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City Profile: Madurai

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Abstract

Madurai city, in the state of Tamil Nadu, is one of the ancient temple cities of India and has been existing since two millennia. It is the second largest city in terms of area and the third largest in terms of population in the state. Despite this, the city's population and economy is shrinking. In 2010, the city's boundary expanded to cover the entire urban agglomeration. But even after 9 years of integration, differences exist between the newly merged areas and the old city. The spatial division in provision of basic services coupled with the characteristics of a shrinking city has posed fundamental challenges in the path of sustainable development. This article discusses the development of Madurai city with regard to its history, demography, economy, health and education infrastructure. It also offers insights into the unique challenges faced by the city and discusses the policy implications for reversal of the retardation of the city to that of holistic progress.

Keywords

Temple city, education hub, shrinking city, planning, water shortage, Madurai

Introduction

India has a 5,000 year history of urbanization, dating back to the Harappan civilization. Some cities still preserve the legacy of their glorious past (Ramachandran, 1989). The temple city of Madurai in the state of Tamil Nadu is one such ancient city that has been a major settlement for two millennia and holds prominence till date as the second largest corporation city by area and the third largest city by population. Madurai is famous for the Meenakshi Amman Temple which has remained central to the development and planning of the city and still attracts a huge number of domestic as well as foreign tourists every year. Madurai, one of the important regional centres of higher and technical education in the state of Tamil Nadu, attracted a large share of youth who migrated to the city for education until recent years. A rapidly growing economy till the 1980s, the city is currently witnessing several backwash effects, with fast declining population growth and economic base. The city now depicts the features of a shrinking city.¹

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In 2010, the municipality boundary of Madurai city was extended to facilitate the population living on the peripheries. The magnum of floating population, in terms of annual tourist flow and 27.32 per cent of the people living in informal settlements, had become a strain on the city's infrastructure. Though the integration (till date) did not facilitate infrastructural development in its periphery, the city's inclusion in the list of Smart Cities was expected to strengthen the urban infrastructure, boosting urbanization and growth.

However, like several other cities in India and across the globe, there has been an overall metropolitan stagnation in growth, both demographic and economic (The World Bank, 2013) in Madurai. It is evident that this historical city is losing its regional supremacy over time. In addition, it is facing tough challenges in providing basic services to the population settled in newly extended areas.

While the Madurai city administrators are making efforts to develop the city's urbanscape, it is critical to understand: (a) the key challenges the city is facing in terms of transforming it into an economic hub that is efficient, liveable, healthy and sustainable and (b) the measures taken by the city to foster inclusive growth and development.

Following the introductory section, the second section of the article provides a description of the historical evolution of the city, the present-day urbanscape, governance of the city, followed by the demographic characteristics and status of economy, health, education and urban infrastructure. The third section critically examines the various efforts undertaken by the city to address the urban challenges. The fourth and the last section concludes the report.

Background: Overview of Urban Growth

History

The city of Madurai, which finds mention in Kautilya's *Arthashastra*² and Ashoka's inscriptions,³ had already emerged as a sacred centre and a place of political power by the third century BC. The city witnessed change in the ruling authority from the Tamil Pandyas to the Telugu-speaking Nayakas in the sixteenth century. The strategic location of Madurai on the banks of the Vaigai river buttressed its growth in the ancient period, because the river not only served as a natural defence but also provided an important waterway for trade and commerce.

In the sixteenth century, the Meenakshi Amman Temple was built based on the sacred geometry of the Vaastu Shastra⁴ (Smith, 1976), which still influences the present-day morphology and growth of the city. The area surrounding the temple was developed in four concentric squares. The city's axes were aligned within the four quarters of the magnetic compass, and the four gateways of the temple provided access to it (Figure 1). The rich and the influential castes and classes lived near the temple and the poor and the lower castes lived at the periphery (Lewandowski, 1977). This arrangement prevails till date with the temple playing a pivotal role in the morphology of the city. This heritage city is also a learning centre for the Tamil language and classical Sangam literature.

Development beyond the temple area mainly took place during the British period. The old fortifications were pulled down to make way for the present Veli Street—a broad avenue circumscribing the city. Railways and bridges were constructed which intersected the city and new settlements developed at the outskirts of the city. Since then, the temple no longer retains centrality in planning.

Present-day Urbanscape and Governance of the City

As mentioned earlier, initially, the city developed around the Meenakshi temple on the southern banks of the Vaigai river, but later with the establishment of government offices and other institutional buildings, areas adjacent to the northern side of the river gained prominence. However, the core of the city is still the commercial hub and also has high residential density (more than 1,000 persons per ha) which further increases during religious festivals due to floating population. The spatial expansion of Madurai has taken place along the major transportation corridors (railway line, two national highways and seven major district roads) in a radial pattern.

Madurai city was declared a municipality on 1 November 1866 under the Town Improvement Act of 1865. However, the current form of governance came into existence after establishment of Madurai Municipal Corporation (MMC) under Madurai Municipal Corporation Act, 1971. The MMC has six departments: general, engineering, revenue, public health, town planning and the computer wing under the direct control of the Municipal Commissioner who is the executive head of MMC. The legislative powers are vested in a body of 100 elected members, one each from the 100 wards. The legislative body is headed by an elected Mayor, assisted by a Deputy Mayor.

Before 2010, Madurai city was part of Madurai Urban Agglomeration (UA) that comprised one municipal corporation,⁵ three municipalities,⁶ six census towns⁷ and four town panchayats.⁸ The jurisdiction of MMC expanded in 2010 to include all constituents of Madurai UA except Paravai town panchayat and Nilaiyur census town. The MMC area increased in 2010 from 51.82 sq. km to 147.99 sq. km, with a corresponding increase in the number of wards from 72 to 100, divided into four regions: zones I, II, III and IV (Figure 2).

Demographic Characteristics

In absolute terms, the population of Madurai city increased from 0.36 million to 1.02 million during 1951–2011 (Table 1). After inclusion of newly merged areas, the estimates of population of the city increased to 1.47 million (Table 1). In 1951, Madurai city covered 97.60 per cent population share of Madurai UA, which systematically declined to 69.40 per cent in 2011 indicating a saturation in the core city and a spillover of population in the peripheral settlements. Madurai city and UA shows a consistent decline in growth rate. In 2001, the city registered a negative growth rate of –0.13 per cent, thereafter improving slightly to 0.91 per cent in 2011. The total fertility rate of the city also declined from 1.8 per cent in 2001 to 1.6 per cent in 2011 (Guilmoto & Rajan, 2013).

It may be noted that in the first few decades after Independence, population growth of Madurai city was higher than the state average. In this period, the city acted as an important regional centre with the emergence of industrial units and educational centres, attracting people from the neighbouring districts of Ramanathapuram, Theni and Virudhnagar.⁹ Gradually, the importance of the city diminished with the growth of other neighbouring cities such as Salem, Coimbatore, Bangalore and Chennai. As mentioned, in the last two census decades, the city has witnessed a sharp decline in the urban population growth not only because of decline in the natural growth rate but also due to declining rural–urban migration.

Though employment-related migration was the main drive for male migration, its share declined from 60 per cent in 1999–2000 to 42.70 per cent in 2007–2008 (Table 2). Likewise, the share of employment-related migration of females declined from 5.37 per cent to 1.14 per cent during the same period.

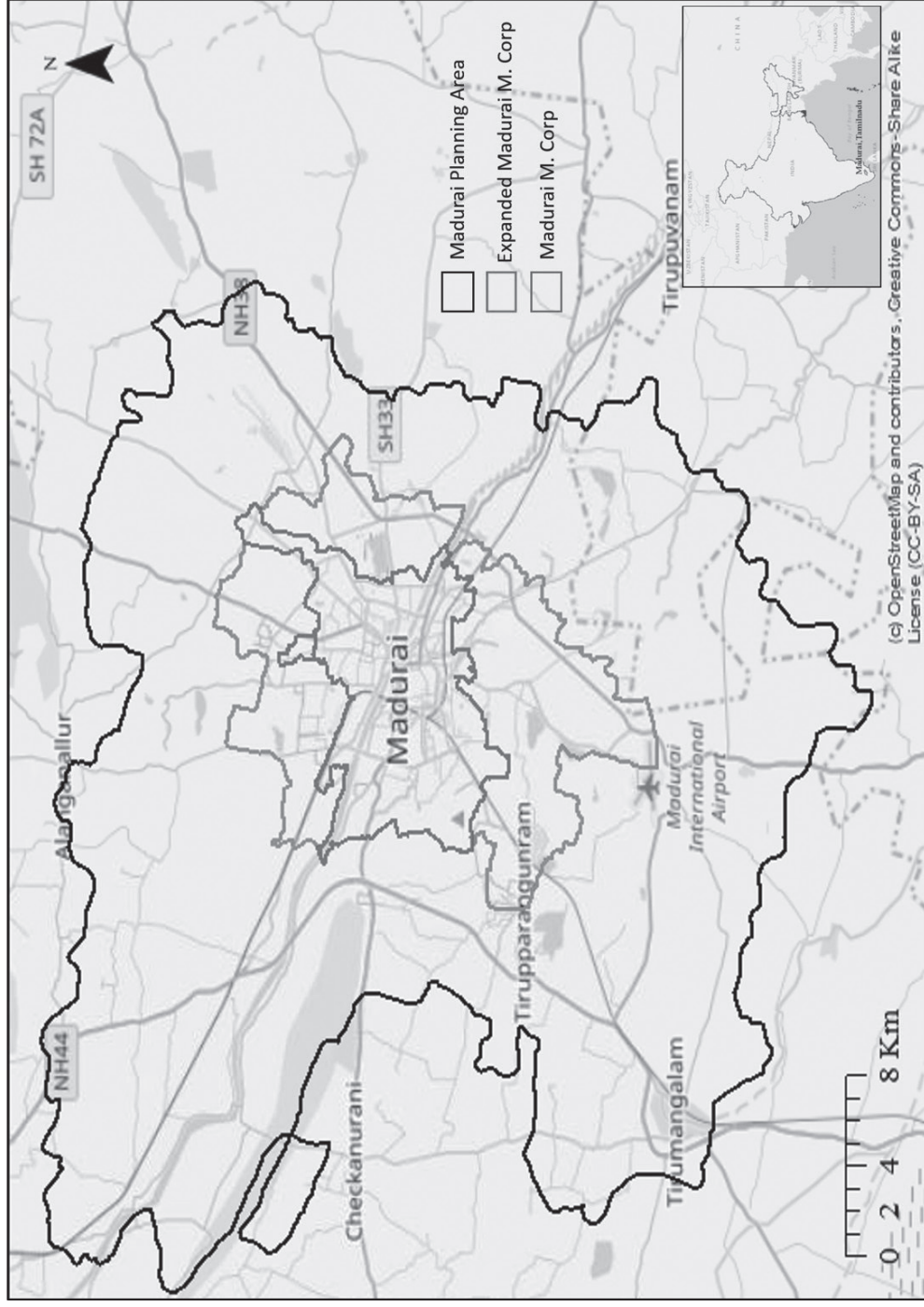


Figure 2. Regional Setting of Madurai

Source: Prepared by the authors using OpenStreetMap contributors licensed under the Creative Commons Attribution-ShareAlike 2.0 license (CC BY-SA).

Note: Present jurisdiction of MMC is marked by orange line.

Table 1. Population and Growth Rate of Madurai

Years	Madurai UA		Madurai Corporation		% Share of Madurai Municipal Corporation in UA
	Total Population	Growth Rate	Total Population	Growth Rate	
1951	370,791	4.15	361,781	4.14	97.60
1961	490,882	2.81	458,981	2.38	93.50
1971	701,904	3.58	633,989	3.23	90.30
1981	899,303	2.48	820,891	2.58	91.30
1991	1,077,158	1.80	940,989	1.37	87.40
2001	1,203,095	1.11	928,869	-0.13	77.21
2011*	1,465,625	1.97	1,017,865	0.91	69.40
2011**			1,470,821		

Source: Census of India (2001, 2011) (A4 series).

Notes: * Before expansion of municipal corporation boundary; ** after expansion of boundary.
Growth Rate (AEGR—annual exponential growth rate).

Table 2. Reasons for Migration in Madurai (per cent)

Reasons for Migration	1999–2000			2007–2008		
	Male	Female	Total	Male	Female	Total
Employment related migration	59.94	5.37	24.17	42.70	1.14	15.11
Education	8.17	2.41	4.40	9.36	9.46	9.43
Marriage	3.73	57.57	39.01	0.17	64.56	42.91
Migration of parent/earning member of the family	24.29	26.83	25.96	26.09	17.76	20.56
Others	3.88	7.82	6.46	21.68	7.08	11.99
Total	100	100	100	100	100	100

Source: NSSO Unit Level Data of 55th (1999–2000) and 64th (2007–08) rounds.

Note: All figures are computed at district level.

Declining population growth, total fertility rate and in-migration have resulted in the city becoming a ‘shrinking city’. However, migration for educational purposes increased during the same period (Table 3). This trend could be attributed to the fact that Madurai has many prestigious educational institutions (Madurai-Kamaraj University, Thiagarajar College of Engineering, polytechnic institutes, etc.) attracting more female than male students from adjoining towns.

Like most of the cities of India, Madurai is also witnessing a demographic dividend. Compared to children and old age population, the proportion of working age (15–59 years age group) population in Madurai was high both in 2001 and 2011. The sex ratio improved from 979 in 2001 to 999 in 2011. General improvement in nutrition levels and access to health-care facilities as well as male out-migration are the reasons attributed to the improved sex ratio. Biases towards the male child and parochial behaviour are reflected in the declining child sex ratio from 953 in 2001 to 949 in 2011, indicating son preference, a common behaviour pattern across Indian cities.

Table 3. Migration in Madurai by Streams and Distance Traversed (per cent)

Direction	Streams	1999–2000			2007–2008		
		Male	Female	Total	Male	Female	Total
Intra-district	Rural–Urban	33.85	38.07	36.60	13.46	20.59	18.26
	Urban–Urban	11.07	6.73	8.24	7.98	13.79	11.90
Inter-district	Rural–Urban	26.58	23.98	24.88	3.53	13.09	9.97
	Urban–Urban	25.77	25.10	25.33	74.65	45.92	55.29
Inter-state	Rural–Urban	0.32	3.08	2.12	NA	NA	NA
	Urban–Urban	2.41	3.05	2.83	0.17	6.41	4.37
Another country		NA	NA	NA	0.21	0.20	0.20
Total		100	100	100	100	100	100

Source: NSSO Unit Level Data of 55th (1999–2000) and 64th (2007–08) rounds.

Note: NA—Sample not available, all figures are computed at district level.

Economy

The GDP of Madurai district increased from ₹1.04 million (USD 15,187) in 2005–2006 to ₹1.80 million (USD 26,057) in 2011–2012¹⁰ (Table 4). However, there had been frequent fluctuations in the rate of growth during this period. While in 2006–2007, the district had a growth rate of 25.94 per cent, it declined to -4.39 per cent in 2007–2008. This was the result of a massive downturn in production in the secondary sector in the same year, which had registered a negative growth rate of 35.62 per cent (State Planning Commission, 2017; Table 5).

Loss of jobs in labour-intensive sectors like manufacturing and mining results in out-migration and pushes a city towards a ‘shrinking city’. Table 5 shows the performance of the manufacturing¹¹ sector in 2007–2008, which coincides with the year for which migration data are available, and this depicts a substantial decline in migration due to employment opportunities. When population declines due to resource depletion or technological shifts, a city degenerates. The city of Madurai is undergoing similar shifts, with the tertiary sector being the main employment provider, though it is also experiencing fluctuating growth (Figure 3). To revive the economy of Madurai district, several initiatives such as establishment of Special Economic Zones (SEZs), industrial and information and technology parks, etc., have been taken by the government (State Planning Commission, 2017).

During 2005–2006 and 2011–2012, the per capita income (PCI) of Madurai district increased from ₹39,864 (USD 578) to ₹67,258 (USD 975), which was higher than that of Tamil Nadu state. In 2010–2011, Madurai district ranked 13th in terms of PCI¹² among the 32 districts of Tamil Nadu, and it also contributed 4.15 per cent to the state Gross Domestic Product (GDP). The sectoral distribution of the economy shows that the share of the tertiary sector is highest (70.6%) in the GDDP of Madurai, followed by the secondary (24.7%) and primary sectors (4.71%) (Table 6). Trade, hotels and restaurants, followed by banking, insurance and real estate were the highest contributors to the tertiary sector in 2011–2012. Tourism and its associate sectors such as hotels and restaurants play an important role in the city’s economy, mainly because of the religious importance of Madurai as a ‘temple city’.

The highest contributors to the secondary sector were manufacturing and construction. Madurai has a few reputed large-scale companies like M/s Madura Coats, Thiyagaraja Mills, TVS Sundaram Iyengar

Table 4. Gross District Domestic Product and per Capita Income (GDDP at 2011–2012 constant price)

Years	GDDP Madurai (Million Rupees)	Growth Rate (%)	PCI Madurai (₹)	PCI Tamil Nadu (₹)
2005–2006	1.04 (15187)		39,864 (578)	38,435 (557)
2006–2007	1.32 (19127)	25.94	50,023 (725)	43,941 (637)
2007–2008	1.26 (18287)	–4.39	47,671 (691)	46,293 (671)
2008–2009	1.35 (19513)	6.71	50,720 (735)	48,473 (703)
2009–2010	1.48 (21442)	9.88	55,590 (806)	53,359 (773)
2010–2011	1.68 (24295)	13.31	62,842 (911)	59,967 (869)
2011–2012	1.80 (26057)	7.25	67,258 (975)	63,996 (927)

Source: State Planning Commission (2017).

Note: Figures in the parenthesis are in USD.

Table 5. Gross District Domestic Product (GDDP at 2011–2012 constant price) of Secondary Sector

Years	Manufacturing	EGWS	Construction	Total	Manufacturing	EGWS	Construction	Total
	USD				AEGR (%)			
2005–2006	2346.67	231.53	1340.20	3918.40				
2006–2007	4489.52	233.10	1395.33	6117.95	64.87	0.68	4.03	44.55
2007–2008	2471.55	164.34	1648.61	4284.51	–59.69	–34.95	16.68	–35.62
2008–2009	2464.54	41.71	1728.21	4234.46	–0.28	–137.13	4.72	–1.17
2009–2010	3472.47	49.21	1808.12	5329.80	34.29	16.55	4.52	23.01
2010–2011	3861.26	64.79	2201.36	6127.41	10.61	27.51	19.68	13.95
2011–2012	4032.14	74.68	2388.61	6495.43	4.33	14.20	8.16	5.83

Source: State Planning Commission (2017).

Sons & Ltd, PRP groups and Fenner India (State Planning Commission, 2017). The state government is taking initiatives to promote Madurai as a second-tier IT city with support from the National Information Technology Development Programme. However, most of the IT companies are at the early stages of development and therefore their contribution to the economy of Madurai is limited.

During 2001–2011, the share of both male and female main workers declined with a corresponding increase in the share of marginal workers (Table 7), indicating increasing marginality of employment in the city. The small and medium industries such as agro-based food processing industries, hotels and restaurants provide short-term seasonal employment, which is largely informal in nature. The estimates from the last two rounds of NSS also exhibit that the contribution of the informal sector in total employment increased from 74.7 per cent in 1999–2000 to 81.5 per cent in 2011–2012.

On the social front the city has fared relatively well. Despite having a sluggish growth in economy, the urban poverty ratio in Madurai city was only 0.96 per cent in 2011–2012, substantially low as compared to urban Tamil Nadu (3.7%) and urban India (13.7%). Low rate of inflation and improvement in the quality of life of the poor are the possible reasons for lower incidence of poverty.

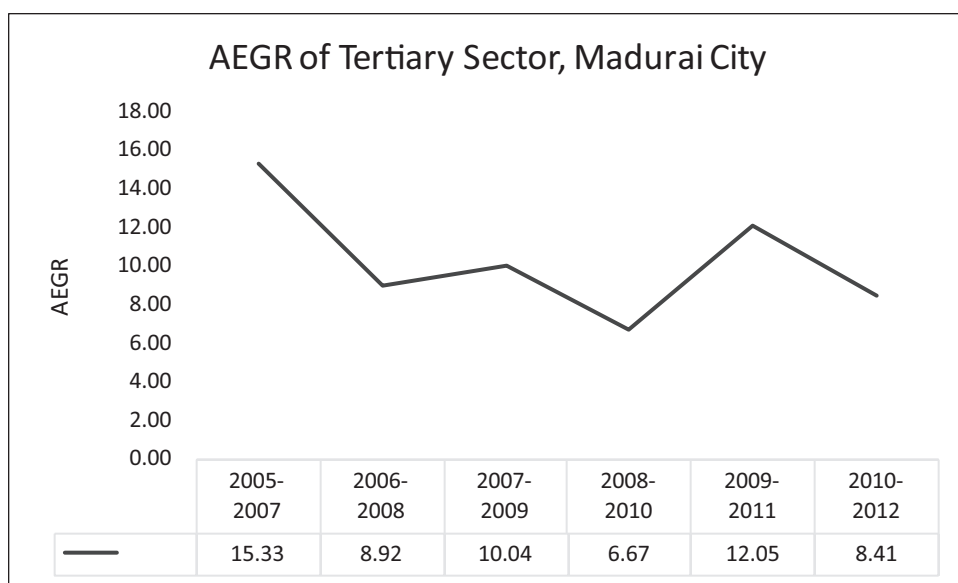


Figure 3. AEGR of Tertiary Sector, Madurai City

Source: State Planning Commission (2017).

Table 6. Sector-wise Contribution to GDDP of Madurai, 2011–2012 (at 2011–2012 constant prices)

Sectors	% Contribution to GDDP
Agriculture and Allied	4.28
Forestry and logging	0.33
Fishing	0.05
Mining and quarrying	0.06
Primary sector	4.71
Manufacturing	15.36
Electricity, gas and water supply	0.28
Construction	9.10
Secondary sector	24.74
Trade, hotels and restaurants	25.00
Railways, transport, storage and communication	10.20
Banking, insurance and real estate	21.26
Community, social and personal services	14.08
Tertiary sector	70.55
Total	100.00

Source: State Planning Commission (2017).

Table 7. Distribution of Main and Marginal Workers in Madurai 2001 and 2011 (in per cent)

Areas	Types of Workers	Males		Females		Total	
		2001	2011	2001	2011	2001	2011
India (Urban)	Main	93.27	90.50	79.31	76.96	90.83	87.65
	Marginal	6.73	9.50	20.69	23.04	9.17	12.35
Tamil Nadu (Urban)	Main	93.86	92.06	85.43	84.00	91.75	89.87
	Marginal	6.14	7.94	14.57	16.00	8.25	10.13
Madurai	Main	96.97	94.80	92.01	86.56	96.06	92.90
	Marginal	3.03	5.20	7.99	13.44	3.94	7.10

Source: Census of India (2001, 2011).

Education

Education is listed in the Concurrent List of the Indian Constitution, which means both central and state governments can make legislations, policies and programmes. Also, under the 74th Constitutional Amendment Act (1992), the urban local bodies (ULBs) in India are empowered to prepare socio-economic plans. The ULBs execute policies and programmes formulated by the central and state governments. Therefore, progress in any sector including education depends heavily upon the vision and policies of central and state governments. Reiterating the vision of the Tenth Plan (2002–2007) of the central government, which stressed universalization of elementary education for children in the age group of 6–14 years and initiated a flagship programme—Sarva Shiksha Abhiyan (SSA)—the government of Tamil Nadu focused on universal education in the same Plan period. During this period, the state launched the Chief Minister's 15-point programme which focused on reducing male and female disparity, retention of children in schools, and vocational training for gainful employment. The Eleventh (2007–2012) and Twelfth (2012–2017) state Five Year Plans furthered the constitutional right of universal access of education to the next level. The success at primary level prompted the state government to extend its education policy for better and quality education at secondary, higher secondary and higher education levels, including technical education.

Education in Madurai city is imparted through both public and private institutions. There are 616 schools in Madurai. The public schools are run by central, state and local governments, within the administrative and financial control of the Department of Education. The private schools are aided or unaided but have to be mandatorily registered with the designated authority (Figure 4). American College (1881), Madura College (1889), Lady Doak College (1948), Fatima College (1953), Waqf Board College (1964), Madurai Kamaraj University (1965) and Vivekananda College (1971) are some of the reputed institutions in the city. A total of 24 autonomous colleges, 14 aided colleges, 33 self-financing colleges, 18 approved institutions, 4 evening colleges, 6 constituent colleges and 1 university college cater to the needs of higher education of a large number of students from all over the state. Madurai also has technical institutions such as Law College, K.M. College of Pharmacy, Madurai Medical College, Velammal Medical College & Research Institute, K.L.N. College of Engineering, Raja College of Engineering and Thiagarajar College of Engineering.

The efforts made by the state government in the education sector are reflected in the high literacy rate in Madurai. The literacy rate of Madurai city is 90.9 per cent, which is higher as compared to the national (84.1%) and the state averages (87.0%) in 2011. Also, the gender gap in literacy in Madurai declined during 2001–2011 and is lower as compared to the national and state levels (Table 8).

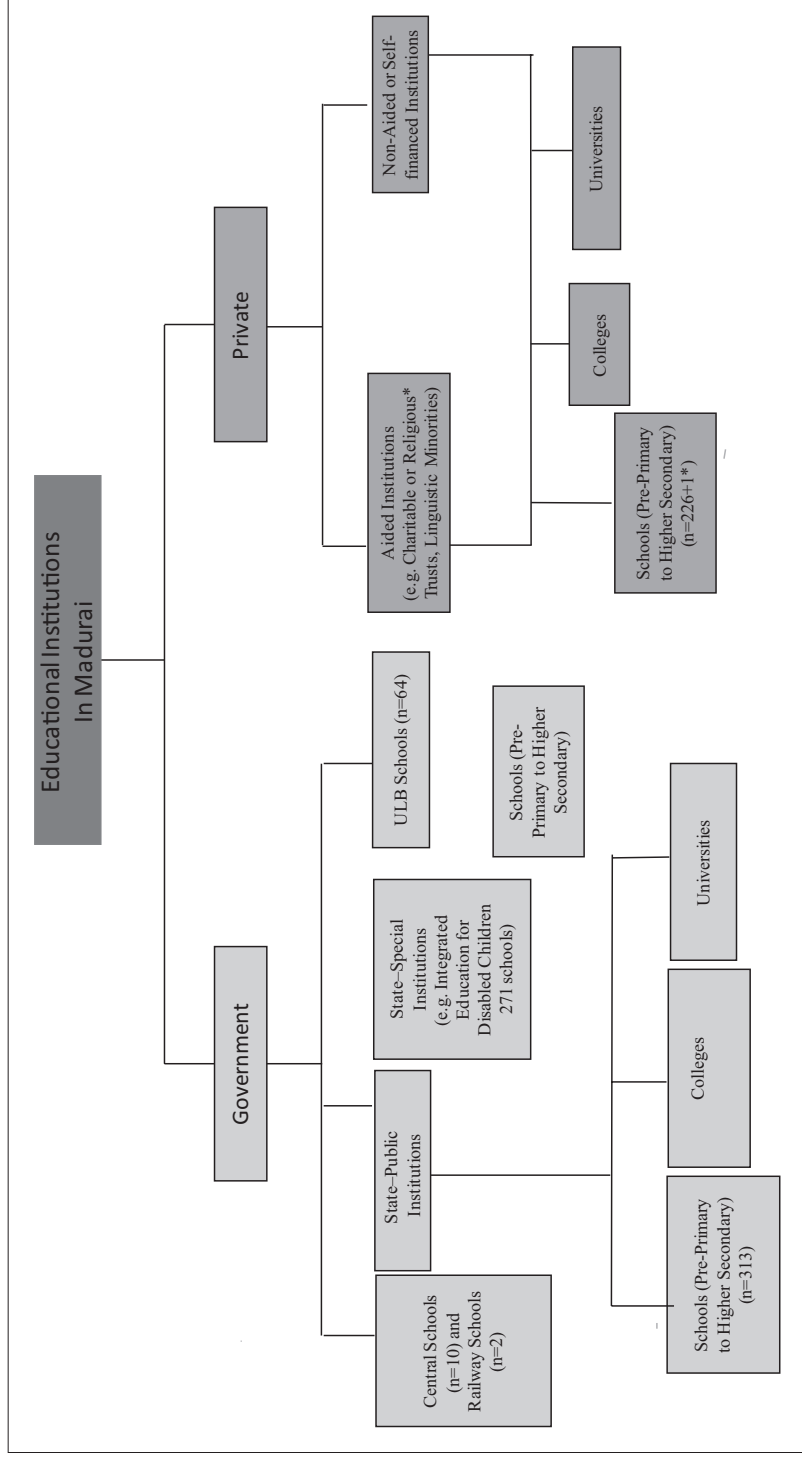


Figure 4. Institutional Structure of Education in Madurai

Source: The authors.

Table 8. Literacy Rates (per cent)

	Total		Males		Females		Gender Gap	
	2001	2011	2001	2011	2001	2011	2001	2011
India (Urban)	79.9	84.1	86.3	88.8	72.9	79.1	13.4	9.7
Tamil Nadu (Urban)	82.5	87.0	89.0	91.8	76.0	82.3	13.0	9.5
MMC	87.9	90.9	92.3	94.8	81.6	87.1	10.7	7.8

Source: Census of India (2001, 2011).

Table 9. Education Participation of Population in Specific Age Cohort in Madurai, 2001 and 2011 (per cent)

Age Group (in years)	Population Attending Educational Institutions			Population Not Attending Educational Institutions					
	Persons	Males	Females	Attended Before			Never Attended		
				Persons	Males	Females	Persons	Males	Females
6–10	91.69 (89.78)	91.58 (89.83)	91.80 (89.72)	1.65	1.59	1.72	6.66	6.83	6.48
11–13	95.68 (89.67)	95.71 (89.34)	95.65 (90.02)	3.21	3.20	3.23	1.10	1.10	1.12
14–15	91.65 (77.39)	91.21 (76.97)	92.13 (77.82)	7.25	7.73	6.73	1.10	1.06	1.14
16–17	81.12 (61.49)	80.75 (61.40)	81.50 (61.58)	17.75	18.24	17.25	1.13	1.02	1.25
18–24	53.61 (25.64)	55.91 (28.00)	51.41 (23.44)	44.44	42.47	46.33	1.95	1.62	2.27

Source: Census of India (2001, 2011).

Note: Figures in parenthesis indicate situation in 2001; data for other indicators are not available for the year 2001.

The Right to Education Act has contributed significantly to increasing the proportion of children (in the age group of 6 to 13) attending educational institutions. Despite this achievement, the universal enrolment, as envisaged in the RTE and also in the Eleventh and Twelfth Five Year Plans of the Tamil Nadu state, is yet to be fully achieved. The state government has made several efforts such as special cash incentives to secondary and higher secondary students, financial assistance to students who have lost bread earning parents, distribution of free uniforms, including footwear, books, educational kits, bus passes and bicycles, to retain the enrolled students and minimize drop-outs. However, the drop-out rate is still high in the age group of 18–24 years (44%) and 16–17 years (18%), as depicted in Table 9. The distressed entry into the labour market due to lack of sufficient resources to complete education, absence of adult members to look after the household affecting especially girl students, and migration of the households disrupting the education of children are some of the reasons for high drop-outs from these age groups.

The city has also taken several innovative approaches in pedagogy to improve the quality of education and minimize the drop-out rate. ‘Smart’ classes¹³ have been introduced in schools to provide special audio-video sessions to make learning more interesting. To improve the communication skills of students, the medium of instruction has been changed to English in 36 schools from the current academic year (2018–2019). The concept of ‘happy schooling’ has been introduced in secondary and higher

secondary schools in collaboration with Hindustan Computer Limited and M. S. Chellamuttu Trust to promote emotional well-being among students.

Since the Eleventh Plan, privatization of education has become the dominant characteristic of the education system in Madurai with mushrooming of several private institutions in the last decade (2008–2018) at all levels of education. In Madurai, the share of private institutes in higher education, especially in technical education is very high mainly because of the large number of private engineering and business administration colleges, vocational institutes and polytechnics (Table 10). The distribution of public and private institutions in higher technical education in the city bears resemblance to the national- and state-level scenarios.

However, the divide between quantity and quality in the education sector is becoming more evident in Madurai. According to All India Council for Technical Education (AICTE), nearly 56 per cent of MBA graduates did not get campus placements between 2016 and 2017.¹⁴ Due to the poor record of accomplishment, a fewer number of students are now opting for private professional colleges. A huge mismatch in the proportion of students completing higher technical education and available job opportunities is evident, which is the main reason for out-migration.

Health

In the federal structure of India, health is a state subject. Importantly, Tamil Nadu is the first state to enact a Public Health Act in 1939 (Gupta, 2005).¹⁴ It had also formulated a health policy in 2003 to address the key health challenges, strengthen management of health systems and increase effectiveness of public sector health-care services. The better performance of the cities of Tamil Nadu in terms of various health indicators is largely due to the significant reforms undertaken by the state. It includes massive expansion of health infrastructure including opening of urban primary health centres (U-PHC), creation of position of a Municipal Health Officer in all ULBs assisted by a team of health experts, and several programmes for reproductive and child health care and non-communicable diseases.

Madurai has an extensive network of public health-care institutions. It has 2 multi-speciality hospitals, 1 cancer institute, 13 maternity hospitals, 35 primary health centres (PHCs) and 31 urban primary health posts (U-PHCs). The U-PHCs are under the direct control of MMC and provide maternal and child health-care services (Figure 5). These U-PHCs are equipped with lab-testing facilities for diagnosing

Table 10. Share of Public-Private Institutions in School Education, 2011 (per cent)

	Public/ Private	Primary School	Middle School	Secondary School	Senior Secondary School	Higher Non- technical	Higher Non- technical	Others
India (urban)	Public	50.81	46.54	42.41	43.05	19.63	39.99	36.67
	Private	49.19	53.46	57.59	56.95	80.37	60.01	64.33
Tamil Nadu (urban)	Public	50.81	53.33	44.06	42.25	25.77	20.07	41.08
	Private	49.19	46.67	55.94	57.75	74.23	79.93	58.92
Madurai Municipal Corporation	Public	35.23	61.03	46.00	49.49	18.75	30.56	9.62
	Private	64.77	38.97	54.00	50.51	81.25	69.44	90.38

Source: Census of India (2011).

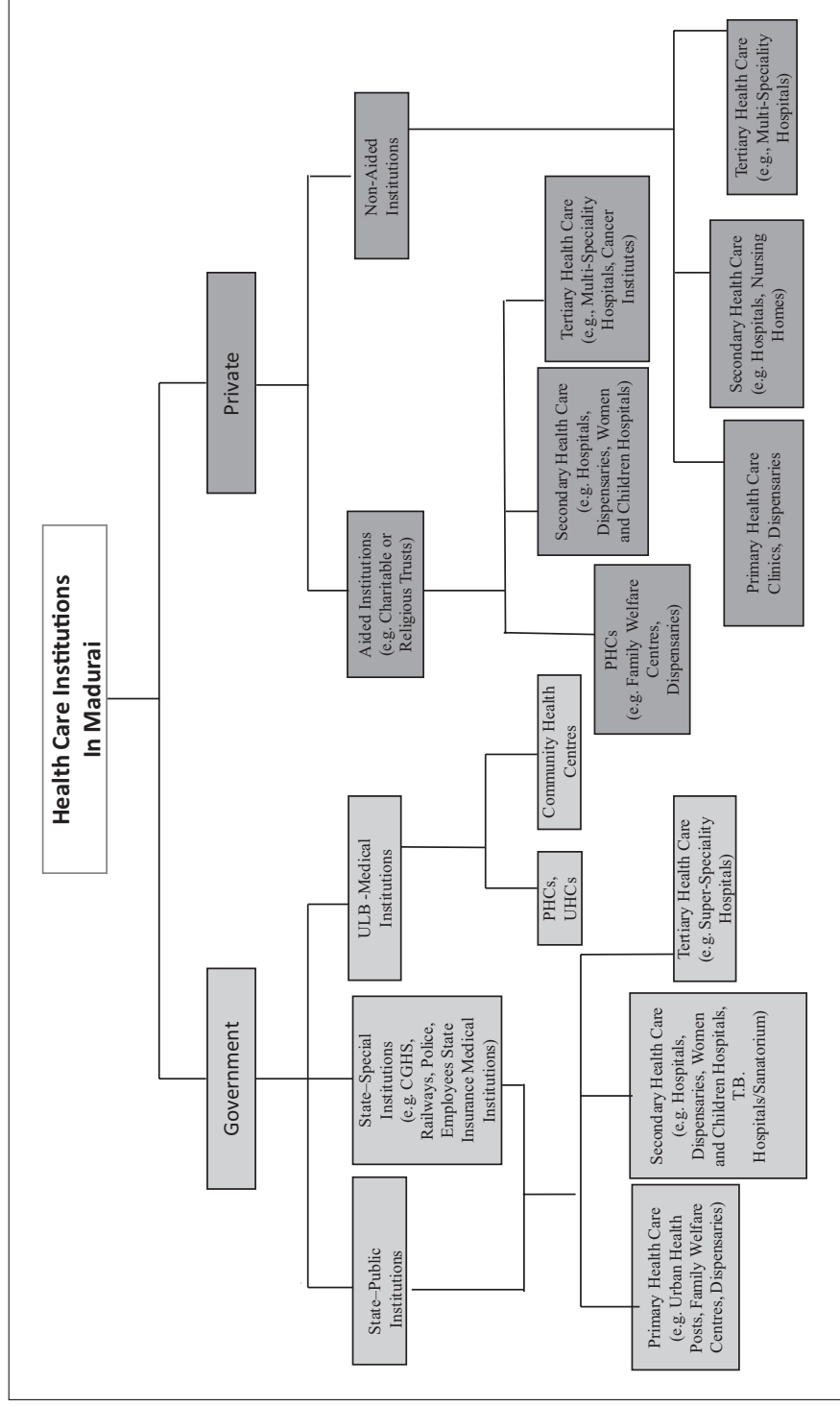


Figure 5. Healthcare Institutions in Madurai

Source: The authors.

non-communicable diseases, HIV/AIDs and other tests are free of cost. The Rajaji Medical Hospital is the main referral hospital in Madurai at the secondary level. Recently, a new medical college, Velammal Medical College Hospital and a Research Institute have been established in the Anuppanadi area of Madurai. Madurai also has a regional cancer centre at the Rajaji Government Hospital. Apart from these public health-care institutes, the private sector also plays an important role in delivering health care in Madurai city.

In addition to the central government programmes, the state government of Tamil Nadu has initiated several schemes to provide quality and affordable health care to all. Dr. Muthulakshmi Reddy Maternity Benefit Scheme and Chief Minister's Comprehensive Health Insurance scheme are some of the measures that have played an important role in improving the health status in cities of Tamil Nadu. In Madurai, these schemes are implemented by the city administration. The efforts and measures taken by the Tamil Nadu government and implemented by the city administration are evident in the outstanding performance of Madurai in most of the health indicators as compared to the national average.

The figures¹⁵ for the select indicators on vital statistics, reproductive and child health and nutrition levels of children show that in comparison to urban India, in terms of health parameters, Madurai is better placed (Table 11). However, in comparison to urban Tamil Nadu, the performance of Madurai is still low. Only in the case of nutritional status of the children, the performance of Madurai is better as compared to both the national and state average. These findings show that concerted actions are still needed at local level to achieve the target set by the state government to ensure universal health coverage in Madurai.

Table 11. Selected Health Indicators of Madurai District (Urban), 2015–2016

Indicators	India (urban)	Tamil Nadu (urban)	Madurai (urban)
Vital statistics			
Birth rate* (per 1,000)	17.4	15.4	16.7
Death rate* (per 1,000)	6.3	5.5	4.5
TFR (children per woman)	1.8	1.5	1.74
Life expectancy at birth** (in years)			
Male	65.8	71.8	65.4
Female	69.3	75.2	68.9
IMR (per 1,000 live births)	29	18	23.71
Under five mortality rate (U5MR) (per 1,000 live births)	34	23	24
Reproductive and child health			
Registered pregnancies for which the mother received Mother and Child Care Protection Card (%)	87.7	96	94.4
Institutional deliveries	88.7	99.2	98.3
Birth assisted by a doctor/nurse/ LHV/ANM/other health personnel (%)	90	99.6	100
Women who had full antenatal care [§] (%)	31.1	46.3	38.7

(Table 11 Continued)

(Table 11 Continued)

Indicators	India (urban)	Tamil Nadu (urban)	Madurai (urban)
Mothers who received financial assistance under Janani Suraksha Yojana# for Institutional delivery (%)	21.4	25.3	24.5
Average out of pocket expenditure per delivery	(₹) 3913 (USD) (57.17)	2556 (37.35)	3,379 (49.37)
Total unmet need for family planning (%)	12.1	10.7	15.5
Children received full vaccination ^{ss} (%)	63.9	73.3	64.58
Nutrition level of children			
Children under 5 years who stunted (height-for-age) ^{##} (%)	31	25.5	20.9
Children under 5 years who are wasted (weight-for-height) ^{##} (%)	20	19	11

Sources: Computed from National Family Health Survey-4, 2015–2016; Sample Registration System of Tamil Nadu, Directorate of Public Health and Preventive Medicine, State Planning Commission (2017).

Notes: *Data of 2014. ** Figures indicate aggregate (rural + urban) level data.

^s Full antenatal care is at least four antenatal visits, at least one tetanus toxoid (TT) injection and iron folic acid tablets or syrup taken for 100 or more days.

^{ss} Full vaccination includes BCG, measles, and three doses each of polio and DPT.

[#] Janani Suraksha Yojana is a monetary assistance scheme for pregnant women for institutional delivery.

^{##} Below -3 standard deviations, based on the WHO standard.

Housing, Slum and Urban Infrastructure

A substantial share of housing in Madurai city is ‘good’¹⁶ as per the 2011 Population Census. However, during 2001–2011, the proportional share of ‘good’ census houses declined from 93 per cent to 84 per cent. This could be attributed to the deteriorating quality of houses in the old city and increasing share of informal settlements or slums from 23.83 per cent in 2001 to 27.32 per cent in 2011. Nearly half of the households in the city are living in deplorable conditions under a high congestion factor¹⁷ (46.5%).

The number of slums in Madurai increased gradually from 36 in 1967 to 127 in 1981 and 331 in 2011. Half of these slums are located on public land. A total of 176 slums are tenable¹⁸ and 23 are located on vulnerable locations (SFCPA, Government of Tamil Nadu, 2013) (Figure 6).

There is also disparity between slums in the old municipal boundary vis-à-vis those located in newly merged areas (NMAs). The former have better coverage of basic amenities. In 2011, 90.4 per cent slum households within the old boundary had access to tap water as compared to only 72.9 per cent slum households in NMAs having access to the same service. MMC ensures at least one water tap for every 25 households and therefore, the coverage of tap waters in slums within the old boundary is high. The access to tap water within premises is also better in the slums located within the old boundary (55.7%) as compared to NMAs (20.7%). The access to toilet within premises was also better in slum households settled within the old boundary as compared to NMAs (84.9% slum households within the old boundary have access to toilets within premises). Nearly half of the slum households in NMAs use either public toilets or resort to open defecation. The access to a bathroom within premises, drainage and sewerage facilities, and electricity were also better in households within the old municipal boundary as compared to NMAs.

Furthermore, there are differences in access to basic amenities between the non-slum households settled within the old municipal boundary vis-à-vis NMAs. Ninety per cent households within the old

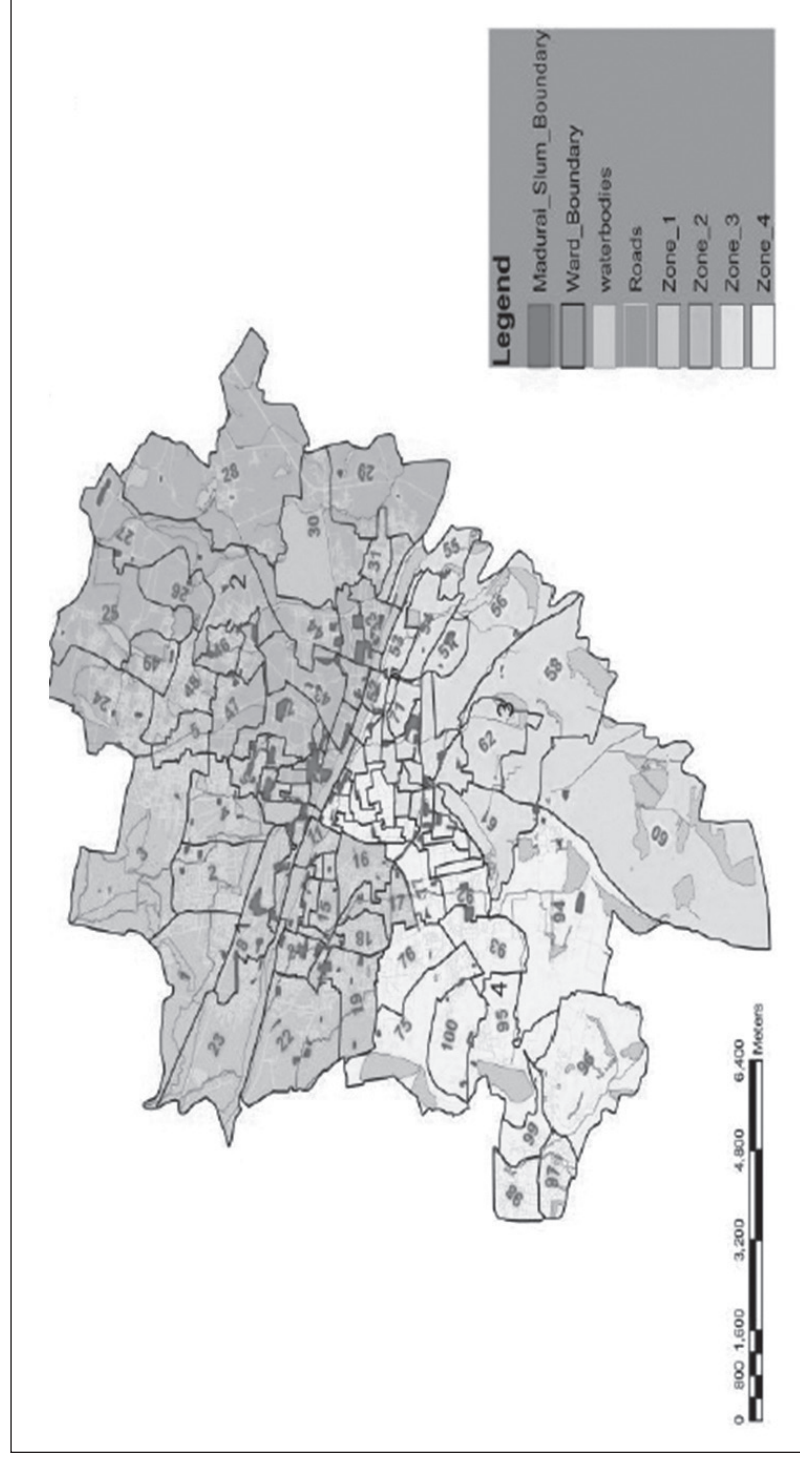


Figure 6. Location of Slums in Madurai City

Source: Government of Tamil Nadu (2013).

municipal boundary had access to tap water, whereas, only 67.1 per cent households in NMAs had access to same. The access to tap water within premises was also much better in households within the old municipal boundary as compared to the NMAs. Even after 9 years of integration, households in NMAs do not have access to piped water supply and underground sewerage. They are dependent on the private water suppliers to meet their daily requirement of water. The private suppliers charge ₹600 (USD 8.7) for 4,000 l of water, which last for about a week, whereas the MMC charges only ₹900 (USD 13.0) per annum. It is evident that the sharp difference in water charges between MMC and private suppliers is an additional burden on the households in NMAs. The proportion of households with access to toilet facility within premises was also high within the old municipal boundary (92%) as compared to NMAs (86.7%). Access to sewerage facility is another major issue in the NMAs as only 28.9 per cent households had access to sewerage facility as compared to 82.3 per cent households within the old municipal boundary. The access to bathroom within premises, drainage facility and electricity were also better in the households within the old municipal boundary as compared to NMAs.

It is apparent from the above analysis that the access to basic services in 2011 was better for slum and non-slum households settled within the old municipal boundary as compared to those households in NMAs (Table 12). The MMC needs to invest in the new areas to bring about overall development in the urban infrastructure. Efforts are underway for infrastructural development (Field Survey, 2018) and several initiatives have been undertaken through different mission programmes to improve this in Madurai. MMC has targets which will benefit households under the Pradhan Mantri Awas Yojana, PMAY (Prime Minister's Housing Scheme). Under Atal Mission for Rejuvenation and Urban Transformation (AMRUT) mission, the city proposed to undertake four projects for improving water supply situation at

Table 12. Access to Basic Amenities in 2001 and 2011

	Non-Slum Households				Slum Households		
	MMC	Old Municipal Boundary	Newly Merged Areas	Total MMC	Old Municipal Boundary	Newly Merged Areas	Total MMC
Basic Amenities	2001	2011	2011	2011	2011	2011	2011
Access to tap water	74.2	90.0	67.1	83.0	90.4	72.9	88.8
Access to water within premises	57.2	68.2	33.9	57.8	55.7	20.7	52.5
Access to safe drinking water	97.5	98.1	90.2	95.7	N.A.	N.A.	N.A.
Access to toilet within premises	83.7	91.9	86.7	90.4	84.9	52.3	81.9
Access to sewerage	N.A.	82.3	28.9	66.1	N.A.	N.A.	N.A.
No toilet within premise	16.3	8.1	13.3	9.7	11.4*	25.3*	12.7*
					3.7**	22.3**	5.4**
Access to bathroom facility within premises	76.3	93.6	90.2	92.5	88.2	66.3	86.2
Access to drainage	87.5	95.9	80.6	91.3	93.1	66.6	90.7
Access to electricity	93.6	98.8	97.5	98.4	98.0	91.8	97.4

Source: Census of India (2001, 2011).

Note: Water sources constituting tap water, well, hand-pump, tube-well/bore well are considered as safe sources.

*Use of public toilet, ** Open defecation.

a cost of ₹300 million (USD 4.29 million). Also, to restrict the growth of slums, MMC has adopted the vision of a 'Slum Free City' in 2013, with the objective of promoting inclusive and affordable housing for all. The Tamil Nadu Slum Clearance Board, the nodal agency responsible for development of slum areas, has undertaken infrastructure improvement works in 126 slums.

Madurai has been selected as a Smart City under the national Smart City Mission (SCM) which aims to develop smart infrastructures. A total of 528.12 hectare area around the Meenakshi Temple is selected for heritage preservation, improvement of infrastructure and IT integration for aiding tourists and citizens under the Area-Based Development (ABD) strategy of SCM. However under ABD, only 11 per cent of the city's population is supposed to benefit. Also, 81.7 per cent of the total allocation is directed towards the ABD, and this may further deepen the inequality across the city. The pan city smart solutions envisage development of an Integrated City Management and Control Centre, the key components of which are intelligent public transport, parking and traffic control systems, street light monitoring and management system, emergency response, surveillance system, waste collection, transportation monitoring system and integrated platform for e-governance.

Challenges

The above discussions emphasize the fact that though on the social front the city has performed fairly well, low level of economic development has pushed Madurai to the verge of a de-urbanizing or shrinking city. The declining population growth rate coupled with out-migration, falling total fertility rate and loss of jobs in labour-intensive sectors like manufacturing have pushed the city towards de-urbanization.

Over-dependence on the tourism sector, degeneration of the city as a professional educational hub, growing unemployment among educated youth in particular and slowing down of the manufacturing sector are some of the challenges affecting the city. Though the literacy rate and school education in Madurai are much better than the state and national averages, improving higher education, in terms of quality, and bridging the gap between higher education and employability remain a major challenge for policy makers. The city no longer remains desirable for technical education because of low placements. Understanding the market requirement and addressing the gaps should become the focus of educationists. Out-migration of students for quality education and the youth for gainful employment has cast a shadow over Madurai's urban future.

The growing marginality of employment coupled with high rate of unemployment in Madurai raises concerns among the youth. Recognition of skills, certification of vocational skills alongside supportive schemes for expansion of the Small and Medium Enterprises (SMEs) can improve the situation. New partnerships and ventures to attract investment alongside diversification can be explored to revamp the economy which is crucial for its sustainable growth.

Inequality exists between the slum and non-slum households with respect to provision of services, although the accessibility to basic services in the old municipal boundary is better. The coverage is low in the Newly Merged Areas and is acute in the slum households of these areas. For a service as basic as potable water, the households have to eke out their incomes to make ends meet.

As mentioned earlier, the number of slum settlements and the proportion of slum dwellers is gradually increasing since the last few decades. The city authorities have relocated a large proportion of slum dwellers to a new township, Rajakur Satellite Township (Figure 7), in the peripheral area of Madurai. In the process of relocation, several slum dwellers especially females have lost their employment.



Figure 7. Rajakur Satellite Township (relocation of slums)

Source: The authors.

The families relocated to this area are mostly from Scheduled Castes and Scheduled Tribes who work as casual labourers and manual scavengers. The relocation has increased the travel time for work and the main approach road from the satellite town is 3 kilometres away. Connectivity becomes a major issue for which several working females, especially those who were engaged in hotels and restaurants are forced to leave their employment. The city officials are making efforts to train these women for candle and matchbox making in collaboration with SIDCO (Small Industries Development Corporation Limited), which is close to this satellite town. The development approach adopted by Madurai city administration largely remains exclusionary as envisaged through relocation of slums outside the core city.

The restricted financial autonomy of the ULBs further jeopardizes the capacity of the municipality as they have to seek the state government's approval for enhancement in tax rates and user charges beyond the limit mentioned in municipal laws. The income generation of MMC has declined from ₹5,044.4 million (USD 73.1 million) in 2014–2015 to ₹3,070.48 million (USD 44.5 million) in 2016–2017 at current prices. Improvement in property tax rates, coverage ratio and collection efficiency are some of the measures which MMC needs to take to improve the financial position of the ULBs.

Conclusion

Madurai city has been one of the main political and economic centres of South India since ancient times. The morphology of the city till date is influenced by the Meenakshi Amman Temple, around which the initial development of the city took place. The importance of the temple prevails till date as it attracts domestic and foreign tourists and contributes significantly to the economy of the city which is reflected in the higher share of trade, hotels and restaurants in Madurai. Keeping these factors in consideration, the area surrounding the temple has been chosen for ABD under the Smart Cities Mission. However, such initiatives are likely to deepen the disparity in the city.

The declining growth of population coupled with the recent trend for out-migration, the slump in the manufacturing sector and fluctuating growth story of the tertiary sector have pushed Madurai towards becoming a 'shrinking city'. Moreover, the limited success of Madurai as an educational hub and the city's inability to keep pace with the changing needs and skills required in the market is evident in the high unemployment rate. Of late, the government has taken several steps such as establishment of SEZs and industrial parks to generate employment and revitalize the economy. However, despite these efforts, the informality and marginality of jobs in Madurai have increased. The narrow economic base and lack of diversification are the main reasons for the growing informality in the city.

Though Madurai has performed on the social front in the sectors of school education and health care, at the level of infrastructural development there exist stark differences between the extended city boundary and NMAs. The high proportion of slum population within the city adds to the problem of inadequacy in providing urban services. In addition, efforts by the state government to relocate the slum dwellers who are settled on the non-tenable land to self-sustaining satellite townships have led to economic dislocation, especially among females.

Furthermore, the outdated Master Plan of Madurai city fails to address the emerging issues and challenges of urban development. A new Master Plan is needed to strategize sustainable urban development including revitalization of the water bodies, addressing the issue of acute water shortage and the problem of sewerage in NMAs.

This case study brings into focus a few challenges that need immediate attention. First, expanding the economic base needs to be one of the priorities to achieve sustainable growth and agglomeration economies in cities of India. Revenue generation will help to roll out better urban services, which otherwise are largely dependent on grants from the central and state governments. Also, the proper implementation of the 74th Constitution Amendment to devolve financial power to ULBs is necessary. Second, inclusive planning and reducing disparities through a concerted plan is needed. Urban policymakers need to strengthen partnerships with citizens, various interest groups and NGOs.

Third, managing core infrastructure has become quintessential for growth and development of city, especially with regard to water. Fourth, an integrated system for cities or a comprehensive network of cities and surrounding peri-urban areas promotes comprehensive and sustainable development. Krishnamurthy, Mishra, and Desouza (2016) aptly puts it 'as cities evolve, developing the expertise and knowledge of the city administrators will become a critical asset for governing and managing urban complexities' and thus, the experience of a city can be used as learning experiences for others.

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Notes

1. The criteria to recognize a city as shrinking or de-populating includes: declining fertility rate below replacement level of 2.1 per cent (cities in countries like South Korea and Japan); loss of jobs in labour-intensive sectors like manufacturing and mining (cities like Leipzig in Germany, Detroit, Pittsburg, Louis and Cincinnati in the United States lost population due to de-industrialization); lost population due to resource depletion or technological shifts (e.g., Yichun, a city in northeast China, though attracted considerable economic activity lost almost 12% of its population between 2012 and 2016, due to depletion of natural resources in the form of unsustainable logging).
2. There is mention of trade between Madurai city and the Mauryan Empire of North India in Kautilya's *Arthashastra* (fourth century BC).
3. Ashoka's inscription (third century BC) described the Pandya, Chera and Chola kingdoms of Madurai.
4. Sacred geometry, which defined the layout of any area, involving elements of both ritualism and architecture.
5. Madurai (M. Corp.).
6. Avaniapuram (M), Anaiyur (M) and Thiruparankundram (M).
7. Melamadai (CT), Kannanandal (CT), Vandiyur (CT), Chinna Anuppanadi (CT), Nilaiyur I Bit (CT) and Nagavakulam (CT).
8. Vilangudi (TP), Paravai (TP), Thirunagar (TP) and Harveypatti (TP).
9. <http://www.maduraicorporation.co.in/socio-economis-resource-profiling.html> (accessed on 27 April 2018).
10. In India, the GDP estimates are available only at district level.
11. Though the performance of electricity, gas and water supply is the worst, the proportion of population engaged in this sector and hence affected is always less than others.
12. <http://www.tn.gov.in/dear/State%20Income.pdf> (accessed on 26 July 2018).
13. Classes equipped with information technology-based learning platform.
14. An Act to make provision for advancing public health care in the state of Tamil Nadu. It contained 15 chapters and 145 sections with focus on environmental health, communicable disease control, food hygiene, maternity and child health-care measures. The Act has 13 amendments.
15. In the absence of city level indicators, the urban district is used as the unit of analysis in this section.
16. Based on the perception of the respondent, population census classifies the census houses in three groups: 'good', 'liveable' and 'dilapidated' based on the condition of the house.
17. Percentage of households having more than two members living in no exclusive room or just one room.
18. Tenable slums are located on lands earmarked for residential land use and environmentally safe areas. Untenable slums are located in the unhealthy and environmentally risk areas.

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