


Healthcare Systems Strengthening in Smaller Cities in Bangladesh: Geospatial Insights From the Municipality of Dinajpur

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ABSTRACT: Throughout South Asia a proliferation of cities and middle-sized towns is occurring. While larger cities tend to receive greater attention in terms national level investments, opportunities for healthy urban development abound in smaller cities, and at a moment where positive trajectories can be established. In Bangladesh, municipalities are growing in size and tripled in number especially district capitals. However, little is known about the configuration of health services to hold these systems accountable to public health goals of equity, quality, and affordability. This descriptive quantitative study uses data from a GIS-based census and survey of health facilities to identify gaps and inequities in services that need to be addressed. Findings reveal a massive private sector and a worrisome lack of primary and some critical care services. The study also reveals the value of engaging municipal-level decision makers in mapping activities and analyses to enable responsive and efficient healthcare planning.

KEYWORDS: Health systems, mapping, urban health, healthcare planning, municipality

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Introduction

In the last several decades, South Asia has seen remarkable growth in the size and number of cities. In addition to megacities with populations greater than 10 million, middle-sized towns and cities will significantly contribute toward a projected 250 million increase in urban population by 2030.¹ In comparison to megacities, however, medium-sized cities with populations between 1 and 5 million inhabitants or smaller cities with less than 1 million residents in Africa and Asia display the fastest urban growth rates. In fact, the majority of the world's fastest growing urban centers are smaller cities with only 500 000 to 1 million inhabitants, accounting for 26 out of 43 fastest growing cities in the world.¹ Despite these trends, disproportionate global attention has focused on larger cities especially in low and middle income countries.²

A similar neglect of small and mid-sized cities is apparent in Bangladesh with its centralized government structure tending to privilege public expenditures on Dhaka, the political and economic capital, and the port city of Chittagong.³ The potential of smaller municipalities as centers of economic growth and alternate destinations for urban migrants has been comparatively overlooked.⁴ In Bangladesh, municipalities with less than 500 000 residents have actually tripled in number (104–318) between 1991 and 2007 especially within district and divisional capitals where public tertiary services are located.⁵

Today, around 40% of urban population resides in municipalities across the country.⁴ With rapid rural to urban migration, and increasing economic activity, small and mid-sized municipalities in Bangladesh are expanding in terms of surface area, population density, and per capita income.⁶ Even though municipalities in Bangladesh comprise about 40% of the urban population, state investments in basic public health services are lacking at this level.⁴ Unlike rural Bangladesh where health services are hierarchically organized under the Ministry of Health and Family Welfare (MOHFW) from tertiary hospital to community clinic, in urban areas the governance and provision of health services is bifurcated between 2 major ministries.⁷ The MOHFW is responsible for public tertiary and some secondary hospitals, Primary Health care (PHC) services, confined to a handful of urban dispensaries, and school health clinics. According to the Local Government Act, 2009, the Ministry of Local Government, Rural Development and Cooperatives (MOLGRD&C) is charged with PHC provision within local government institutions (LGIs) (municipalities and City Corporations).⁸ Lacking in capacity and resources to provide these services, for the last 2 decades, urban PHC services have been contracted out to local Non-Governmental Organizations (NGOs) through the donor-funded *Urban Primary Health Care Service Delivery Project*.⁷ Under the current phase of the project, contracted out services are offered in



21 City Corporations and 14 municipalities.⁹ Filling the vacuum in publically-provided healthcare in urban areas, is a massive, growing and diverse private-for-profit sector. Comprised of private clinics, diagnostic centers and hospitals, as well as individual doctor's chambers and informal drug sellers, this sector provides a range of curative services at hours and locations convenient to urban dwellers.¹⁰ The high out-of-pocket expenditures that households shoulder in Bangladesh (73.88%) are largely a function of medical costs incurred in the private sector, and can have impoverishing consequences for the urban poor.^{10,11}

Limited knowledge exists regarding the configuration of municipal health services in Bangladesh, and the capacity of municipalities to hold these systems accountable to the public health goals of equity, quality, and affordability. In order to ensure equitable and quality services to all urban citizen especially to the urban poor, it is vital that both national and local decision-makers anticipate and plan for the healthcare needs of growing populations living in smaller cities.

Toward this end, a mapping study was commissioned by the DFID-funded Urban Health Systems Strengthening Project (UHSSP) to document the healthcare landscape of Dinajpur municipality and in particular, the availability and geographic accessibility of services to the urban poor. The mapping exercise was undertaken with the dual goals of increasing the awareness of municipal-level authorities regarding their cities' current healthcare capacity and informing efforts to address health system deficiencies. This paper presents findings from this mapping study by describing both the healthcare landscape and overall experience of engaging municipal-level decision makers in the exercise. It aims to identify gaps and inequities in services that need to be addressed while reflecting on their implications for municipal governance and priority-setting toward achieving equitable service coverage in smaller cities.

Methods

Study site and population

The data used in this study originate from a health facility mapping census conducted in Dinajpur Municipality in 2016. Dinajpur municipality is located in the northern-most district of Bangladesh, approximately 400 km northwest of Dhaka, the capital of Bangladesh. It is one of the oldest municipalities in the country, with a total population of 206 234 spread across 12 administrative wards, each of which has an elected public representative.^{12,13} There are also 5 extension areas of Dinajpur Municipality slotted for eventual inclusion into the municipality's jurisdiction. Geographically, the Dinajpur municipality area skirts the river Punarbhaha, and occupies a land area of 20.23 square kilometres.¹³ A City health planning exercise supported by a donor-funded project was ongoing in Dinajpur during the study period. It was an opportunity to leverage the existing platform to use the

health facility maps generated through the mapping exercise. Since Dinajpur is one of the oldest municipalities in Bangladesh,¹² many other municipalities have similar characteristics. Dinajpur municipality was selected for the above-mentioned reasons.

Study design

This descriptive quantitative study consists of a GIS-based census and survey of health facilities. An application compatible for tablet computer was developed for facility listing and survey. Features included in the app were the ability to record and track GPS coordinates, capture road networks (including the type and width), insert facility locations, perform surveys on the inserted facilities using the digital version of the questionnaire, and insert key landmarks. The app included ward boundaries/study boundaries and also satellite images for accurate GPS tracking and survey. All recorded data were saved locally on the tab either in MySQL database or in JSON (Javascript Object Notation Format) so that the app can work without any active internet connection. All operating health facilities were included in the facility listing, and all formal health care providers, with the exception of those operating private doctor chambers, were included in the health facility survey.

Facility census and survey

Data collection occurred over the period March to April in 2016. Prior to field level activities, permission from respective Municipality authorities was obtained including the Mayor, Civil Surgeon, Directorate General of Health Services, and Directorate General of Family Planning. Written confirmation was also obtained from the NGO partners working in the municipality. A data collection team was formed and trained over a 5 day period. Data collection involved a 2-step process starting with a health facility listing of all operating facilities, followed by a health facility survey which focused on facilities with sufficient infrastructure and personnel to support a spectrum of services. Data collectors physically visited health facilities and collected information from clinic managers, hospital superintendents and in few occasions from doctors. We were able to collect information from all the facilities included in the survey. Survey data included the type of health facility, management entity involved, facility focus, service hours, staffing pattern, qualifications and training, and services offered. A total of 806 facilities were listed and among these listed facilities, 207 health facilities were surveyed following the inclusion criteria. Since prior permissions were obtained, and multiple visits were made in instances when respondents were not available, data collectors were successful in collecting information from all the facilities targeted for inclusion in the survey.

Table 1. Operational definitions of health facilities.

FACILITY TYPE	DEFINITION
Hospital	Any formal institution providing both outdoor and indoor services with more than 30 beds (≥ 31).
Clinic	Any formal institution with or without indoor services having less than or equal 30 beds (≤ 30) and provides primary or secondary healthcare.
Diagnostic center	Facilities that provide medical testing and imaging facilities. In addition, some also provide out-patient services.
Drop-in-center	A facility that serves only specific groups of people such as sex workers, intravenous drug users, street children. Services are largely focused on health education, with clinical care available only 1 or 2 days a week. It can be either static or satellite.
Blood bank	A facility whose primary function is blood collection, preservation, and sometimes transfusion service. Clinical services are not provided in this facility.
Delivery center	Informal MNCH facilities run by BRAC and Caritas where poor women can receive ANC and PNC services and have normal deliveries assisted by trained birth attendants or midwives.
EPI center	These facilities only provide immunization services for children under the Government's Expanded Program of Immunization.
Satellite clinic	Limited services offered by NGOs at the community level during particular hours and days in a week at a location which might not be specific.
Doctor chamber	Private practice by doctors not attached with any larger institute like hospital or clinic
Pharmacy	A facility that sells drugs as its primary service.

Table 2. Number, types, and distribution of surveyed health facilities in Dinajpur municipality.

FACILITY TYPE	DINAJPUR MUNICIPALITY (N=207)			
	PUBLIC (N=33)	NGO/NOT-FOR-PROFIT (N=99)	PRIVATE (N=75)	TOTAL (N=207)
Static				
Hospital	2	4	1	7
Clinic	7	15	36	58
Diagnostic center	1	0	36	37
Pharmacy attached with doctor's chamber	1	0	0	1
Doctors' chamber	0	5	0	5
Drop-in-center	0	4	1	5
Blood bank	0	3	1	4
Total	11	31	75	117
Satellite				
Clinic	2	66	–	68
EPI center (immunization)	20	2	–	22
Total	22	68	0	90

Data analysis

Health facility data were analyzed using Stata 13 statistical analysis software and MS Excel. Descriptive statistics were performed to generate frequency tables and graphs. Geographic Information System (GIS) coordinates were collected for each facility and represented visually on base maps relative to ward-wise population using ArcGIS 10.2. Based on these maps and

associated data, specific questions regarding geographic accessibility and service coverage were explored.

Ethical considerations

The study received ethical clearance from the Ethical Review Committee of icddr,b on 16 April 2014 (PR-13100). Permission was also sought from relevant authorities prior to

facility census and survey. Written consent was taken from the respondents prior to the survey. Participation was completely voluntary, and efforts were made to collect service information at the respondent's convenience to minimize disruptions to normal business activities.

Operational definitions

Operational definitions of health facilities are described in the following table 1.

Results

Distribution

The large majority facilities listed in Dinajpur were managed by the private sector: out of 806 facilities, 83.6% were managed by private-for-profit sector with the remaining managed by NGOs (12.3%) and the public sector (3.9%).

Among the 207 facilities surveyed in Dinajpur (Table 2), 117 offered services at a static, dedicated location. Of these, 2 hospitals and 7 clinics were managed by the public sector while the private-for-profit and NGO sector accounted for a total of 5 hospitals and 51 clinics. A total of 90 satellite clinics were identified offering services during limited hours and days of the week or month. Apart from 2 satellite clinics and 20 state-provided Expanded Program on Immunization centers, the majority of satellite clinics were managed by NGOs and largely involved a single paramedic registering patients and providing referral services. Out of 4 standalone blood banks, 3 were operated by NGOs and 1 by the private sector. However, apart from these standalone blood banks, many hospitals and clinics possessed their own blood bank.

As shown in Table 3, general health and curative services, such as diabetes, blood transfusion, pharmacy, maternal health, etc., were available across all health facilities in Dinajpur Municipality. However, capacity for emergency services such as cardiac care unit was limited to 1 public hospital and 1 NGO only, with the same NGO being the sole facility equipped with an Intensive Care Unit. No neonatal intensive care services were found in the municipality. It is worth mentioning that although private-for-profit facilities offer the highest numbers of surgical services, none reported having critical care capacity. NGOs are much more involved in the provision of family planning and health education services compared to public or private-for-profit private facilities.

Table 4 demonstrates substantial variations in the cost of selected health care services in Dinajpur municipality comparing public, private-for-profit and NGO facilities. Public facilities were available free of charge, sometimes involving a nominal registration fee. NGO facilities also provided health services affordable to the poor by means of subsidized or free services and health cards, along with the provision of regular services which are priced below what is charged in private-for-profit facilities. For example, the median cost for a

Table 3. Reported availability of major health services.

	PUBLIC	NGO	PRIVATE	TOTAL
General health and curative service				
Diabetes	3	13	38	54
Blood transfusion	2	1	3	6
Blood bank	1	3	1	5
Eye exam	3	2	3	8
Maternal health	3	6	29	38
TB (Dot's)	2	3	–	5
Skin infection	6	20	39	65
Respiratory infection	7	26	47	80
Diarrhea	6	31	40	77
Emergency and critical care service				
First aid and casualty	7	41	36	84
Cardiac/coronary care unit	1	1	–	2
Intensive care unit	–	1	–	1
Burn unit	1	–	–	1
Ambulance service	3	5	8	16
Surgery services				
General	2	6	31	39
Laparoscopic	2	2	8	12
Cesarean section	3	6	30	39
Dental	2	2	3	7
Family planning service				
Temporary family planning methods	4	77	4	85
Long term family planning methods	1	15	4	20
Permanent family planning methods	3	7	18	28
Family planning counseling	13	76	28	117
Health education				
Adolescent	11	71	–	82
Sexual and reproductive health	13	67	8	88
Maternal services	11	69	7	87
Others	4	9	1	14

pregnancy ultrasonogram in the public sector was 110 BDT, which was 250 BDT in private-not-for-profit facilities, and 500 BDT in private-for-profit facilities. Similarly, median

Table 4. Cost of selected health services by management entity in Dinajpur municipality.

SERVICE COST IN BDT [1 BDT = .012 USD]	PUBLIC (N=11)			NGO/NOT-FOR-PROFIT (N=31)			PRIVATE (N=75)			TOTAL (N=117)		
	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE
ECG	80	80	-	200	200	-	243.1	250	150-500	233.6	250	80-500
Pregnancy ultrasonogram	173.3	110	110-300	266	250	80-500	478.3	500	250-730	388.9	500	50-730
C-section (package)	3250	3250	-	8314.3	9000	5200-10000	8664.3	8000	5500-15000	8445.8	8000	3250-15000
C-section (non-package)	0	0	0	6900	7500	3000-9500	7240	7000	3000-13000	7183.3	7250	3000-13000
Chest X-ray	70	70	-	175	175	150-200	206.8	200	150-400	198.6	200	70-400
NVD (package)	0	0	0	2550	2000	1500-5000	3913.8	4000	1000-8000	3649.9	3000	1000-8000
NVD (non-package)	0	0	0	2050	1750	1000-3700	3095.5	3000	1500-5000	2934.7	3000	1000-5000
Random blood sugar	58.1	60	40-60	85.6	80	10-120	101.2	100	50-150	91.9	100	10-150
Urine routine	21.9	20	20-40	45.8	50	30-80	50.5	50	40-80	46	50	20-80

ECG charges were 80 BDT in a public facility and 500 BDT in a private facility; while normal vaginal delivery could cost 1000 BDT in an NGO and up to 5000 BDT in a private facility.

As seen in Figure 1, an unequal distribution of static government health facilities in relation to population density, was observed. Among 10 static public facilities in Dinajpur, the Ministry of Health managed 8 facilities while the remaining 2 were managed by the municipal authority under the Ministry of Local Government. Most of these facilities were concentrated in only 4 of its 12 wards, leaving some wards with high population densities (ranging from 9000 to 20000 persons per square kilometre) comparatively uncovered. In ward 1, for example, the population density was as high as 8775 per square kilometre, yet no government facility was available in that area.

As shown in Figure 1, private facilities predominantly clustered around public facilities. For example, a significant number of private facilities were located within close proximity of Dinajpur Medical College.

This unequal distribution is particularly apparent in the southern and northern part of Dinajpur municipality where facility concentration is lower.

Service gaps

According to the Local Government Acts of 2009, local government institutions are responsible for providing primary healthcare in urban areas.⁸ However, at the time of study, Dinajpur was not part of the current extension of the Urban Primary Health Care Project which supports the provision of PHC services in cities and municipalities through contracting-out arrangements with NGOs. Rather, independent NGOs were the primary provider of PHC services in Dinajpur, supplemented by a singular Outdoor Dispensary operated by the Ministry of Health.

In terms of emergency services, huge gaps were revealed including a lack of Neonatal Intensive Care services. In addition, only 2 facilities respectively were found to possess intensive care, burn unit capacity. Only 2 facilities, 1 public and 1 private not-for-profit, were reported to provide coronary care services in Dinajpur, both found in the Southeastern part of the municipality. The public facility, located in the extension area of the municipality, is equipped with coronary care and burn units, while intensive care and coronary care services are available in the private sector facility.

Service hours

Figure 2 reveals a large variation in service hours comparing facilities managed by public, private or NGO sector. Hospitals, clinics, diagnostic centers, blood banks, doctor chambers, and drop-in centers are included in this analysis. The majority of public and NGO facilities offered services up to 5 pm. By contrast, private-for-profit health facilities such as hospitals,

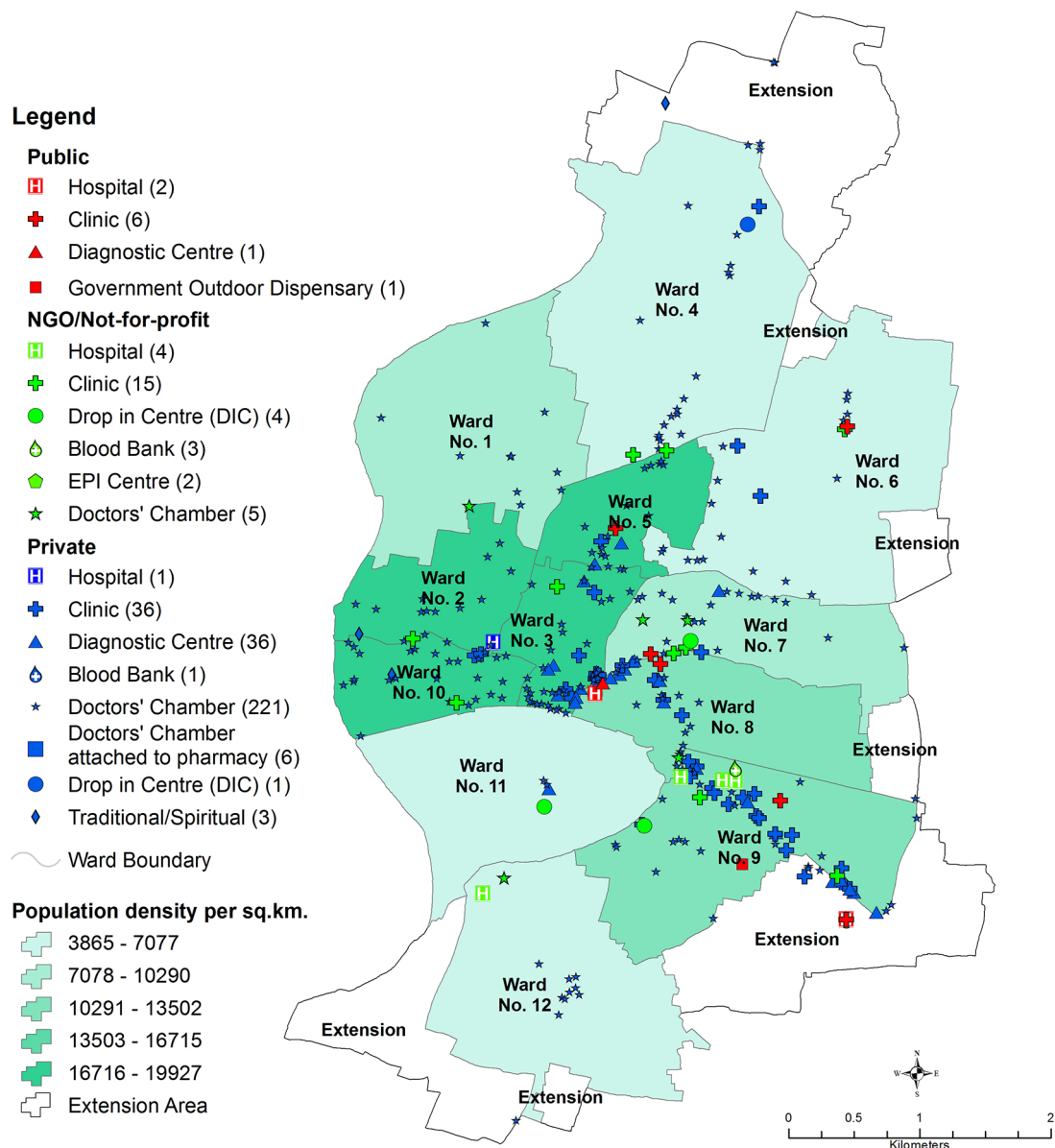


Figure 1. Distribution of all static facilities.

clinics and diagnostic centers were open after 5 pm. Among the 10 public facilities in Dinajpur, only 3 provided services after 5 pm. In Dinajpur among 50 facilities providing 24/7 care, 38 were private, 3 public, and 9 were NGO facilities. NGO-run facilities mainly provided services during day time and morning hours.

As shown in Figure 3, large geographic gaps in 24/7 services are also apparent. For example, in Dinajpur, there was no public 24/7 facility in the highly dense northern part of the city (wards 1, 4, 6). A similar unequal distribution of 24/7 facilities is apparent for the private-for-profit sector since the large majority of private-for-profit 24/7 facilities are clustered in wards 3, 8, and 9.

Engagement of municipal-level authorities

Municipal-level engagement was an important component of our mapping exercise to ensure that facility listing and survey

activities were accurate and complete, but more importantly, that resulting maps were widely disseminated and used. Engagement with local-level authorities was initiated in January 2016 and permission for the mapping exercise was obtained in February 2016. The health facility mapping exercise was executed between March 2016 and April 2016. Local authorities started city health planning activities immediately after completion of the mapping exercise. During the post-mapping period, regular communication was maintained with the Municipal authority, Civil Surgeon, and other stakeholders in Dinajpur up to June 2016. At the design phase of the study, we brought a stakeholder group together comprised of municipal authorities, local representative of the Ministry of Health, as well as NGOs and private-for-profit providers. They were informed about our purpose and methods, and engaged in ensuring that necessary permissions were enabled. After the completion of mapping activities, findings were shared and

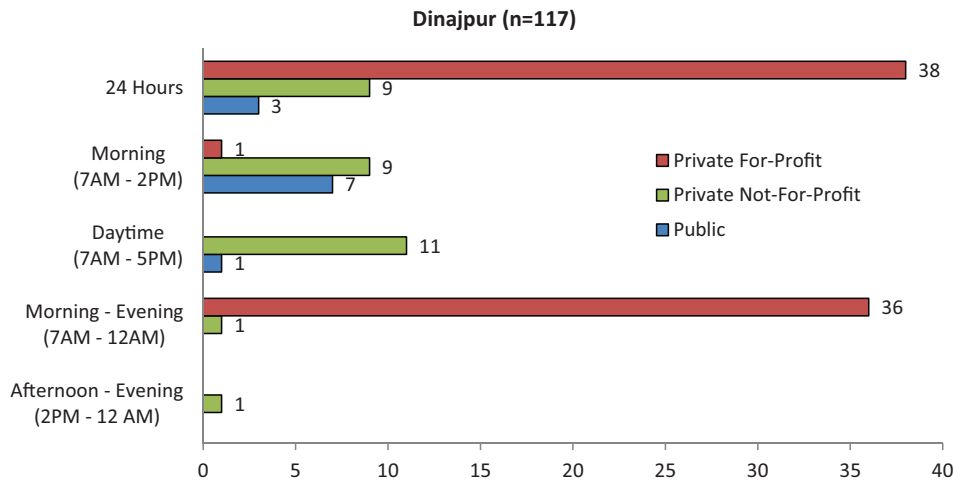


Figure 2. Pattern of service hours by management entity in Dinajpur Municipality.

validated through a series of workshops involving the same stakeholders, as well as representatives at both ward, and central levels. During these workshops, stakeholders discussed gaps and duplication in health service delivery, possible remedial actions, and potential applications of the maps for health systems governance and planning.

Encouragingly, follow-up revealed that maps were actively informing municipal planning activities. Local health coordination committees, chaired by the Mayor, with the district level Civil Surgeon as Vice Chair and the Municipal Health Officer as Member Secretary, were formed to review the current situation regarding healthcare provision in Dinajpur, and the maps produced by icddr,b were central to discussions on how to improve service coverage for the urban poor. Several concerns and remedial actions were identified with reference to facility maps. Municipal authorities noted the absence of service area demarcation among NGOs resulting in duplication of satellite and immunization sites and service gaps particularly in slums. To address the problem, maps were employed to identify and allocate catchment areas to NGO providers in these areas. NGOs reported consulting facility maps to determine where to establish new satellite and immunization centers and where merge such centers, with the goal of optimizing coverage of the referral and immunization services they provide. This was achieved without additional investment, through leveraging NGOs' existing resources.

Discussion

Rapid urbanization poses challenges to local and national governments related to growing urban demand for healthcare services, and the health risks accompanying unplanned growth. Among the issues of concern is the maldistribution of healthcare services relative to population needs, inadequacies in health human resources, weak regulation and quality, and rising hospital and medical costs.¹⁴ These issues are even more acute in smaller cities which are growing in size and population, but with limited additional investment in healthcare provision.

Recent global discourse emphasizes the value of urban spatial planning in integrating the public sector functions, for example, health, for sustainable urban development which is linked to the Sustainable Development Goals related to cities (SDG11).¹⁵ In fact, city planning is now being regarded as a preventive health measure, and place-based indicators are increasingly considered fundamental to a systems approach to urban health and a crucial input to policy-making.^{16,17}

It is well established that evidence is key in ensuring equitable health services for all urban dwellers.¹⁸ As such, this study provides an example of the value of geospatial data in revealing the maldistribution of healthcare services, and informing tangible action to rectify inequitable gaps in coverage. Study findings also point to specific issues of concern for Dinajpur with respect to the availability and geographic accessibility of services.

Availability

Perhaps the most concerning finding was the overall lack of urban public primary healthcare in Dinajpur in stark contrast with surrounding rural areas where a comprehensive system of public community clinics is in place that provide primary care services and referral to district and divisional hospitals throughout the country.¹⁹ In Bangladesh, the few investments made in urban primary care have tended to privilege larger city corporations. For example, the Urban Primary Health Care Service Delivery Project operating in 21 cities and 14 municipalities across the country did not extend to Dinajpur at the time of study.⁹ This bias in investment toward larger urban areas and the project's centralized management structure has overlooked the need to strengthen municipal capacity in meeting the growing healthcare demands of their expanding populations.⁷ Filling this vacuum in public provision is the fast growing urban private-for-profit sector.²⁰ It accounts for the largest number of facilities compared to public and NGO sectors. This finding is also similar to a GIS study conducted in Kaduna State in Nigeria, which found that the private sector accounted for

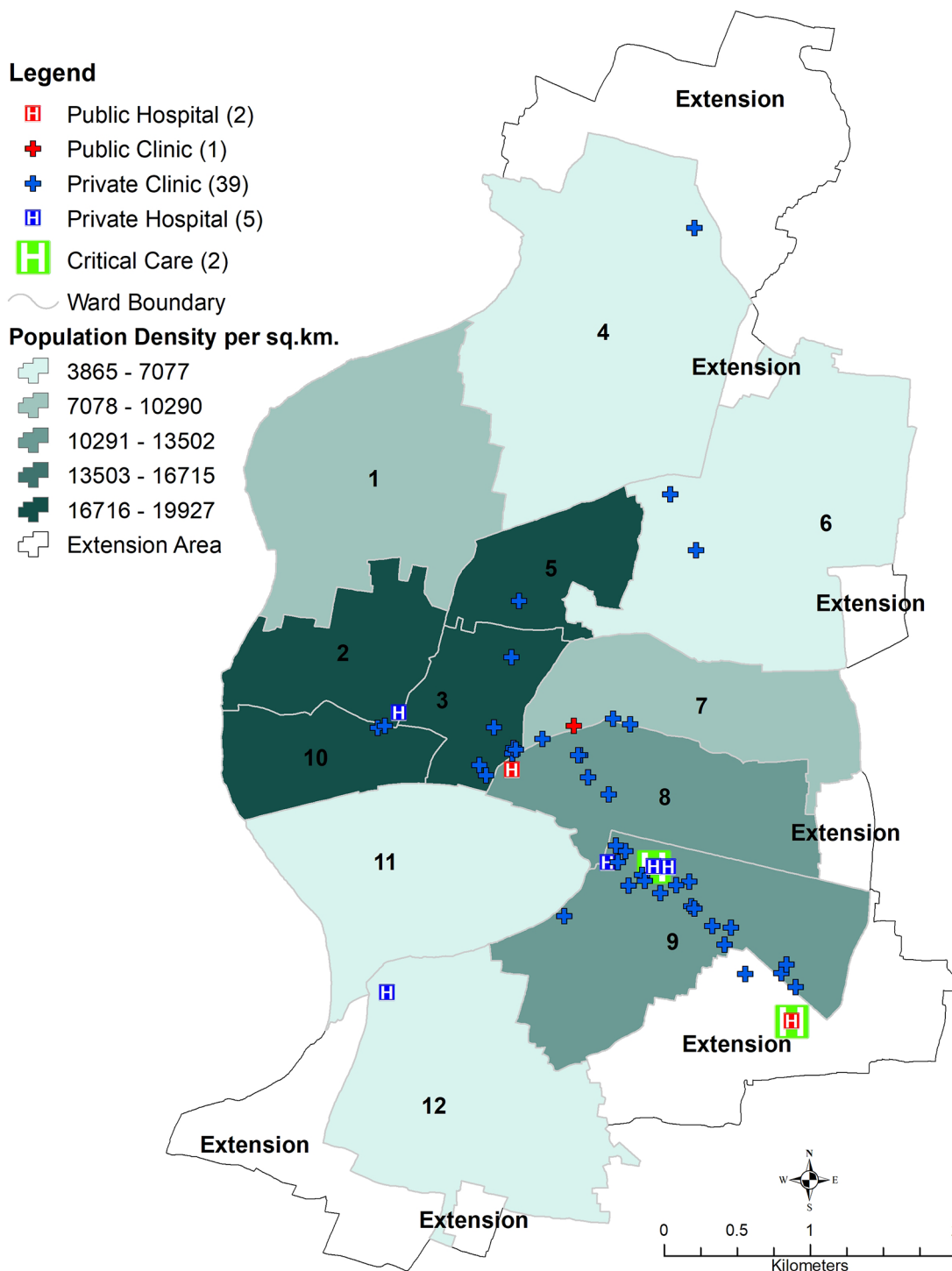


Figure 3. Distribution of critical care and 24/7 services in Dinajpur Municipality.

majority of health facilities, and identified large inequities in the distribution of facilities across the state relative to needs.²¹

Findings also indicate limited service hours in both public and NGO facilities which further exclude the working poor during daytime hours. While the majority of public and NGO health facilities close in the early afternoon, a significant number of private facilities are open in the evening and 24/7 which serve the working middle class. Among the urban poor, however, evidence from the literature suggests a preference for services from informal private facilities, especially drug shops,

which dispense medication without prescription at hours and locations deemed more convenient than public, NGO or formal private sector facilities. (Health Systems and Population Studies Division, icddr,b, unpublished report, April 2017).

Geographic accessibility

In terms of distribution, geospatial evidence revealed areas of the municipality where facility concentration was higher, and other pockets where service gaps were apparent. We also

observed a particular concentration of private sector facilities around public facilities. This finding is consistent with a GIS study in Chittagong City Corporation indicating an uneven distribution of facilities and a clustering in 3 major zones,²² and to analyses, we have conducted in other cities of Bangladesh.²³⁻²⁵ Adopting an approach similar to our own, a study conducted in Cambodia also noted a high concentration of healthcare resources in areas with the lowest poverty rate.²⁶

Geospatial analysis further revealed concerning gaps in critical care. It is well known that timely and appropriate emergency care could avert a significant number of deaths and associated disabilities in low- and middle-income countries.²⁷ It is also established that health system planners often encounter difficulties ensuring access to trauma services.²⁸ Our findings indicate significant geographic gaps in coverage of comprehensive emergency and critical care health services including intensive care units, burn units, and neonatal intensive care units. Similar gaps are apparent in other cities in which mapping has occurred.²⁴

Implications for urban health governance

Evidence suggests that municipal authorities can play a pivotal role in reducing health disparities in cities.²⁹ Indeed, given their knowledge of local circumstances, they are better placed to identify and respond to gaps in services, and to harness opportunities to enable health coverage for their citizens. Study findings suggest that local municipalities can implement actions to improve health coverage by leveraging and redistributing existing resources if given the tools to do so. However, national-level action is also needed to address urban health governance challenges around regulation, accreditation, and the accountability of a system largely dominated by the private sector, as well as related concerns about escalating out of pocket payments for the urban poor.³⁰ These are system-level issues that municipalities cannot tackle alone, and which require state-level engagement and financing. Although municipal authorities are interested in improving city health infrastructure and healthcare access for their citizens, fiscal and administrative capacity constrain efforts to plan and implement corrective actions.³ In this respect, state-level investments in building the capacity of municipal authorities to plan and manage healthcare provision, are also necessary. Finally, this study emphasizes the value of geospatial health facility information systems to help decision-makers identify service coverage service gaps and under-served populations, and their promise in improving the quality, equity, and efficiency of the overall health system.

Limitations

The facility mapping only listed informal healthcare providers but did not capture their details. All facility data on service provision and health human resources was reported by the facility concerned and quality of service was not assessed. The collection of population data including socio-demographic

information and service utilization was not within the scope of this study. A follow-up study that investigates whether the use of geospatial data for health planning has been sustained over the long-term will help establish the feasibility and impact of this approach.

Conclusion

Since municipalities in Bangladesh are shouldering an increasing proportion of the urban population, greater attention to health systems development is needed in terms of service delivery, capacity building and regulatory support. South Asian countries like Bangladesh can let unplanned urban growth continue or undertake policy reforms that leverage the untapped potential of agglomeration economies in cities.³¹ Municipalities in Bangladesh also have the opportunity to assume a proactive approach toward planned urban development especially for the health sector and to ensure health services for all citizens.³² As this paper argues, the availability of comprehensive information regarding the supply of healthcare services and their distribution across the urban landscape can assist the formulation of evidence-based strategies toward this end. Insights from geospatial data can contribute toward improved urban health service delivery, and even more so when local-level authorities are engaged in using maps to rectify coverage inequities. These findings may be valuable for other countries in the Asia Pacific region that are experiencing rapid urbanization.

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Author Contributions

SMH conceptualized the paper, carried out the literature review, analysed the data, interpreted the results, prepared the first draft of the manuscript, revised it and prepared the final version for submission. KGB carried out the literature review, analysed the data, interpreted the results, and took part in the preparation of the draft manuscript. DSB carried out the literature review, interpreted the results, and took part in the preparation of the draft manuscript. SA analysed the data, interpreted the results, and took part in the preparation of the draft manuscript. AA critically reviewed and revised the manuscript. AMA conceptualized the paper, provided expert knowledge on urban health systems in Bangladesh, critically reviewed and revised the manuscript. All authors read and approved the final manuscript.

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