Nadu, and the prevalence is highest among 30–39 year olds (0.7 percent) (National Mental Health Survey).

62.   According to the National Crime Records Bureau, in 2014, Tamil Nadu had the second highest suicide rate in—23.4 suicides per 100,000 population—and almost double the national average of 10.6 per 100,000 population (National Mental Health Survey, 2015). Suicide is particularly high among farmers and agricultural laborers—almost 9.4 percent of suicides in India are among this group.

Figure 20. Suicide Attempts in Tamil Nadu, 2008–2018
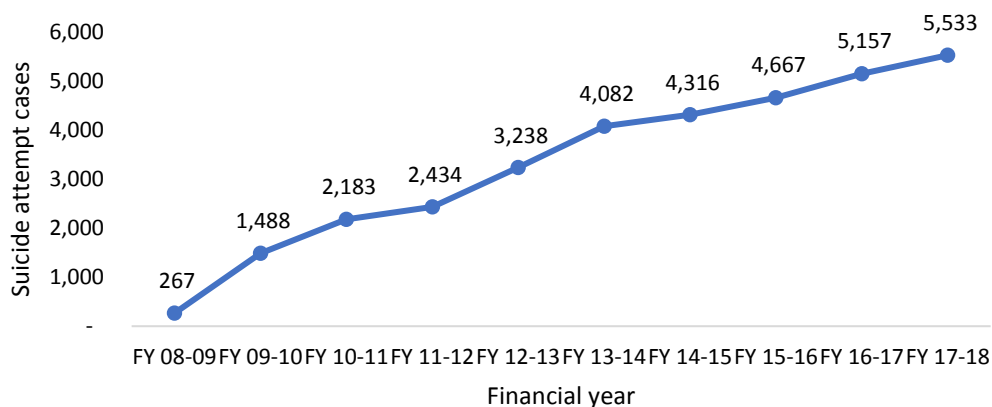
63.   Tamil Nadu is facing a shortage of dedicated mental health providers, such as psychiatrists, psychiatric nurses, psychologists, and counselors. The Mental Health Policy identifies training as the key barrier to addressing mental health in the state. The policy proposes to train health workers (for example medical officers at PHCs) to identify common mood disorders, especially among target groups, such as children and adolescents.

International Experience

64.   The Program aims to address the burden of NCDs, mental health, and injuries by focusing on cost-effective interventions. NCD interventions under the Program focus on the following areas: (a) health promotion and NCD prevention; (b) population-based screening of NCDs among the eligible population; (c) treatment and follow-up; and (d) improving monitoring and evaluation related to NCDs. Screening is essential for early detection of NCDs. Cervical screening, for example, can significantly reduce mortality by early detection and treatment and has been identified as a highly cost-effective intervention in India.[45] Screening of hypertension and treatment with antihypertensive drugs is considered a 'best buy' for NCD prevention and control. Primary prevention is essential for those who are at high risk of NCDs. Evidence shows that control of risk factors is associated with a substantial reduction in cardiovascular mortality.[46] At a minimum, global experience suggests that patients availing health services at facilities should be screened at least once a year (i.e. opportunistic screening).[47] IEC campaigns have been found to be

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[45] Goldie, S. J., Gaffikin, L., Goldhaber-Fiebert, J. D., Gordillo-Tobar, A., Levin, C., Mahé, C., & Wright, T. C. (2005). Cost-effectiveness of cervical-cancer screening in five developing countries. New England Journal of Medicine, 353(20), 2158-2168.
[46] Ford, E. S., & Capewell, S. (2011). Proportion of the decline in cardiovascular mortality disease due to prevention versus treatment: public health versus clinical care. Annual review of public health, 32, 5-22.
[47] Disease Control Priorities 3 (2017)

effective in changing lifestyle behaviors and risk factors. Table 14. summarizes the most effective interventions for changing risk factors based on the findings of a 2009 WHO systematic review.

65.   WHO recommends a pyramid model of organizing mental health services to reduce the cost of mental health treatment and associated stigma and to address the shortage of mental health professionals and increase early detection of mental disorders (Figure 21).

Figure 21. WHO Organizational Pyramid for Mental Health Services
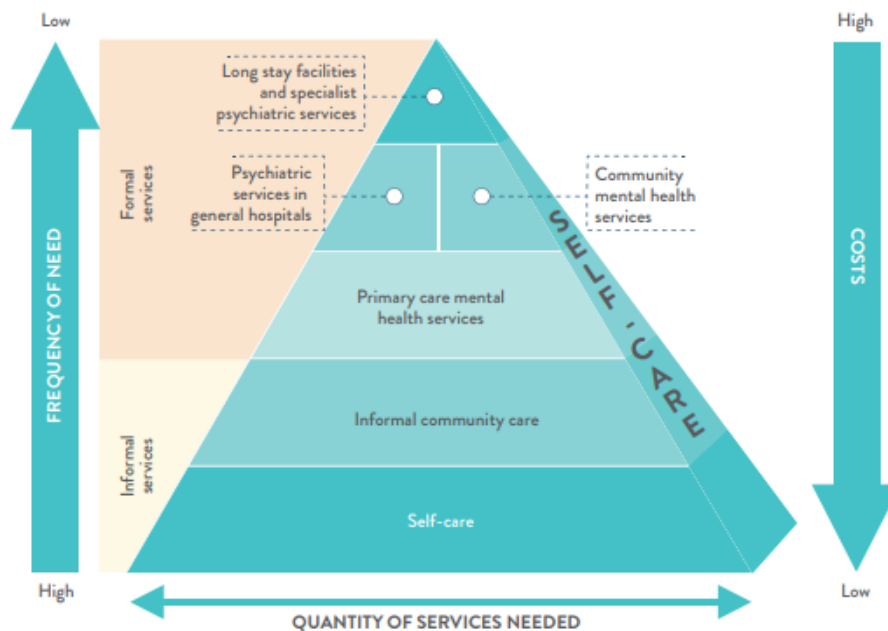
Source: Weissbecker et al. (2017) [48] based on WHO (2009)[49].

66.   Prevention of mental illness has been found to be successful, particularly in the early and subclinical stages. Psychological interventions, including cognitive behavioral therapy, interpersonal therapy, individual counseling, and group sessions, are effective in reducing the incidence of depression, as demonstrated in a meta-analysis of 32 studies.[50] A randomized controlled trial in India found that a collaborative model is particularly effective for severe mental illnesses.[51] Such a model includes proactive case detection, a structured management plan, patient education, systematic monitoring and follow-up, and close collaboration among the patient, a case manager, primary care providers, and specialists. This model, however, is highly dependent on the availability of trained staff, clear protocols and guidelines, and specialist supervision.[52]. Regulations restricting access to common, lethal means of suicide, such as

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[48] Weissbecker, Inka; Khan, Olga; Kondalova, Nataliia; Poole, Laura; Cohen, Jordana T.. (2017). Mental health in transition: assessment and guidance for strengthening integration of mental health into primary health care and community-based service platforms in Ukraine (English). Global Mental Health Initiative. Washington, D.C.: World Bank Group.

[49] World Health Organization (2009). Improving health systems and services for mental health.

[50] van Zoonen, K., Buntrock, C., Ebert, D. D., Smit, F., Reynolds III, C. F., Beekman, A. T., & Cuijpers, P. (2014). Preventing the onset of major depressive disorder: a meta-analytic review of psychological interventions. International journal of epidemiology, 43(2), 318-329.

[51] Chatterjee, S., Naik, S., John, S., Dabholkar, H., Balaji, M., Koschorke, M., ... & McCrone, P. (2014). Effectiveness of a community-based intervention for people with schizophrenia and their caregivers in India (COPSI): a randomised controlled trial. The Lancet, 383(9926), 1385-1394.

[52] Patel, V., Belkin, G. S., Chockalingam, A., Cooper, J., Saxena, S., & Unützer, J. (2013). Grand challenges: integrating mental health

restrictions on pesticides or firearm control, have been shown to decrease suicide rates in high- and lower-middle-income countries.[53] After the ban of all WHO toxicity Class 1 pesticides in 1995 and endosulfan, a Class II toxicity pesticide, in 1998, the suicide rate halved in Sri Lanka between 1996 and 2005.[54] Interventions promoting healthy lifestyles can also help to reduce the risk for dementia later in life, since cardiovascular disease is one of the risk factors.[55]

Soundness

67.   NCD interventions under the Program represent the continuation and further scaling-up of the successful Tamil Nadu NCD initiatives previously supported by the World Bank, mainstreamed into Tamil Nadu's health sector activities and fed into the National Programme for Prevention and Control of Cancers, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS). Tracer conditions for NCD response supported by the Program include hypertension, diabetes, cervical cancer, breast cancer, oral cancer, and mental health. New guidelines have been issued to introduce population-based NCD screening through field functionaries. This population-based screening approach will be integrated with the establishment of health and wellness centers and strengthening of PHCs at the lowest level. In addition, the Program will include the development of NCD care cascades for selected tracer conditions (for example, hypertension and diabetes) for monitoring and response; strengthening of lab services; improving health provider capacity to address mental health; improving data on NCDs and mental health for better planning and management; and strengthening social and behavior change communication (SBCC). A comprehensive SBCC strategy will be developed that includes multiple layers of engagement with patients, health providers, and communities through various channels of communication. As part of the SBCC strategy, patient empowerment mechanisms will be established to transform patients, especially those with chronic conditions, from being passive recipients of care into proactive participants who are equipped with knowledge and skills for self-management of their conditions. While the Program will focus on NCD response within the health sector, the comprehensive NCD response will require a multi-sectoral approach. To facilitate this approach, a multi-sectoral coordination mechanism will be established to support the state's NCD response. Many of the quality of care interventions discussed above will also benefit NCD management.

68.   Given the high prevalence of road traffic accidents and other injuries, the Program scope will include addressing injuries. Tamil Nadu has an advanced Emergency Medical Services (EMS) work plan which adequately covers both pre-hospital and in-hospital EMS. It also has been the pioneer in establishing a robust and well-utilized emergency transport service (108 ambulance service). The 108 system provides both pre-hospital emergency and interfacility transfer (IFT) services. The Program will support the implementation of the EMS work plan, including emphasis on further strengthening the 108 ambulance service to improve pre-hospital care, provision of 24x7 trauma care services at Level 1 and Level 2 emergency departments to improve in-hospital care, and establishment of a trauma registry. Under the Program, training will also be scaled up as part of the Tamil Nadu Accident and Emergency Care Initiative (TAIE) initiative to provide Level 3 and Level 4 training to emergency department trauma care providers and other health care workers to strengthen both pre-hospital and in-hospital care.

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services into priority health care platforms. PloS medicine, 10(5), e1001448.

[53] Van der Feltz-Cornelis, C. M., Sarchiapone, M., Postuvan, V., Volker, D., Roskar, S., Grum, A. T., ... & Ibelshäuser, A. (2011). Best practice elements of multilevel suicide prevention strategies. Crisis.

[54] Gunnell, D., Fernando, R., Hewagama, M., Priyangika, W. D. D., Konradsen, F., & Eddleston, M. (2007). The impact of pesticide regulations on suicide in Sri Lanka. International journal of epidemiology, 36(6), 1235-1242.

[55] DCP3 (2017)

69.   Implementing the activities listed above will require expenditures by DPH, DMRHS, DME, TNHSP, NHM, TNFSDA, and DIMH in the following budget categories: salaries, advertising and publicity, minor works, maintenance, machinery and equipment, materials and supplies, payment for professional and special services, training, computer and accessories, grant in aid (NHM), and grant in aid (TNHSP). The detailed expenditures by directorate and budget head are provided in Section 8.

C3. Result 3: *Reduced Equity Gaps in Reproductive and Child Health*

Situation

70.   At the aggregate level, Tamil Nadu performs well on health indicators relative to other states in India. However, the disaggregated data reveal poorer health outcomes and access to and utilization of health services among tribal populations, the urban poor, and those living in select districts, reflecting socioeconomic, geographic, and ethnic disadvantages. Child mortality, for example, is substantially higher among the ST and those residing in rural areas (Figure 22).

Figure 22. Child Mortality, 2015–16
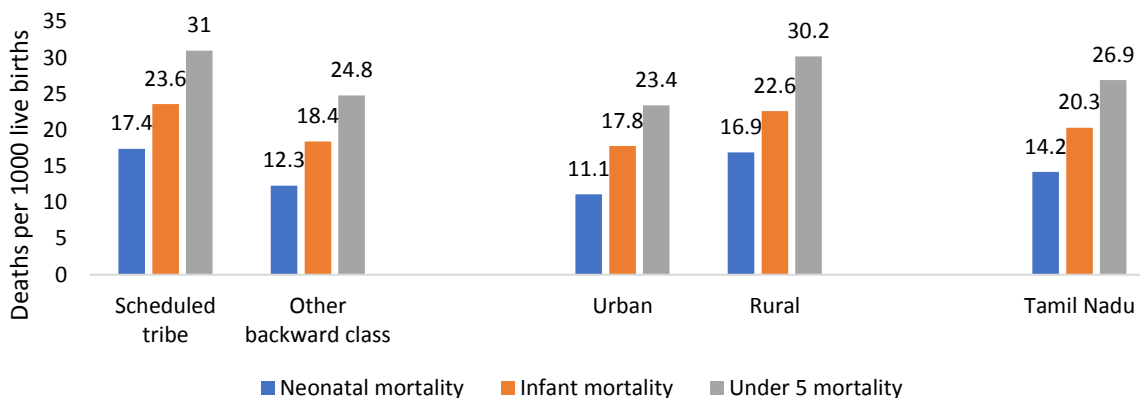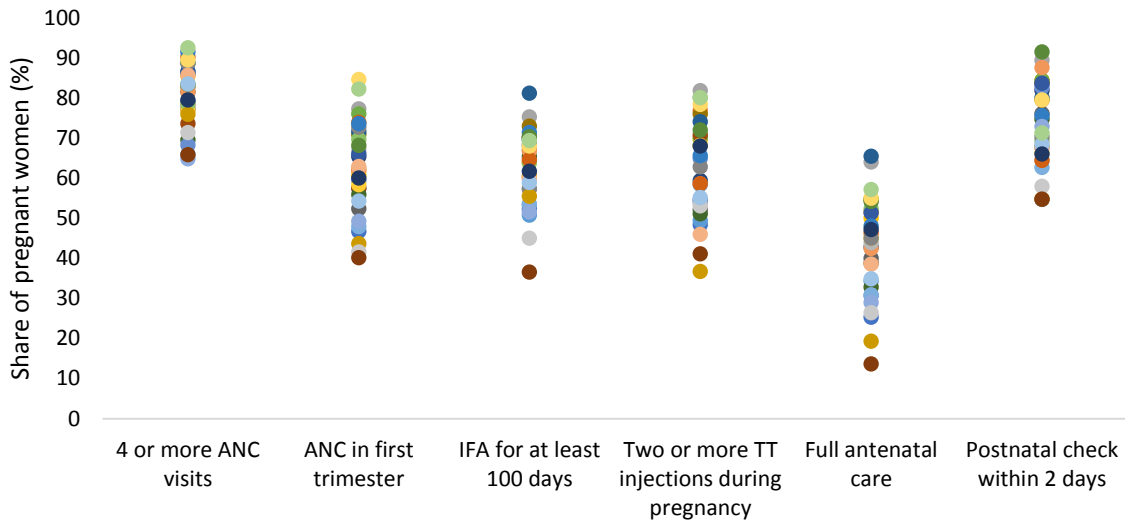

Source: NFHS-4

71.   Quality of ANC also varies by district. While on average only 43 percent of pregnant women receive all recommended services during ANC, this ranges from 14 percent in Virudhunagar to 66 percent in Krishnagiri (Figure 23). Similarly, only 40 percent of women in Virudhunagar seek ANC in the first trimester compared to 84 percent of women in Tiruppur.

**Figure 23. Components of ANC by District, 2015–16**

Note: Each dot represents a district in Tamil Nadu. Full antenatal care includes four or more antenatal checks, at least one tetanus toxoid injection, and iron and folic acid tablets or syrup for 100 days or more.

72.   Similar variation is observed for child health indicators, with coverage of basic vaccination among children 12–23 months ranging from 39 percent in Nagappatinam to 93 percent in Tiruppur. Stunting varies from 17 percent in Kanniyakumari to 37 percent in Ariyalur (Figure 24).

Figure 24. Key Child Health Indicators by District in Tamil Nadu, 2015–16
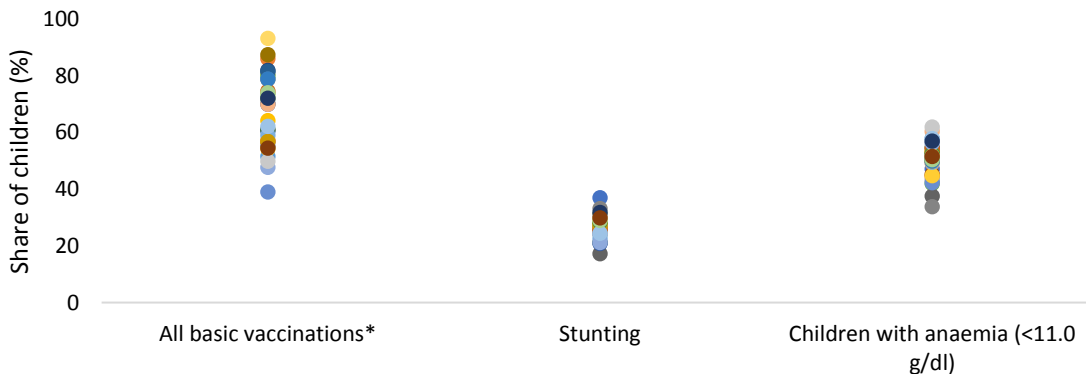
Note: *Vaccinations against tuberculosis, diphtheria, pertussis, tetanus, polio, and measles for children 12–23 months old. Each dot represents a district in Tamil Nadu.

73.   Utilization of health services is slightly lower among the ST. For instance, 77 percent of pregnant women attend four or more ANC visits as compared to the state average of 81 percent. The timing of ANC also differs, with only 56 of pregnant women from ST seeking ANC in the first trimester. While almost all women are given iron and folic acid (IFA) during ANC, uptake of this intervention is low—only half of women from the ST take IFA for at least 100 days during pregnancy (compared to the state average of 64 percent) (Table 5).

Table 5. ANC Services by ST/SC in Tamil Nadu, 2015–16 (%)

	4 or More Visits	ANC in First Trimester	Two or More TT Injections during Pregnancy	IFA for at least 100 Days	Full ANC
SC	79.6	63.4	66.7	61.6	44.2
ST	77	55.5	51	52.8	33.4
Other Backward Class	81.9	64.2	65.3	65.2	45.6
Other	85.6	75.9	64.1	68.9	50.7
Tamil Nadu	**81.2**	**64.0**	**65.4**	**64.0**	**42.7**

Source: NFHS-4
Note: TT = tetanus toxoid.

74.   Notably, screening for cancer is higher among women from ST/SC or Other Backward Classes than those from other castes. Only 17 percent of women from other castes had a cervix exam and 5 percent had an oral cavity exam (compared to the state averages of 23 percent and 12 percent, respectively).

Table 6. Cancer Screening among Women 15–49 Years in Tamil Nadu (%)

	Cervix Exam	Breast Exam	Oral Cavity Exam
SC	22.8	15.6	11.8
ST	24.2	17.6	15.7
Other Backward Class	23.3	15.3	12.4
Other	16.5	14.2	4.6
Tamil Nadu	23.1	15.4	12.1

Source: NFHS-4.

75.   The state provides mobile outreach services for tribal populations through 20 mobile medical units operated by nongovernmental organizations in tribal blocks. The mobile outreach team includes one medical officer, staff nurse, lab technician, and driver and offers minor ailment treatment, antenatal screening, NCD screening, and lab tests. Drugs are also provided free of charge. In addition, they screen for hemoglobinopathies among 10th–12th standard tribal school children and school dropouts. The program has high coverage: in 2017–18, 325,366 outpatients used mobile medical units in tribal areas.

76.   The Program aims to close the equity gaps in RCH outcomes. To address geographic disparities on account of RCH and quality-related issues, special focus will be maintained in nine priority districts which constitute the bottom quintile of the RCH indicators in the state and have a relatively large proportion of tribal population. The six priority districts based on poor performance on RCH indicators are Ariyalur, Ramanathapuram, Theni, Thoothukkudi, Tirunelveli, and Virudhunagar. Table 7 presents the top six and bottom six districts on select RCH services. The three additional districts with relatively large ST populations are Dharmapuri, The Nilgris, and Tiruvannamalai (Table 8).

Table 7. Top 6 and Bottom 6 Districts on Select RCH Services (%)

	District	Modern contraceptive prevalence (%)*	Full antenatal care (%)**	All basic vaccinations (%)***
Top 6 Districts	Tiruppur	63	55	93.2
	Coimbatore	64.7	64	80.7
	Krishnagiri	60.4	65.5	81.6
	Karur	57.1	54.7	87.4
	Chennai	60.1	51.6	86.1
	Vellore	63.5	57.2	74
Bottom 6 Districts	Virudhunagar	23	13.7	54.5
	Thoothukkudi	29.7	29	47.7
	Tirunelveli	35.3	26.4	49.8
	Theni	38.5	19.3	56.8
	Ramanathapuram	25.7	30.9	59
	Ariyalur	35.8	25.3	60.6
Difference between top 6 and bottom 6 districts		30.1	33.9	29.1

Source: NFHS-4

Notes: * Modern methods include male and female sterilization, injectables, intrauterine devices (IUDs/PPIUDs), contraceptive pills, implants, female and male condoms, diaphragm, foam/jelly, the standard days method, the lactational amenorrhoea method, and emergency contraception.
** For the last live birth in the five years preceding the survey, mother received four or more antenatal checks, received at least one tetanus toxoid injection, and took iron and folic acid tablets or syrup for 100 days or more.
*** Vaccinations against tuberculosis, diphtheria, pertussis, tetanus, polio, and measles for children 12–23 months old.

Table 8. Performance of ST Districts on RCH indicators

District	Modern contraceptive prevalence (%)*	Full antenatal care (%)**	All basic vaccinations (%)***
Dharmapuri	54.3	34.3	51.6
The Nilgris	55.8	45.0	78.7
Tiruvannamalai	48.5	34.9	62.1

Source: NFHS-4

Notes: * Modern methods include male and female sterilization, injectables, intrauterine devices (IUDs/PPIUDs), contraceptive pills, implants, female and male condoms, diaphragm, foam/jelly, the standard days method, the lactational amenorrhoea method, and emergency contraception.
** For the last live birth in the five years preceding the survey, mother received four or more antenatal checks, received at least one tetanus toxoid injection, and took iron and folic acid tablets or syrup for 100 days or more.
*** Vaccinations against tuberculosis, diphtheria, pertussis, tetanus, polio, and measles for children 12–23 months old.

Soundness

77.   Interventions in the Program to reduce inequities between districts focus on a combination of supply- and demand-side interventions to support increased utilization of RCH services. The state provides mobile outreach services for tribal populations through 20 mobile medical units operated by nongovernmental organizations in tribal blocks. The mobile outreach team offers minor ailment

treatment, antenatal screening, NCD screening, and lab tests. Drugs are also provided free of charge. Additional supply-side interventions include improved budget allocations for priority districts and better provision of quality RCH services as measured by NQAS accreditation of primary and secondary care facilities. Furthermore, maternity stay wards will be established in remote areas to facilitate continuum of care following before, during and after delivery which will positively impact both immunizations and contraceptive uptake. Other quality of care interventions under Results Area #1 will also benefit RCH services. Demand side interventions include the development and implementation of the SBCC strategy tailored to these priority districts. A household RCH survey will be administered in the priority districts to not only track progress on the service coverage indicators (and DLIs) but also to better assess demand-side barriers over time which will also facilitate course corrections in implementation as needed

78.   Implementing the activities listed above will require expenditures by DPH, DMRHS, TNHSP, and NHM in the following budget categories: salaries, advertising and publicity, minor works, maintenance, machinery and equipment, materials and supplies, payment for professional and special services, training, and grant in aid (NHM). The detailed expenditures by directorate and budget head are provided in Section 8.

C4. Cross-Cutting Initiatives to Strengthen Institutional and State Capacity to Achieve the Above Results

79.   The TNHSRP will strengthen the existing HMIS. The HMIS was established under the TNHSP and comprises the following four components: an HMS, MIS, college management system, and university automation system. Since hospitals are not incentivized to report data, however, quality of data entry is very poor and the number of missing observations is high. The HMS only collects data on outpatient visits (patient's name, age, sex, and dispensed drugs) and does not have any inpatient data. The MIS compiles aggregate facility-level monthly statistics and consists of more than 700 forms and 2,000 reports. The HMS is currently implemented in 263 secondary care hospitals and 22 tertiary care hospitals, while the MIS is functional in 1,889 PHCs, 287 secondary care hospitals, and all medical colleges.

80.   The SHDRC compiles data from the HMIS for various directorates and has simple analytical tools embedded in the platform (for example, creation of charts for various indicators). Currently, each directorate can only view data related to its own activities, and the quality of data is poor. In addition, there are several apps and other data systems collecting data on service provision and utilization that are outside the HMIS, such as the NCD app. The Pregnancy and Infant Cohort Monitoring and Evaluation collects data on ANC, deliveries, postnatal care, and immunization (for children below 16 years). An ID number is issued to the woman at the health care center of the village at the time of ANC registration. As the data are primarily used to monitor utilization of the Muthulakshmi Reddy Maternity Benefit Scheme, entry and quality of data appear to decline substantially after the disbursement of the second payment, which is given at the second ANC visit.

81.   Data are visible in slices to relevant actors, but all data are not visible to all in the health sector. Similarly, the amount of data and information that is accessible by the public is limited to a selection of reproductive and child health indicators. During the implementation of the TNHRSP, strengthening existing data systems will be critical to ensure timely and quality collection of data.

82.   The Program supports cross-cutting initiatives to strengthen institutional and state capacity to achieve the above three areas of results. These interventions aim to improve "how" the sector operates

and complement the technical interventions discussed above in the three results areas ("what" specifically the sector does). As such, these interventions fall along the causal chain of results on quality of care, NCDs and injuries, and RCH equity. Good practices and innovations from Tamil Nadu are being scaled up while others from around the world are being introduced through the Program to improve management of the public health sector, increase transparency, and strengthen accountability. These key "hows" will enable Tamil Nadu to move from a focus on access to an increasing focus on quality of care. These systematic reforms will also better position the state to tackle emerging disease patterns that require a different approach to service delivery while simultaneously closing the remaining gaps on last mile delivery of basic RCH services. Finally, the PforR instrument – with a focus on achievement of outputs and outcomes – will help the sector realign planning, budgeting, expenditures and coordination to defragment implementation and ensure the achievement of results. With this innovative and forward-looking approach, Tamil Nadu will offer lessons learned and set the stage for other states to follow suit. Box 1 provides details about these initiatives and how they will enhance public health sector management.

Box 1: Enhancing Public Sector Management of the Health Sector

There is no universal definition of what 'good management' is. The management literature for both private and public organizations is full of frameworks, examples, and methods for improving the quality of management in organizations. The same applies for the health sector. Health management systems across countries vary substantially, and experts argue about the supremacy of one approach over another to reach objectives of coverage, quality, equity, and efficiency.

Still, despite the variations across organizations and countries, there are several common underlying principles that characterize effective management. These include, among others, strong customer focus; clear mission statement with principles that all staff know and share; staff recognition, empowerment, and training; clear organizational structure with processes that function as a coherent and integrated system; constantly striving for improvement; decision-making based on reliable, relevant, and timely data; and transparency and accountability of its operations.

The health public sector administration in Tamil Nadu has been very successful in increasing the coverage of health services for its citizens and introducing innovative approaches to tackle emerging needs. It ranks third in the country's Health Index[56] and is generally respected as one of the best in the country. However, taking the system from great to excellent will require a change in 'how' the health sector is managed. To improve public sector management, the GoTN has already embarked upon reforms, which are not limited to the health sector alone. For example, the treasury systems of Tamil Nadu are currently being strengthened through the implementation of an Integrated Human Resources and Financial Management System that will bring operational efficiencies in the treasury processes. The system is currently being tested and is expected to be fully operational in FY2019–2020. In addition, the GoTN has slowly started to move toward more transparent procurement processes, including through the decision to implement e-procurement. Given the GoTN's desire to strengthen public sector performance, this Program—as described below—supports not only 'what' interventions but also 'how' interventions to strengthen the common pillars of management.

Shared principles, common vision, and setting benchmarks. The GoTN has been successful in articulating a clear high-level statement for achieving SDG 3 on health and well-being. However, at the organizational and operational levels, a common set of goals and a framework for achievement need to be developed. It is important for all stakeholders in the various directorates to understand how their annual work plans add up and contribute to the DoHFW's medium- and long-term goals. This is critical to make sure that all staff share the same vision and ultimately work toward the same common goals. Benchmarking with quantifiable results-oriented indicators is the next step, and the Program will support this through a number of initiatives, including the development of a

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[56] See http://social.niti.gov.in/health-index

Vision 2023 Health Strategy that will lay out 10-year policy priorities, goals, and quantifiable results indicators to measure progress toward the goals.

Strengthening the content, quality, accessibility, and use of data for decision making. Currently, data sources are not integrated. Data collected at facility level is not consistently and regularly aggregated into one common database, and the reported data is visible in select portions to relevant actors. Furthermore, all data is not visible to all in the DoHFW. Countries around the world have invested heavily in HMIS, including having single patient information records that are shared among physicians and contain historic records. These systems have had very positive effect on the quality of patient care and costs, as well as on management of the health sector. To improve data and its use, the Program will strengthen HMIS, integrate data sources into an online database, and introduce electronic patient medical records.

Increasing transparency and accountability of operations. Public administrations around the world, not only in health but in a variety of sectors, have embarked on sharing performance data and indicators to communicate progress toward previously-stated standards and benchmarks. In the health sector, the GoI introduced this idea with the disclosure of select RCH data by states in an online portal. The Program will support the GoTN build on this with an expanded set of data that will additionally include NCD and quality indicators. In addition, to increase citizen empowerment and accountability of the health sector to its citizens, the Program will support the convening of district and state health assemblies. This will improve voice and agency of citizens through collective action while also raising the visibility of the health concerns and needs of communities.

Better coordination and integration of implementation. The organogram of the Tamil Nadu DoHFW illustrates the 10 budget-holding directorates and societies that need to work together to deliver high quality health services. For example, there are separate directorates for primary, secondary, and tertiary-level facilities as well as for specific disease areas. Centrally-sponsored schemes—especially very critical initiatives on cross-cutting health system strengthening—could also be better integrated into the state's health program for a more efficient approach to service delivery and sector planning. Better coordination and integration would reduce the fragmentation and inefficiencies in the current system and allow for better planning and budgeting across the directorates for harmonization on the front lines of service delivery. The Program will facilitate this by introducing a set of cross-cutting interventions that will bring these vertical entities together to foster greater horizontal integration.

83.   Implementing the activities listed above will require expenditures by DPH, DMRHS, DME, TNHSP, NHM, TNFSDA, and DIMH in the following budget categories: salaries, advertising and publicity, payment for professional and special services, training, and grant in aid (NHM).

7.   Institutional Arrangements and Capacity

84.   The GoTN has adequate capacity to implement the Program. The TNHSP Society, established for the World Bank-funded project in 2005, will be the coordinator of Program activities and will be responsible for reporting on results. The Program is designed to reduce the organizational fragmentation in the department and will promote collaboration between directorates to achieve results. The Program will improve governance of the health sector and strengthen the capacity of the directorates through systematic, cross-cutting reforms. These include (a) strengthening the HMIS; (b) increasing transparency and accountability with the use of data; and (c) strengthening health administration and management at different levels, including improving integration/coordination between different health directorates. Citizen participation will be promoted through the establishment of the state and district health assemblies. In addition, the Program will support operational, implementation, and health system research to inform decision making, generating lessons for Tamil Nadu as well as other states.

85.   Within the DoHFW, a few of the directorates and societies are the critical actors in implementation of activities and achievement of results. In addition to implementing some activities, the

TNHSP Society will be the coordinator of Program activities and will be responsible for reporting on results. The TNHSP Society will also hire the third-party IVA which will apply the verification protocol to verify that the DLIs have been achieved. The TNHSP Society DPH DMRHS, DME, and NHM will be responsible for implementing activities related to quality of care improvements (Result 1). The TNHSP Society, DPH, DMRHS, DME, NHM, TNFSDA, and DIMH will be responsible for implementing activities related to NCDs and injuries (Result 2). The TNHSP Society, DPH, and NHM will be primarily responsible for implementing the activities related to closing equity gaps (Result 3). All seven Program directorates (DPH, DMRHS, DME, TNHSP, NHM, TNFSDA, and DIMH) will be responsible for implementing cross-cutting initiatives. The DoF will provide budget and political support to the DoHFW in implementing the government program and receive the transfers linked to the achieved DLIs.

86. To facilitate this coordination function, a TNHSRP PMU will be formed within the TNHSP Society. A GoTN order has been issued for the TNHSRP PMU with sanctioned posts. In addition, two high-level committees will be established to guide the Program. An Empowered Committee (EC) will be headed by the Chief Secretary of Tamil Nadu and consist of members from the Departments of Finance, Planning and Development and HFW. The EC will meet twice a year to take crucial administrative and financial decisions for the Program. A Program Steering Committee (PSC) will also be established to provide government oversight over the Program. The PSC will be chaired by the Principal Secretary, DOHFW and include representatives from the DoF and DOHFW. It will meet at least every quarter to monitor progress and address implementation bottlenecks. The PMU will also play the role of Secretariat to support both the EC and PSC.

8. Assessing the Program Expenditure Framework

87. Tamil Nadu's health budget for FY2018–19 is INR 113.3 billion (US$1.6 billion), representing about 5.8 percent of the total GoTN spending for FY2018–19 of INR 1,937.42 billion (US$27.7 billion). The overall expenditure framework of the government program for FY2019–24 is estimated at US$8.2 billion. The overall expenditure framework of the Program for FY2019–24 is estimated at US$5.278 billion, of which the World Bank financing is US$287 million, or 5.44 percent of the total Program financing. The Program cost includes costs of the ongoing reforms and operational costs attributable to the operation. The expenditure program is based on directorate-level work plans designed to achieve the DLIs and the overall results. The expenditure proposed for individual activities is commensurate with their scale and complexity and facilitates efficient execution. The Program Expenditure Framework strikes a balance between reform actions such as capacity building, recurring expenditure, and asset creation. The majority (65 percent) of Program costs are recurrent salary expenditures. Other program costs include advertising and publicity, maintenance, machinery and equipment, materials and supplies, payments for professional and special services, training, computers, and accessories. Table 9 shows the overall Program composition by entity/department involved and by detailed budget head (expenditure category), and

Budget Details		Directorates and Societies (USD, million)							Amount in USD, millions
Detailed Budget Head	Category of Expenditure	DMRHS	DME	DPHPM	TNFSDAD	DIMH	NHM Society	TNHSP Society	Total 1 year (FY2018-19)
1	Salaries	138	288	255	10	30	-	0	**722**
8	Advertising & Publicity	0	0	0	0	0	-	-	**1**
17	Minor Works	-	-	-	-	-	-	-	**-**
18	Maintenance	4	5	4	0	0	-	-	**13**

Budget Details		Directorates and Societies (USD, million)							Amount in USD, millions
Detailed Budget Head	Category of Expenditure	DMRHS	DME	DPHPM	TNFSDAD	DIMH	NHM Society	TNHSP Society	Total 1 year (FY2018-19)
19	Machinery & Equipment	0	11	0	0	0	-	0	**11**
24	Materials & Supplies	-	0	16	0	0	-	-	**17**
33	Payment for Professional & Special Services	10	24	3	0	0	-	0	**37**
72	Training	0	0	0	0	-	-	-	**0**
76	Computer & Accessories	0	0	0	0	0	-	0	**0**
9	Grant in Aid	-	-	-	-	-	160	12	**172**
	Total 1 year* (US$, millions)	**152**	**329**	**279**	**11**	**30**	**160**	**12**	**974**
	Total 5 years (US$, millions)**	**824**	**1,785**	**1,514**	**58**	**165**	**865**	**67**	**5,278**

*FY 2018-19 budget

**Including an expected increase of USD 410m over 5 years

88.   Table 10 shows the composition of Program financing by source of financing. Funding predictability is high, and risks to the Program Expenditure Framework arising out of budget constraints are considered moderate because the Program expenditure constitutes a relatively small portion of the overall Tamil Nadu state budget and is well-aligned with the government priorities.

Table 9. Program Budget Composition by Directorate/Society and Expenditure Categories

Budget Details		Directorates and Societies (USD, million)							Amount in USD, millions
Detailed Budget Head	Category of Expenditure	DMRHS	DME	DPHPM	TNFSDAD	DIMH	NHM Society	TNHSP Society	Total 1 year (FY2018-19)
1	Salaries	138	288	255	10	30	-	0	**722**
8	Advertising & Publicity	0	0	0	0	0	-	-	**1**
17	Minor Works	-	-	-	-	-	-	-	**-**
18	Maintenance	4	5	4	0	0	-	-	**13**
19	Machinery & Equipment	0	11	0	0	0	-	0	**11**
24	Materials & Supplies	-	0	16	0	0	-	-	**17**
33	Payment for Professional & Special Services	10	24	3	0	0	-	0	**37**
72	Training	0	0	0	0	-	-	-	**0**
76	Computer & Accessories	0	0	0	0	0	-	0	**0**
9	Grant in Aid	-	-	-	-	-	160	12	**172**
	Total 1 year* (US$, millions)	**152**	**329**	**279**	**11**	**30**	**160**	**12**	**974**
	Total 5 years (US$, millions)**	**824**	**1,785**	**1,514**	**58**	**165**	**865**	**67**	**5,278**

*FY 2018-19 budget
**Including an expected increase of USD 410m over 5 years

Table 10. Program Financing by Source of Financing

Source	Amount (USD, millions)	% of Total
Government financing*	4,990.75	94.56
PforR IBRD financing	287	5.44
Other development partners	0	0
Total Program Costs	**5,277.75**	**100.0**

*Including an expected increase of USD 123m over 5 years

89.   Overall funding to the health sector in Tamil Nadu has shown an increase from INR 84.7 billion (US$1.2 billion) for FY2015–16 to INR 113.3 billion (US$1.6 billion) for FY2018–19. This is equivalent to an annual increase of over 10 percent on average in nominal terms, while the average annual inflation at the national level during the same time period was about 5 percent per year, showing GoTN's commitment to ensure significant real increases in the health budget. The actual health sector budget execution for the most recent three years shows an actual budget outturn of within 5% of the originally approved budget for two of the three years (Table 11), thus corresponding to a best Public Expenditure and Financial Accountability (PEFA) Performance Indicator PI-1 rating of "A".

Table 11. Original Health Budget versus Actual Expenditures, 2015-18

	FY 15-16	FY 16-17	FY 17-18
Actual Expenditure (million Rs)	84,680	84,310	105,820
Original Budget (million Rs)	82,450	90,720	101,570
Budget Outturn	103%	93%	104%

Note: The actual amounts for FY 17-18 are not yet audited. The average yearly USD/Rs exchange rates for the past 3 fiscal years (FY 2015-18) were: 61.14; 65.47; and 67.07, respectively (Source: Reserve Bank of India).

9.   Economic Analysis

90.   An economic analysis was conducted to estimate the overall impact of the Program on health (using disability-adjusted life years [DALYs]). The cost-benefits of the project were calculated for a 20-year period (2019–2038) using three scenarios (baseline, low, and high). The total cost of the Program is US$5.278 billion, of which the World Bank financing is US$287 million.

91.   The assumptions used in the cost-benefit analysis are listed below and summarized in Table 12.

- **Basic discount rate.** Financial costs (project costs) and financial savings (from project interventions) were discounted at 4.5 percent to account for future inflation and the time value of money. A higher discount rate of 6.5 percent was used in the high scenario.

- **Health benefits.** The health benefits were calculated based on the potential reductions in DALYs related to NCDs. DALYs for Tamil Nadu were obtained from the Institute for Health Metrics and Evaluation India Global Burden of Disease Study for 2016 and were projected until 2038 based on historical trends between 2006 and 2016. We assumed that the Program would reduce NCD DALYs by up to 1 percent annually (reduction of 0 in the first year and

decreasing returns after 2028), and that the quality interventions would result in reductions in overall DALYs by up to 0.5 percent.

- **Monetary value of health benefits.** In the baseline and low scenarios, each DALY was valued at GDP per capita (US$2,590 in 2018). In the high scenario, we assigned each DALY a value of three times the per capita GDP as commonly used in the benefit-cost analysis literature.[57]

- **Discount rate of the monetary value of future health benefits.** The monetary value of the future stream of health benefits (annual DALYs averted) is discounted at 3 percent based on the recommendations outlined by WHO and the Disease Control Priorities Project. In the low scenario, the discount rate is set at 5 percent.

Table 12. Key Inputs and Assumptions Used for the Cost-Benefit Analysis

Key Inputs	Baseline Scenario Assumptions	Sensitivity Analysis	
		Low Scenario	High Scenario
Monetary value of DALY	1 x GDP per capita	1 x GDP per capita	3 x GDP per capita
Discount rate of the monetary value of future health benefits	3%	5%	3%
Basic discount rate	7.5% (4% inflation; 3% time value of money)	4.5%	10.5%
GDP growth rate	7.5% (growth rate in 2013–14)	5%	10% (average growth rate envisioned in Vision 2023)
Benefits of interventions in terms of DALYs averted	**Improved quality of care:** up to 0.5% reduction in DALYs **NCD-related interventions:** up to 1% reduction in NCD DALYs	**Improved quality of care:** up to 0.5% reduction in DALYs **NCD-related interventions:** up to 1% reduction in NCD DALYs	**Improved quality of care:** up to 0.5% reduction in DALYs **NCD-related interventions:** up to 1% reduction in NCD DALYs

92. Figure 25 shows the number of DALYs averted per year between 2018 and 2038 under the baseline scenario.

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[57] Chang, A., S. Horton, and D. T. Jamison (2018). "Benefit-Cost Analysis in Disease Control Priorities, Third Edition." In Disease Control Priorities (third edition): Volume 9, Improving Health and Reducing Poverty, edited by D. T. Jamison, H. Gelband, S. Horton, P. Jha, R. Laxminarayan, C. N. Mock, and R. Nugent. Washington, DC: World Bank

Figure 25. Estimated DALYs Averted under the Baseline Scenario
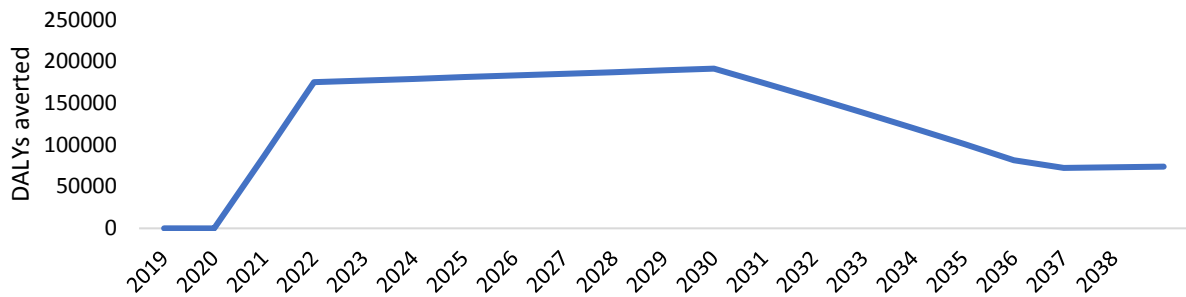
93.   Table 13 presents the results of the economic analysis. Under the baseline scenario, the benefit-cost ratio (BCR) is 2.04; internal rate of return (IRR) is 9 percent, and the net present value (NPV) of the project is US$4.743 billion. Even under the low scenario, the project demonstrates a significant development impact: BCR of 1.77, IRR of 5 percent, and NPV of US$3.132 billion.

94.   It is important to note that even the baseline scenario is conservative and likely to underestimate the full impact of the Program, as it does not include the potential impact of several cross-cutting interventions and the improvements in the equity results related to MCH.

Table 13. Results of the Economic Analysis

	Baseline Scenario	Low Scenario	High Scenario
BCR	2.04	1.77	4.10
IRR (%)	9	5	16
NPV (US$, billions)	4.743	3.132	13.629

95.   In addition to the direct health benefits of NCD and quality interventions, the Program is likely to bring additional indirect economic benefits. The global economic burden of NCDs has been estimated to amount to US$47 trillion between 2010 and 2030 (in real 2010 U.S. dollar).[58] This is equivalent to a loss of approximately 5 percent of GDP per year. Mental health and cardiovascular diseases are estimated to account for almost 70 percent of lost output. In low- and middle-income countries (LMICs), the four main NCDs would cost more than US$7 trillion (in 2008 U.S. dollars) in output between 2011 and 2025.[59] Poor health affects economic growth through reduced productivity, negative expectations about employment, and increased rates of early retirement. In addition, it leads to higher expenditures in the health system. In short, NCDs divert savings from capital investment into health care, while mortality reduces the stock of available labor supply. Given the substantial economic consequences, the World Economic Forum has ranked NCDs among the top global threats to economic development.[60] Reducing the mortality rate for ischemic heart disease and stroke by 10 percent is estimated to reduce economic losses in LMICs by US$25 billion annually—triple the investment required for the interventions to achieve this result (WHO 2011).

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[58] Bloom, D. E., Cafiero-Fonseca, E. T., McGovern, M. E., Prettner, K., Stanciole, A., Weiss, J., ... & Rosenberg, L. (2014). The macroeconomic impact of non-communicable diseases in China and India: Estimates, projections, and comparisons. The Journal of the Economics of Ageing, 4, 100-111.

[59] Bloom, D.E., Cafiero, E.T., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L.R., Fathima, S., Feigl, A.B., Gaziano, T., Mowafi, M., Pandya, A., Prettner, K., Rosenberg, L., Seligman, B., Stein, A.Z., & Weinstein, C. (2011). The Global Economic Burden of Noncommunicable Diseases. Geneva: World Economic Forum.

[60] World Economic Forum (2010). Global risks 2010: a global risk network report.

Based on the results of the WHO EPIC model, the total economic cost of NCDs and mental health in India will amount to US$4.58 trillion (in 2010 U.S. dollars) between 2012 and 2030.[61] Other studies have estimated the cost to be between 4 percent and 10 percent of GDP.[62,63]

96.   In addition to the productivity losses associated with NCDs, chronic diseases can lead to impoverishment due to the high associated health expenses. Chronic diseases require longer periods of inpatient, outpatient, and drug treatment than acute communicable diseases.[64] Yet most LMICs offer limited financial protection for chronic diseases. In India, for example, Engelgau et al. (2012) found that hospitalization for NCDs was more likely to put households at risk of impoverishment than hospitalization for communicable diseases.[65] Cardiovascular diseases led to catastrophic expenditure for 25 percent of Indian households and drove 10 percent of families into poverty.[66] By preventing, detecting, and treating NCDs, in addition to improving health outcomes, the Program is also expected to avert some of the macroeconomic and microeconomic costs of NCDs.

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[61] Bloom et al. (2014)

[62] Thakur, J. S., Prinja, S., Garg, C. C., Mendis, S., & Menabde, N. (2011). Social and economic implications of noncommunicable diseases in India. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine, 36(Suppl1), S13.

[63] Mahal, A., Karan, A., & Engelgau, M. (2010). The economic implications of non-communicable disease for India. HNP Discussion Paper. World Bank: Washington, DC.

[64] Kankeu, H. T., Saksena, P., Xu, K., & Evans, D. B. (2013). The financial burden from non-communicable diseases in low-and middle-income countries: a literature review. *Health Research Policy and Systems*, *11*(1), 31.

[65] Engelgau, M. M., Karan, A., & Mahal, A. (2012). The economic impact of non-communicable diseases on households in India. *Globalization and health*, *8*(1), 9.

[66] Mahal et al. (2010)

Figure 26. Example of a High Quality Health System Dashboard
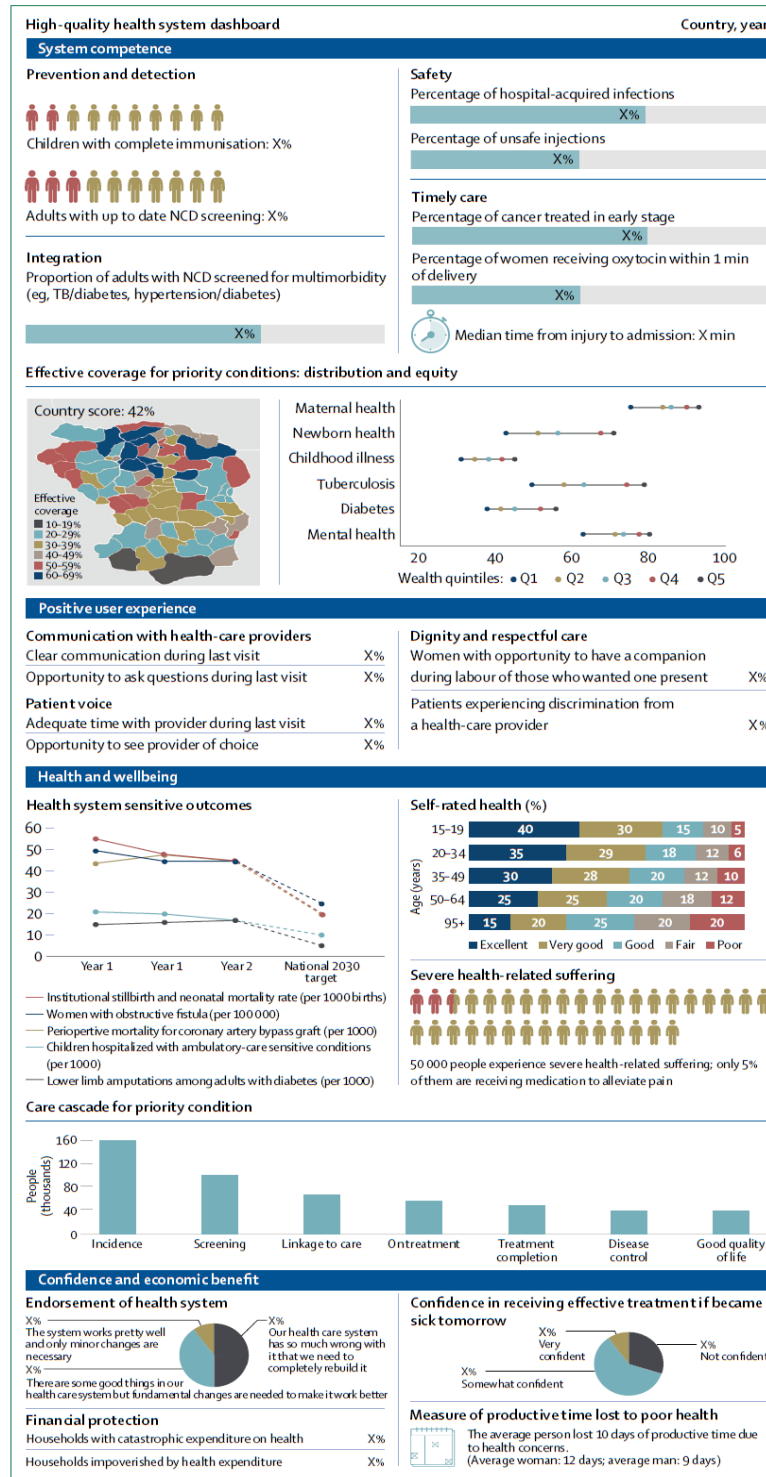
Source: Kruk et al. (2018).

Table 14. Interventions on Diet and Physical Activity: Summary Results from a Systematic Review

Settings	Impacts	Examples
Policy and environment	Effective interventions	• Government regulatory policies to support a healthier composition of staple foods (e.g. replacing palm with soya oil reduces the saturated fatty acid content of the oil). • Environmental interventions targeting the built environment, policies that reduce barriers to physical activity, transport policies, and policies to increase space for recreational activity. • Point-of-decision prompts to encourage using the stairs (e.g. information on the benefits of physical activity beside elevators and stairs)
	Moderately effective interventions	• Pricing strategies (fiscal policies) and point-of-purchase prompts in grocery stores, vending machines, cafeterias, and restaurants to support healthier choices • Multi-targeted approaches to encourage walking and cycling to school, healthier commuting, and leisure activities
Mass media	Effective interventions	• Mass media campaigns promoting physical activity: with community-based, supportive activities such as programs in schools and local communities; or associated with policies to address local environmental barriers to participation
	Moderately effective interventions	• Intensive mass media campaigns using one simple message, e.g. increasing consumption of low-fat milk, or fruit and vegetables • National 'health brand' or logos to assist consumers to make healthy food choices • Long-term, intensive mass media campaigns promoting healthy diets

School settings	Effective interventions	• High-intensity school-based interventions that focus on diet and/or physical activity, are comprehensive, multi-component and include:
		  o Curriculum on diet and/or physical activity taught by trained teachers
		  o Supportive school environment/policies
		  o A physical activity program
		  o A parental/family component
		  o Healthy food options available through school food services: cafeteria, vending machines, etc.

	Moderately effective interventions	• A focused approach, for example programs aimed at reducing sedentary behavior and increasing participation in physical activity, accompanied by supportive activities within the curriculum • A formative assessment that addresses the needs of the school and cultural contexts

Workplace	Effective interventions	• Multi-component programs promoting healthy dietary habits and/or physical activity, that
		  o Provide healthy food and beverages at the workplace facilities, e.g. in the cafeteria or vending machines;
		  o Provide space for fitness or signs to encourage the use of stairs;
		  o Involve workers in program planning and implementation;
		  o Involve the family in interventions through self-learn programs, newsletters, festivals, etc. or
		  o Provide individual behavior change strategies and self-monitoring

Settings	Impacts	Examples
Community	Effective interventions	• Diet education programs that: target high-risk groups (e.g. menopausal, pre-diabetic women); and are multi-component • Community development campaigns with intersectoral cooperation and/or focused on a common goal (e.g. reduction in cardiovascular disease risk) • Group-based physical activity programs or classes for a homogenous group of individuals
	Moderately effective interventions	• Interventions that use an existing phone-in service to provide dietary advice • Community-wide interventions conducted as part of a national or global campaign (e.g. healthy lifestyles strategy or 'Healthy Village') in a homogenous community • Programs that target low-income/low-literacy populations and include diet education in the standard program • Computer/web-based interventions with interactive personalized feedback, targeting high-risk groups • Supermarket tours and on-site educational programs to support the purchase of healthier foods • Walking school bus

Primary care	Effective interventions	• Interventions targeting chronic NCD risk groups that
		  o Include persons who are inactive, consume less than five servings of fruits and vegetables daily, consume a lot of dietary fat, are overweight, or have a family history of obesity, heart disease, cancer, and/or type 2 diabetes and
		  o Include at least one session (health risk appraisal) with a health-care professional, with a brief negotiation or discussion to decide on reasonable, attainable goals, and a follow-up consultation with trained personnel who are supported by targeted information and are linked and/or coordinated with other stakeholders such as community sports organizations or ongoing mass media physical activity campaigns

	Moderately effective interventions	• Cholesterol screening programs that provide clients with their results and follow-up education, ideally in person
		• Weight loss programs using health professionals with
		  o Personal or telephone/Internet consultations over a period of at least four weeks, and
		  o A self-help program that includes self-monitoring.

Source: World Bank (2017) based on WHO (2009).

Table 15. Core Competencies for all Service Providers across MNS Disorders

Competency
Screening and identification
• Demonstrate awareness of common signs and symptoms of MNS disorders
• Recognize the potential for risk to self and others
• Demonstrate basic knowledge of causes
• Provide the patient and community with awareness and education
• Demonstrate cultural competence
• Demonstrate knowledge of other MNS disorders
Formal diagnosis and referral
• Demonstrate knowledge of when to refer to the next level of care or other providers
• Demonstrate knowledge of providers for specialized care within the community
Treatment and care
• Provide support for patients and families while in treatment and care
• Identify and assist patients and families in overcoming barriers to successful treatment and recovery, for example, adherence, stigma, finances, accessibility, and access to social support
• Demonstrate ability to monitor mental status
• Demonstrate knowledge of how to offer emergency first aid
• Initiate and participate in community-based treatment, care, and prevention programs
• Demonstrate knowledge of treatment and care resources in the community
• Promote mental health literacy, for example, to minimize the impact of stigma and discrimination
• Communicate to the public about MNS disorders
• Monitor for adherence to regimens and side effects of medication
• Practice good therapeutic patient interactions, for example, communication, relationship, and attitude
• Provide links between patients and community resources
• Identify available resources to support patients, for example, rehabilitation and medication supplies
• Promote activities to raise awareness and improve the uptake of interventions and the use of services
• Protect patients and identify vulnerabilities, for example, human rights
• Demonstrate respect, compassion, and responsiveness to patient needs
• Demonstrate knowledge and skills to use information technology to improve treatment and care.

Source: IOM 2013.
Note: MNS = mental, neurological, and substance use.

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