

HEALTH FACILITY MAPPING IN JESSORE MUNICIPALITY, BANGLADESH

JESSORE MUNICIPALITY



Census conducted in
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Health Systems and Population Studies Division,
icddr,b, Dhaka

Phone: +880-2-982 7001-10

Fax: +880-2-881 1686

Email: smehdi@icddrb.org

Web: www.icddrb.org

Cover Design

Rahenul Islam

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Mehdi Hasan
Shakil Ahmed
Fayeza Sultana
Dipika Shankar
Nushrat Mehjabin
Rahenul Islam
Nibras Rakib
Sohana Shafique
Alayne Adams



68, Shaheed Tajuddin Ahmed Sarani, Mohakhali, Dhaka – 1212, Bangladesh
Phone: +880-2-982 7001-10, **Email:** smehdi@icddr.org, **Web:** www.icddr.org

GPO Box 128, Dhaka 1000, Bangladesh

@icddr_b /icddrb icddr,b communications@icddr.org

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Study Team

Shaikh Mehdi Hasan, PI

Alayne Adams

Sohana Shafique

Shakil Ahmed

Quazi Fayeza Sultana

Md. Rahenul Islam

Nibras-Ar-Rakib

Dipika Shankar Bhattacharyya

Nushrat Mehjabin

Sharlin Akter

Ayesha Akter

Nasrin Akter

Sufia Sultana

Sadia Arefin

Sajia Afroja

Nusrat Salma Sultana

Md. Jolhash Uddin

Md. Shah Jalal Bhuiyan

Md. Sujaul Islam

Abdulla Sayed

Shamsul Huda Uzzal

Saify Iqbal

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Acronyms

ANC	Antenatal Care
BBS	Bangladesh Bureau of Statistics
BEmOC	Basic Emergency Obstetric Care
CCU	Coronary Care Unit
CEmOC	Comprehensive Emergency Obstetric Care
CRHCC	Comprehensive Reproductive Health Care Centre
DGFP	Directorate General of Family Planning
DGHS	Directorate General of Health Services
DIC	Drop in Centre
DOTS	Directly Observed Treatment, Short-course
EmOC	Emergency Obstetric Care
EPI	Expanded Program on Immunization
FSW	Female Sex Worker
FPAB	Family Planning Association of Bangladesh
GIS	Geographic Information System
GPS	Global Positioning System
HMIS	Health Management Information System
icddr,b	International Centre for Diarrhoeal Disease Research, Bangladesh
ICU	Intensive Care Unit
KEPH	Kenya Essential Package of Health
MSM	Men Who Have Sex With Men
MOH&FW	Ministry of Health and Family Welfare
MFL	Master Facility List
NGOs	Non-Government Organizations
NHSDP	NGO Health Services Delivery Project
NICU	Neonatal Intensive Care Unit
PNC	Postnatal Care
SARAM	Service Availability Readiness Assessment Mapping
SRH	Sexual Reproductive Health
UHC	Universal Health Coverage
WHO	World Health Organization

Chapter 1

Introduction

BACKGROUND

Bangladesh is one of the most densely populated countries in the world. This country is experiencing rapid urban population growth in recent decades. Uneven development, natural hazards and lack of employment opportunities are the key factors of urban population growth (Rana, 2011). While the many benefits of organized and efficient cities are well understood, we need to recognize that this rapid, often unplanned urbanization brings risks of profound social instability, risks to critical infrastructure, potential water crises and the potential for devastating spread of disease. (World Economic Forum, 2015). Annual urban growth rate in Bangladesh is 3.15% (BBS, 2003). Slum-non slum disparity is increasing day by day and most urban growth occurring in slum settlements, where health risks are greatest (United Nations, 2014). In addition, the absence of well designed policies for health system strengthening and the lack of coordination between central and local government amplifies the differences in health care provision (Ahmed et al., 2015).

The health system of Bangladesh is pluralistic with major four key actors that define the structure and function of the system; government, private sector, non-governmental organizations (NGOs) and donor agencies; providing health care services in many areas of Bangladesh (Ahmed et al., 2015). The growth of the private sector compared to the public sector is significant. It has been noticed that there are duplication and gaps in service delivery (MOH&FW, 2012a). Along with the increasing number of hospitals and hospital beds, over the last few years the private sector has witnessed a tremendous growth of teaching institutions. For instance, in 1996 there were no medical colleges or any teaching institutions in the private sector, but by 2011 the private sector had 44 medical colleges (Ahmed et al., 2015).

Strategic policy information in all health systems should be based on information relating to health promoting, seeking and utilization behavior and the factors determining these behaviors (Shaikh & Hatcher, 2005). Despite of having density of health care services and concentration of skilled health workers gender discrimination and socio-economic inequality creates inequality in availability, accessibility and utilization of health care services (Ahmed et al., 2015; Ahmed, Hossain, & Chowdhury, 2009). Moreover, neglected policy and lack of coordination between national Govt. and local Govt. regarding urban health issue keep this problem unsolved. While urban living continues to offer many opportunities, including potential access to better health care, today's urban environments can concentrate health

risks and introduce new hazards (WHO, 2016).

To meet the increasing demand for quality health care it is essential to keep a sustainable health system that can ensure equal service to all, particularly for the poor and marginalized population. This can be done with the development of a regulatory system which utilizes the expansive private sector in providing equal healthcare services can improve effective and accessible healthcare (Ahmed et al., 2009; MOH&FW, 2012b). Sound information on the supply and availability of health services is essential to provide good services. Moreover, it is essential that policy makers and health system planners have an accurate understanding of existing healthcare facilities to develop a picture of the demands and gaps of the urban health system. Given that the development and maintenance of a comprehensive master facility list (MFL) is the basis of monitoring the health services provided to the population, the use of Geographic Information System (GIS) can play an important role in this listing process. Because health has an important environmental and spatial dimension where a GIS survey can play a very useful role for health researchers and planners as evidenced from various studies (MOHFW, 2012b). In Nepal, a Health Facility Mapping Survey was done in 2009 using GIS that played a significant role in improving the health system management by conducting a needs analysis/assessment of establishing new facility in the required locations and by providing health facility-population ratios (HMIS, 2009). In 2013, Kenya prepared a service availability and readiness assessment mapping (SARAM) (Government of Kenya, 2014) which helped them to define county and national government strategic direction in transfer of health and to guide future measuring and tracking of progress in expansion of Kenya Essential Package of Health and related Services Census (KEPH) service provision and as whole Universal Health Coverage (UHC) in Kenya.

The Health Systems and Population Studies Division (HSPSD) at icddr, b for the first time has mapped the existing urban health system, including health facilities, the existing infrastructure, services provided, fees charged, service duration; with the aim of mapping the current status of healthcare provision in urban Bangladesh. The analysis of this data demonstrates the demands and availability of services for the urban poor in selected areas of Bangladesh. The data includes digital mapping of existing health facilities of the city corporations

including those of Dhaka, Chittagong, Sylhet, Khulna, Rajshahi, Narayanganj and Dinajpur Municipality. Service location, distribution and geospatial information was collected, with the aim of developing a dataset that can be used by health service planners to strategize for future health service provision, including planning and monitoring. This map provides stakeholders with an urban atlas visualization tool to aid in identifying coverage gaps between primary and tertiary care facilities, skilled staff availability and hours of service.

Why GIS in Urban Bangladesh: Prior to this study, the specific health needs and available services information to the urban population were not known. Given the complex landscape of cities, there is an urgent need for up-to-date information about the location of health facilities and infrastructure to help guide decision making and provide essential services (WHO, 2013). Listing and mapping of health care facilities in Jessore Municipality is the continuation of this initiative. This study has developed a computer based interactive map that provides important information regarding type, distribution and cost of health services.

OBJECTIVES

1. List all health facilities in Jessore Municipality
2. Collect geospatial data of all health facilities in Jessore (public, NGO and private for profit - formal and informal)
3. Digitize city road network
4. Collect general and service attributes of select health service providers
5. Produce GIS maps of health facilities
6. Incorporate health facility mapping information of Jessore municipality into the Urban Health Atlas

Chapter 2

Methods

STUDY PERIOD AND SITE

The health facility mapping study in Jessore Municipality was conducted in between February 2017 and March 2017. Jessore district is situated in the South-Western side of Bangladesh. It is a part of Khulna Division. Jessore was the first district of Bangladesh to become independent. It gained independence from Pakistan on 6 December 1971. It has a total population of 201,796 (BBS 2011) across its 9 wards. Geographically, Jessore municipality area skirts the river Bhairab, and occupies a land area of 14.72 square kilometer.

The table-1 below details the time of activities conducted during the study period.

Table 1: Timeline of activities in Jessore Municipality

Activity	February				March				April				May			
	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
Preparatory work (Initial visit, permissions obtained, secondary lists collection, Base Map preparation etc.)	■															
Training and pretesting		■														
Health facility listing			■	■	■	■										
Survey training						■										
Health facility survey						■	■	■								
Data cleaning and analysis					■	■	■	■	■	■	■	■				
Atlas preparation													■	■	■	
Report Preparation																■

TEAM COMPOSITION

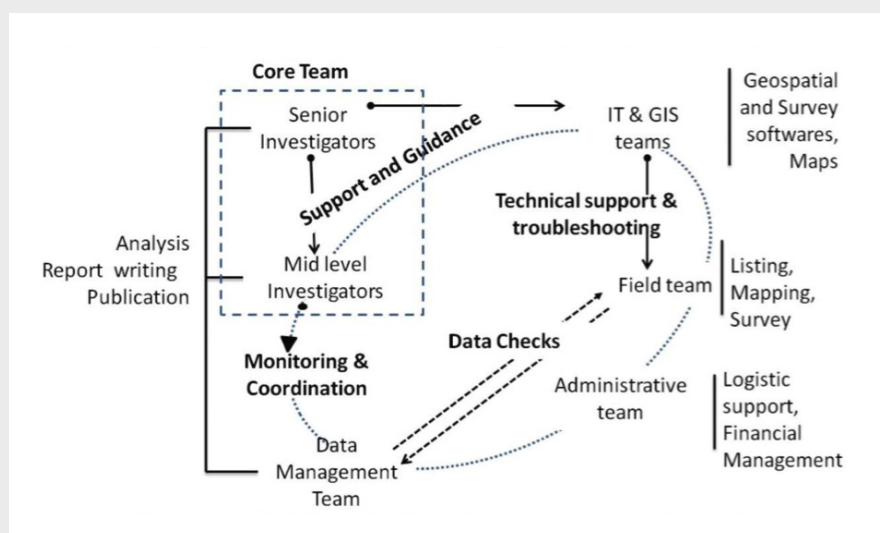
Working in an integrated manner, the urban mapping team was divided into five specialized teams: a) the GIS and IT team (3 people) including geographers, computer programmers, web designers and network experts b) the data collection and mapping team 10 people comprised of research assistants, senior research assistants, research officers, and senior research officers c) the data management and analysis team (3 people) including statisticians, data managers and operators d) the administrative team (2 people) and e) the core or oversight team (4 people) including mid- and senior-level researchers and scientists. The core team was responsible for the overall functioning of the study and its scientific outputs.

PREPARATORY WORK

Prior to field level activities, permission from Jessore Municipality authorities was obtained including the Mayor office, Civil Surgeon, Deputy Director of Family Planning. Permissions from Directorate General of Health Services and Directorate General of Family Planning were also collected. Written confirmation was also obtained from the NGO partners providing healthcare services.

In efforts to ensure data validity and minimize the risk of missing health facilities, a comprehensive list of health facility was initially prepared through communication with respective NGOs and government authorities. This list included EPI centres, DOTS centres, DIC centres, static and satellite clinics of Marie Stopes clinics, NHSDP etc. Moreover, to further strengthen the data authentication process, a secondary list of registered private clinics and diagnostic centres from Civil Surgeon Office was collected.

Figure 1: Team structure and responsibilities



BASE MAP PREPARATION

To delineate the study area, maps for the administrative boundaries of Jessore Municipality along with road networks, were collected and shape files were created by a team of two members with expertise on GIS.

APPLICATION DEVELOPMENT

A semi-structured facility survey questionnaire was developed by incorporating features from the master health facility listing guideline prepared by WHO and previous survey elements used in Sylhet. The questionnaire was improved and modified through field testing, then transformed into a digital version using HTML script.

A web based facility listing and survey software application was developed for tablet computers. 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 a survey of the inserted facilities using the digital version of the questionnaire, and insert key landmarks. The app incorporated 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 (Java script Object Notation Format) so that the app could function without any active internet connection. The generation of unique facility IDs and other features attached with each facility, follows the recommendations/ guidelines of WHO.

The listing and survey questionnaire comprised the following parameters:

- Facility name
- Facility address
- Facility category by nature and management entity
- Facility types
- Service types
- Human resources
- Facility focus
- Service pattern
- Service provision
- Cost of services (in BDT) and
- Provision for the poor

LISTING, PREPARATION: RECRUITMENT, TRAINING, etc.

Field team was formed with postgraduate level education in various disciplines including

anthropology, nutrition, and geography. A week-long training was organized for data collectors to clarify study objectives, goals and procedures, and to provide necessary context regarding urban health systems and the respective municipality. Demonstrations of GIS applications, and hands-on practice sessions with Samsung Galaxy tablet 2 were conducted to familiarize the team with how to update existing road networks and to enter spatial locations of health facilities. This training program encompassed path drawing, tracking and demo facility listing using the new application. Field testing of the apps was performed in urban areas of Jessore Municipality to identify problems and troubleshoot accordingly.

HEALTH FACILITY LISTING

Prior to data collection a work plan was developed by team supervisors and team was assigned daily responsibilities by them. Each ward was listed and surveyed by one data collector; each of them had one tab to conduct the survey. After completion of one study area, each data collector was assigned to the next study area. In the listing phase, the spatial location and other basic information was collected for each facility. In addition, the team updated the existing road networks within the municipality boundary via walking.

Using the customized smart device application, the listing team also updated road networks using GPS tracking and field observation. Ward boundaries were updated using base maps from Jessore Municipality through Arc Map 10.1, and then transferred to the tablet for field verification. Beyond recording GPS coordinates, the tool was also designed to generate unique IDs based on time and day of recording, and numerical order in the facility list. The unique feature of real time visualization of one's position on a digital map in relation to landmarks can help in minimizing the range of error inherent to any other GPS device. Shape files of all wards were installed on the tabs to assist in path drawing, tracking and locating health facilities. Using this tool, health facility listing was done through transect walks across the study areas. To ascertain the completeness of the inventory, three approaches were followed: signboard observation, conversation with proprietor and conversations with community people.

At first, difficulties in categorizing health facilities were faced which subsequently compelled the team to develop operational definitions of various health facilities. Weekly meetings and fortnightly question-answer sessions were arranged for the entire team to maintain uninterrupted health facility listing. Data collectors submitted their daily work updates to an assigned member of the data management team.

HEALTH FACILITY SURVEY

After the completion of listing a week-long training was arranged for survey field staff. Throughout March, 2017 field staff collected survey information from the listed facilities excluding pharmacies, optical shops, traditional healers, and doctor's chambers.

FIELD CHALLENGES

To accomplish health facility mapping activities in Jessore Municipality, a number of unfavorable circumstances had to be overcome during facility listing and survey.

Unavailability of service providers for information: There were few health facilities, where service was provided once in a week. It was difficult for the data collectors to match with their schedule for conducting survey as the service providers remained busy handling with their patients.

Getting information from service providers: Authorities of few private health facilities often did not welcome the survey team to conduct survey right away. They asked the survey team to wait for a long period or come another day. Sometimes the data collectors had to wait for more than hours and sometimes they had to go to the same facility several times to conduct the survey. These interrupted the survey and made delay. Sometimes, survey team faced difficulties in obtaining consent from the authorities of the health facilities.

Difficulty with finding the addresses of satellite clinic: Sometimes, the addresses of satellites provided by corresponding authorities did not match with the actual address, e.g some satellite service points shifted elsewhere or closed. In such cases, the survey team had to communicate with the community

service provider or the clinic managers of the attached clinic to get the updated list of address for satellite facilities.

DATA REGULATION AND FIELD MONITORING

The field monitoring team embarked on a rigid monitoring of the data collection during the health facility listing & survey, aiming to ensure validity of data and ensure coordination between the GIS team and the Data Management team for data authentication. Four staff in a team was assigned to make sudden spot checks to improve data quality. Data rechecking was used to frame the data, maintain consistency and continue regular monitoring of data collection. A 5% recheck method did not apply in this study as the listing used the census method. For this reason, health facilities were selected randomly for data recheck. To ensure no missing facilities, a list of all health facilities of a particular ward was used when re-visiting that particular ward for data rechecking. Weekly meetings were arranged to share work progress and obstacles faced in the field and to identify solutions.

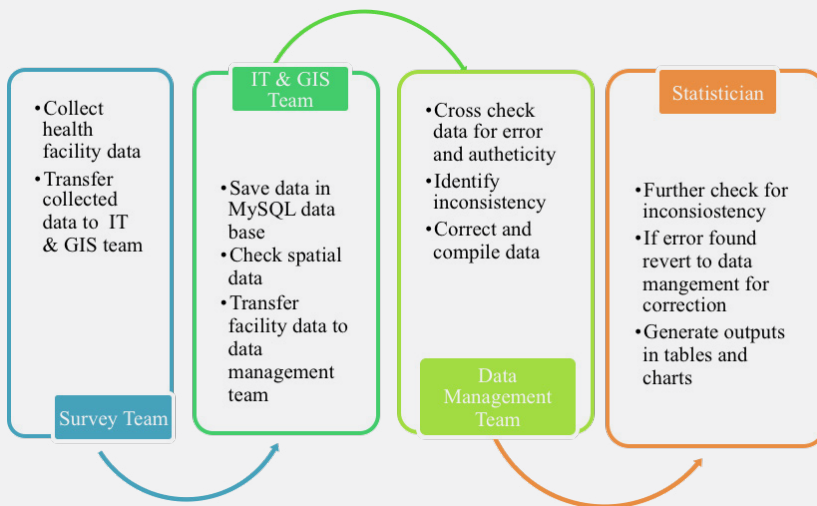
DATA VERIFICATION

Besides the regulatory team, a GIS team also verified collected data in the field following a purposive sampling method. The GIS team split the total area of Jessore Municipality into several blocks. The total area covered by Jessore Municipality (number of wards: 9) is 14.72 sq km. This area was then divided into 162 blocks whereby each block covered 0.1145 sq km. For the purposes of field checking, 9 blocks in 9 study wards were identified for field check, with each block located near the centre of each ward. Information on road networks (new road /removed road), facilities and various shapes of buildings were considered in each block. Together, 9 blocks covered 1.03 sq km each which comprised around 7% of the area of Jessore Municipality. To further validate facility data, the location of static and satellite clinics of NGO facilities were matched-up and verified by their respective program managers/clinic managers.

DATA PROCESSING

Collected data was routinely saved in MySQL database to avoid loss, and the data management team regularly cross-checked collected data for any inconsistencies. The data collection flow is summarized in the figure below.

Figure 2: Data Management Process



The data management team simultaneously edited input data with the help of the facility listing team, and updated data using the existing application developed by software specialists. Afterwards, the data management team members sent the data to the team leader responsible for cross-checking the consistency of data and finally updating and compiling the data ready for data analysis. If there were any inconsistencies found, the team leader sent the data back to the data management team. Data were further rechecked by a statistician using statistical analysis. If any anomaly was found, the data was sent immediately to the leader of the data management team. Finally, when the statistician ensured data authenticity, the required format (like, SPSS, STATA) for data analysis was generated.

DATA ANALYSIS

Data was analyzed using SPSS v. 20.0, Stata 13 and MS Excel. Simple descriptive statistics are presented in this report, including frequencies of facility types, and cross tabulations by typed of Health Facility Managing authority.

ETHICAL CONSIDERATIONS

A signed consent was obtained from each respondent at health facilities prior to participation in this study. Participation was completely voluntary and each participant was given the right to withdraw at any moment of the survey. Health facility service

information was collected at a time specified by the respondent to minimize disruption of normal business activities.

OPERATIONAL DEFINITIONS

Due to the pluralistic health market and lack of uniform terminology across health facilities, commonly used terms are operationalized for clarity and consistency. Box-1 presents the operational definitions of health facilities.

SOME OTHER PRE-DEFINED TERMS WERE:

Specialists: All allopathic practitioners who have a MBBS degree and also have completed all parts of FCPS /FRCS/ MD/ M.Phil/ MS/ MRCP/ MRCS degree were considered specialists in a specific sector.

Dentists: Those who possess a BDS degree and in addition FCPS/ DDS/ MS degree on Maxillofacial/ Children/ Conservative/ Orthodontics/ Prosthodontics were recognized as Dental Surgeons (Specialists). Diploma or short course degree or medical diploma holders were not considered specialists.

BEmOC (Basic Emergency Obstetric Care): This service includes treatment for sepsis, eclampsia, removal of retained products following miscarriage or abortion, manual removal of the placenta and oxytocin.

CEmOC (Comprehensive Emergency Obstetric Care): This service includes c-section, anesthesia, safe blood transfusion, resuscitation along with the services in BEmOC.

Box 1. Health facility type and definition

Facility Type	Definitions
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).
Diagnostic Centre	Facilities that provide medical testing and imaging facilities. In addition some also provide out-patient services.
Drop in Centre (DIC)	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.
EPI centre	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

LIMITATIONS:

The facility survey did not capture all information on the informal sector in health care services of Jessore Municipality; informal facilities were not included in the survey, but only listed. Since a huge number of pharmacies and optical shops (both are non-attached

with doctor's chamber) exist which provided very limited services, these were also not included in the survey. As it was not one of the objectives, this study did not measure the quality of services; only basic reported information has been collected regarding service provision, service duration, cost of services, health human resources etc.

Results

MAPPING HEALTH SERVICES IN JESSORE MUNICIPALITY

Key Findings

- In Jessore municipality, there were 878 health facilities in total of which 220 health facilities were surveyed.
- EPI services were provided through 88 service points and among them 16 service points were fixed EPI center and 72 were satellite.
- Among the 12 surveyed hospitals, 1 was managed by public sector and rest 11 hospitals were run by private sector
- Out of total surveyed health facilities (220), 38 were clinics which included 6 public, 14 NGOs and 18 private facilities.
- There were 2 stand alone blood banks in Jessore municipality.
- Out of total 141 Satellite facilities, 117 satellites were run by NGOs.
- The total number of bed was 1300; among them 1179 were general beds and only 121 were devoted to maternal services.
- There were two Drop in Centers (DIC) in this municipality; one of those were focused on MSM and Transgender; another one focused on FSW.
- 14.5% (32) of the surveyed facilities conducted surgery in addition to in-patient and out-patient services and majority service was provided by private sector.
- A total of 31 facilities were providing 24/7 services in Jessore Municipality, a large majority of these facilities had clustered in ward no 3, 5 and 6.
- There was no service reported on ICU, NICU and Burn unit in Jessore Municipality. In addition, there was no MRI and CT-scan service reported providing by public and NGO facilities.
- 19 health facilities offered ambulance service for the patients.
- Only 1 CCU service was reportedly present during the survey, which was in public sector(250 bedded General Hospital).
- Total 3 CEmOC services were offered in Jessore Municipality which included only 1 public and 2 private facilities.

LISTING SUMMARY:

The primary aim of this project was to list all the existing health care facilities in Jessore municipality. In the first phase of the study, a total of 889 facilities were listed including pharmacies and traditional healers. Among them, a total of 878 facilities were finally included in our database, as 11 facilities could not be reached for collecting information from the facility authority. Out of 878 health facilities, 220 health facilities were surveyed which included 5 health facilities from out boundary area as these numbers of facilities were close-proximate to the demarked Jessore Municipality. (Figure-3)

FINDINGS FROM THE SURVEY:

Health facility type and distribution

Table-2 shows the availability and distribution of health facilities surveyed:

- Total 220 facilities were surveyed in Jessore municipality, among which 79 static facilities were offering daily services at a dedicated location.
- Out of 8 government static facilities there were 1 hospital, 6 clinic, 1 EPI center

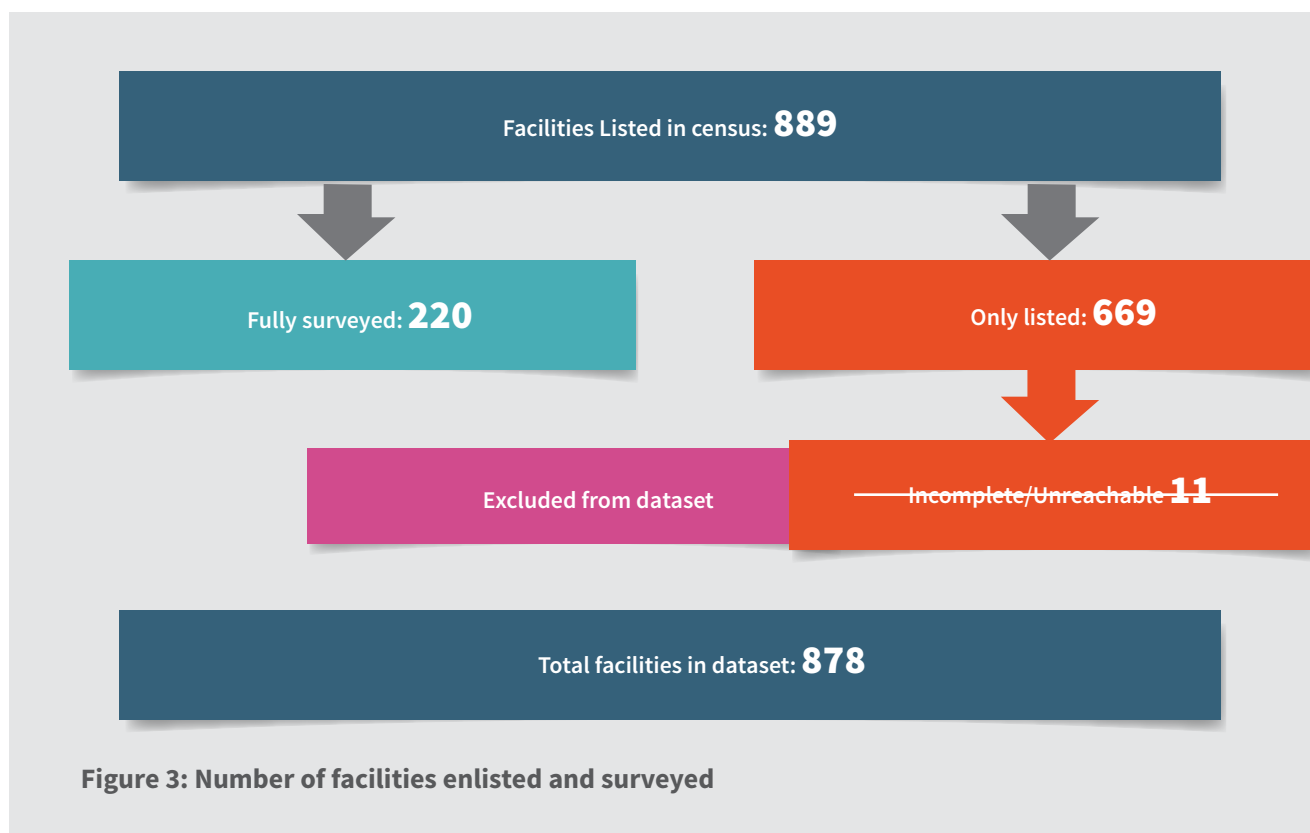


Figure 3: Number of facilities enlisted and surveyed

- There were only two standalone blood banks in Jessore municipality and both of them were operated by private health facility.
- Including clinics and EPI centers there were 141 satellites out of which majority (117) were operated by the NGOs, 24 were operated by government health facility.
- Other health facilities included VCT center (managed by FPAB), National Hearing Center and Jessore Hearing Center.

Figure-4 shows that, public health facilities were moderately distributed in central and western part of the city. However, in the North-East and South-East parts of the city, only one public facility is available. Among all the public health facilities, there were 2 hospitals, 6 clinics and 25 EPI Centers.

The private health facilities were mostly concentrated in the central part of the city where population is high. It was also identified that the concentration of private facilities are especially apparent around the 250 bedded General Hospital.

NGOs facilities were more evenly distributed across the municipality. Among these facilities, there were 123 clinics (14 static and 109 satellites), 2 DICs, 8 stand-alone EPI centers and 1 VCT center.

Special Health Programs

Table-3 presents the number of facilities running special health programs such as Govt. EPI program, Govt. TB/DOTS program and programs provided by different NGOs. NGOs were contracted out by government to provide EPI services. Other than the government programs, some of the NGOs provided services focusing on specific population groups or on particular health services; such as NGO Health Service Delivery project (NHSDP), Marie Stopes were especially providing maternal and child health services with their other health service activities. The overall distribution of the special health programs is stated below:

- Jessore municipality was providing immunization services through 88 govt. EPI service points.

Table 2: Number of surveyed facilities by management entity (n=220)

	Public (n=32)	NGO (n=134)	Private (n=54)	Total (n=220)	Percentage
Static					
Hospital	1	0	11	12	5.5
Clinic	6	14	18	38	17.3
Diagnostic Centre	0	0	21	21	9.5
Drop In Centre (DIC)	0	2	0	2	0.9
Blood Bank	0	0	2	2	0.9
EPI centre	1	0	0	1	0.5
Others	0	1	2	3	1.4
Total	8	17	54	79	35.9
Satellite					
Clinic	0	109	0	109	49.5
EPI centre	24	8	0	32	14.5
Total	24	117	0	141	64.1

- BRAC was found to be operating the only DOTS center in this municipality.
- NHSDP had 88 health service points including satellite spots.
- Marie Stopes provided service at 14 different points.

Table-4 gives the details the service pattern in terms of mode of service and business hours of the mode of health service delivery-

- Majority outreach services were provided by NGOs operated clinics (117 out of 141).

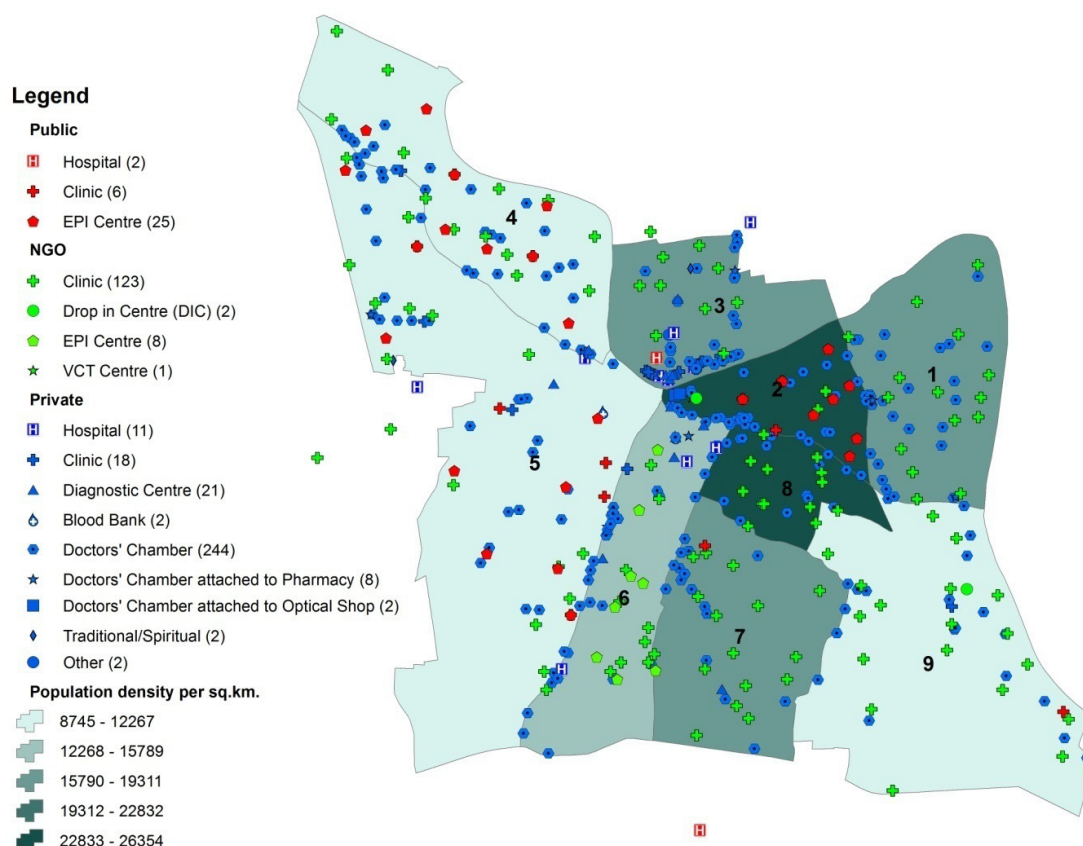


Figure 4: Relative density of health care facilities surveyed (by type)

Table 3: Service delivery points providing Special Health Programs (n=154)

Special Program	Public (n=27)	NGO (n=123)	Private (n=4)	Total (n=154)	
					Percentage
Govt. EPI	27	57	4	88	57.1
Govt. TB/DOTS	--	1	--	1	0.6
NHSDP	--	88	--	88	57.1
Marie Stopes	--	14	--	14	9.1

*Multiple responses

Table 4: Mode of health service delivery by management entity (n=220)

Special Program	Public (n=32)	NGO (n=134)	Private (n=4)	Total (n=220)
Outreach services only	75 (24)	87.3 (117)	0 (0)	64.1 (141)
Outdoor services only	12.5 (4)	8.2 (11)	40.7 (22)	16.8 (37)
Outdoor services with surgery	3.1 (1)	3 (4)	5.6 (3)	3.6 (8)
Indoor service without surgery	3.1 (1)	0 (0)	0 (0)	0.5 (1)
Outdoor and indoor services without surgery	0 (0)	0 (0)	1.9 (1)	0.5 (1)
Outdoor and indoor services with surgery	6.3 (2)	1.5 (2)	51.9 (28)	14.5 (32)
Total	100 (32)	100 (134)	100 (54)	100 (220)

*Multiple responses

- More than 40% of outdoor services are provided by private sector health facilities which included 2 blood banks and 21 diagnostic centers.

- Among the total of 32 surveyed health facilities that able to perform surgery in addition to in-patient and outpatient services, 28 were from private sector, 2 were from NGOs (NHSDP and Marie Stopes maternity) and the rest two were from public sector.

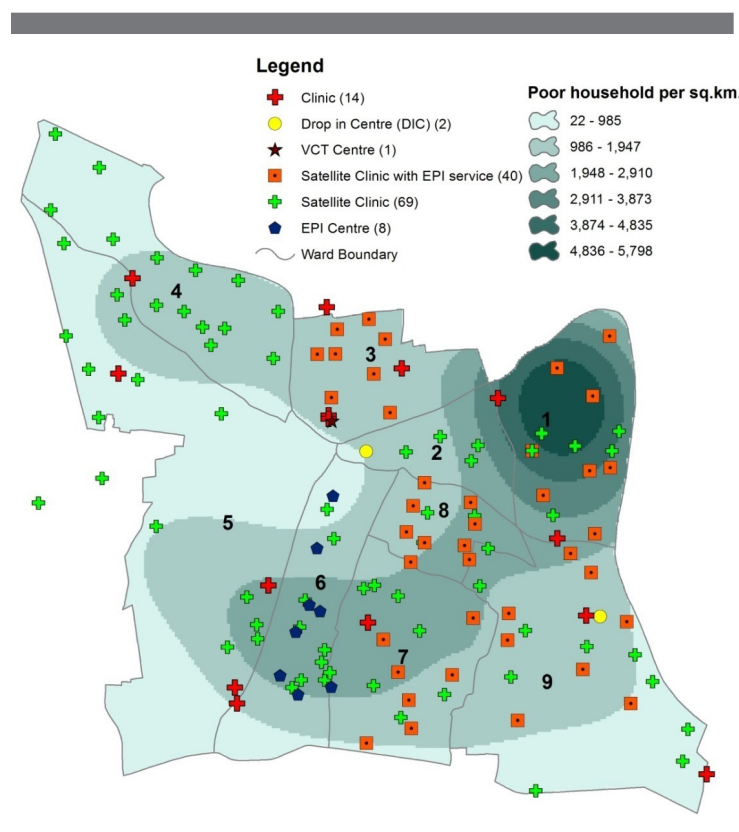


Figure5: Spatial distribution of NGO facilities

Figure-5 delineates that NGOs facilities provided a good coverage over the poor communities through satellite clinics (109). However, these facilities only offered limited services during a few hours (morning-afternoon), one or two days a week. A substantial number of static clinics (4) were also located near hotspots of poor settlements.

Hospital bed availability

Table-5 shows the number of in-patient beds available in surveyed health facilities in Jessore Municipality:

- Among the surveyed 220 health facilities, 34 housed in-patient service and had capacity for 1300 patients' bed together
- Among 1300 beds, 121 beds were allocated for maternal services and the rest (1179) were allocated for general beds.
- Private sector had the highest number of beds (950), followed by government sector (328) and NGOs (22).

Table 5: Number of patient's beds by management entity (n=34)

Special Program	Public (n=4)	NGO (n=2)	Private (n=28)	Total (n=34)
Maternity Bed	n=3	n=2	n=5	n=10
Total bed	57	20	44	121
Mean bed	19	10	8.8	12.1
Median bed	20	10	10	10
Range	10-27	--	2-16	2-27
General Bed	n=2	n=1	n=28	n=31
Total bed	271	2	906	1179
Mean bed	135.5	2	32.4	38
Median bed	135.5	2	25	25
Range	20-251	--	4-134	2-251
Overall	n=4	n=2	n=28	n=34
Total bed	328	22	950	1300
Mean bed	130.8	11	33.9	38.2
Median bed	20	11	27.5	20
Range	10-278	10-12	10-150	10-278

*Multiple responses

Table 6: Service pattern of health facility by management entity (n=220)

	Public (n=32)	NGO (n=134)	Private (n=54)	Total (n=220)
Static				
Weekly	62.5 (5)	88.2 (15)	9.3 (5)	31.6 (25)
Daily	37.5 (3)	11.8 (2)	90.7 (49)	68.4 (54)
Total	100 (8)	100 (17)	100 (54)	100 (79)
Satellite				
Weekly	--	22.2 (26)	--	18.4 (26)
Monthly	100 (24)	77.8 (91)	--	81.6 (115)
Total	100 (24)	100 (117)	--	100 (141)

Table 7: Days of service by management entity (n=220)

	Public (n=32)	NGO (n=134)	Private (n=54)	Total (n=220)
Static				
All week	37.5 (3)	13.3 (2)	87.5 (49)	68.4 (54)
3-4 days	--	6.7 (1)	1.8 (1)	2.5 (2)
5-6 days	62.5 (5)	80 (12)	10.7 (6)	29.1 (23)
Total	100 (8)	100 (15)	100 (56)	100 (79)
Satellite				
1-2 days	100 (24)	100 (111)	100 (6)	100 (141)
Total	100 (24)	100 (111)	100 (6)	100 (141)

Table 8: Hours of service by management entity (n=220)

Hours of service	Public (n=32)	NGO (n=134)	Private (n=54)	Total (n=220)
Morning-Afternoon	62.5 (5)	86.7 (13)	10.7 (6)	30.4 (24)
Afternoon-Evening	--	--	1.8 (1)	1.3 (1)
Morning-Evening	--	--	39.3 (22)	27.8 (22)
24 hours	37.5 (3)	13.3 (2)	48.2 (27)	40.5 (32)
Total	100 (8)	100 (15)	100 (56)	100 (79)
Morning-Afternoon	100 (24)	100 (111)	100 (6)	100 (141)
Total	100 (24)	100 (111)	100 (6)	100 (141)

Service Pattern

Tables (6-9) illustrate the days and service hours of health care facilities surveyed in Jessore Municipality, moreover, the availability of 24/7 health care is also described.

- Among all the surveyed static facilities (79), 31 facilities provided 24/7 services in Jessore Municipality; which included 3 public, 2 NGOs and 26 private facilities.
- Majority of the satellite clinics were operated by NGOs (117), however services were mainly available only for 1-2 days a week during daytime.

Figure-6 shows that only a handful of 24/7 health services were available in Jessore Municipality where

a large majority clustering in ward no 3, 5 and 6. A noticeable gap in 24/7 services was visible in ward no 1, 2, 7 and 8 which may hinder timely and effective management of emergency health service.

Doctor's Availability:

Table-10 shows the availability of doctors at the facilities that had physicians in their staff list:

- In total, 69 facilities had on-site doctor across all types of health facilities in Jessore Municipality
- Private facilities had the widest range of service hours among all the facilities
- Out of 8 public facilities; only 2 facilities provided 24 hours service and 6 reported providing services from morning to afternoon.

Table 9: Facilities providing 24/7 service (n=31)

Hours of service	Public	NGO	Private	Total
Hospital	1	0	9	10
Clinic	2	2	17	21
Total	3	2	26	31

Table 10: Availability of doctors at the facilities that had physicians in their staff list (n=69)

Doctor's availability	Public (n=8)	NGO (n=11)	Private (n=50)	Total (n=69)
Afternoon Only	--	9.1 (1)	--	1.4 (1)
Evening Only	--	--	4 (2)	2.9 (2)
Morning-Afternoon	75 (6)	72.7 (8)	18 (9)	33.3 (23)
Afternoon-Evening	--	--	18 (9)	13 (9)
Morning-Evening	--	--	28 (14)	20.3 (14)
24 hours	25 (2)	18.2 (2)	32 (16)	29 (20)
Total	100 (8)	100 (11)	100 (50)	100 (69)

- Only 2 private health facilities provided health services during evening time while no public and NGO facility reported providing service during this time.
- Most of the 24 hours service coverage by physicians was provided by private facilities (16). Only 2 NGO reported providing 24 hours service.

Human Resources for Health

Table-11 presents the number of composition of available health workforce in the health care facilities surveyed in Jessore Municipality. Only the numbers of staffs at static facilities have been considered.

- A total 4,015 staffs were reported in 220 health facilities, however, this may be an overestimate since dual practice or working at more than one facility, is a common practice in Bangladesh.
- In general, the largest numbers of physicians (719) were working in the private sector.
- Out of total 4,015 staffs, more than half of the numbers (2,853) were working in the private sector.

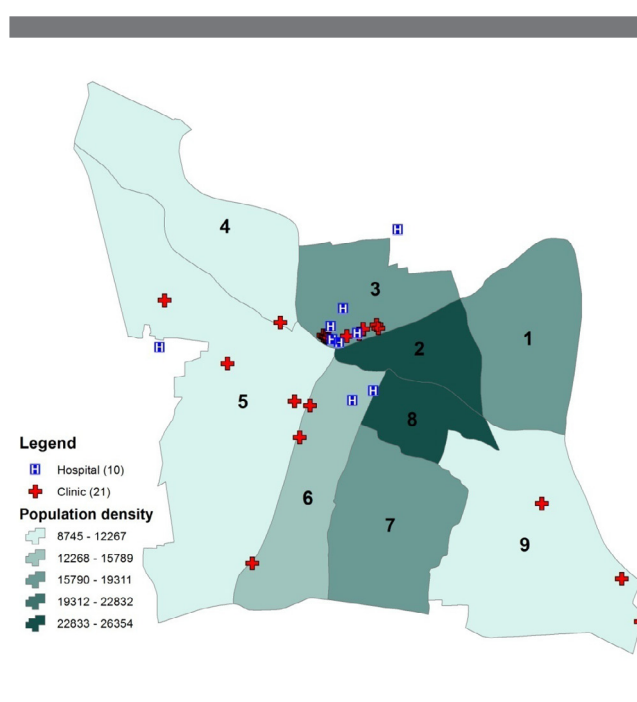
**Figure 6: Distribution of 24/7 services providing facilities**

Table 11: Number and composition of staffs by management entity (only static facilities) (n=220)

	Public (n=32)				NGO (n=134)				Private (n=54)				Total (n=220)			
	Total	Mean	Median	Range	Total	Mean	Median	Range	Total	Mean	Median	Range	Total	Mean	Median	Range
Physician	60	7.5	1.5	1-49	43	3.6	1	1-20	719	13.8	9.5	1-66	822	11.4	8	1-66
Nurse	198	39.6	2	1-188	2	2	2	--	171	14.3	5.5	1-60	371	20.6	4	1-188
Midwives	1	1	1	--	1	1	1	--	34	11.3	12	3-19	36	7.2	3	1-19
Pharmacists	6	1.5	1	1-3	1	1	1	--	8	1.1	1	1-2	15	1.3	1	1-3
Paramedics	1	1	1	--	140	1.2	1	1-11	13	2.6	2	2-4	154	1.3	1	1-11
Non-physicians clinicians	67	2.3	2	1-9	37	1.8	1	1-10	580	10.9	9	1-74	684	6.6	3	1-74
Community health worker	35	1.4	1	1-3	249	2	2	1-10	2	2	2	--	286	1.9	2	1-10
Other staff	13	4.3	2	1-10	11	2.8	2.5	1-5	43	4.8	3	1-18	67	4.2	2.5	1-18
Support staff	135	27	7	1-116	162	9	5	1-65	1283	25.7	13.5	1-186	1580	21.6	11	1-186
Total Staff	516	16.1	3.5	3-365	646	4.8	3	1-71	2853	52.8	34	1-326	4015	18.3	3	1-365

Figure-7 depicts the number of specialists available in Jessore Municipality during the survey period. While this figure is subject to over-counting, it provides a rough estimate of total number of specialist across all types facilities. Among the surveyed facilities:

- Out of total 53 surveyed static facilities, 48 facilities were providing health services with specialists which belong to private facilities.
- The highest numbers of specialists were gynecologist & obstetricians (76) followed by the 56 general surgeons across all the health facilities in Jessore Municipality.
- The numbers of available specialist were- Pediatrician (46), Medicine (46), Cardiologist (36), Otolaryngologist (33), Orthopedist (24) and Anesthetist (23) etc altogether in all kinds of facilities.
- There were very few numbers of endocrinologist and Diabetologist (2 & 7) and 17 Sonologist against 44 USG service in Jessore Municipality.
- There were a good number of ENT specialist (33) reported in Jessore Municipality

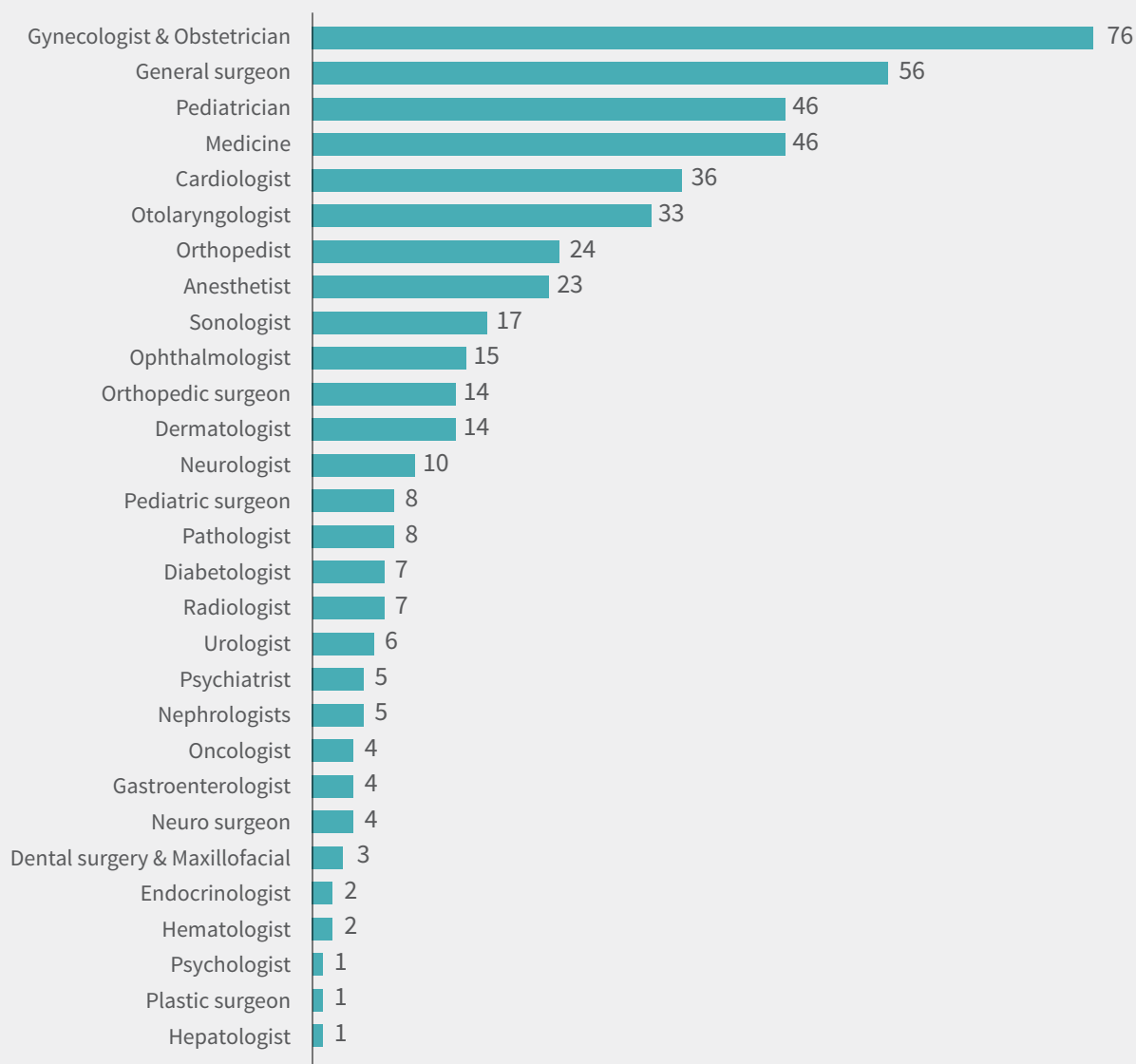


Figure 7: Total number of specialists (n=53)

Health Service

Tables (12 –17) show the availability and distribution of various health care services available in Jessore Municipality; e.g. diagnostic service (X-ray, CT scan, MRI etc.), diabetes, blood transfusion, blood bank, pharmacy, eye examination, family planning, health education, sexual and reproductive health, maternal health and emergency health services etc

Selected general health (Table 12):

- There were total 5 blood transfusion services in Jessore Municipality

- There were only 1 MRI, 5 CT-scan and 44 X-ray service providers (38 X-ray chest and Dental X-ray 6) in Jessore Municipality; majority was offered by private facilities.
- Clinical services like; services for diabetes, orthopedics were available in a small number of public health facilities; in comparison a large number of private and NGO facilities offered these general health services.

Table 12: Reported availability of diagnostic services

Nature of health status	Public	NGO	Private	Total
Diabetes	2	85	39	126
Blood transfusion	2	--	3	5
Blood bank	1	--	2	3
Pharmacy/ Sell medicine	5	122	29	156
Orthopedics	1	22	35	58
Eye examination	2	--	5	7
Laser & cosmetics service	--	--	3	3
TB (Dot's)	3	1	--	4
Leprosy (Multi drug therapy)	1	--	1	2
Diagnostic Biochemical				
Random blood sugar	1	101	49	151
Blood grouping	1	17	49	67
Diagnostic Imaging				
X-ray chest	1	--	37	38
MRI	--	--	1	1
CT scan	--	--	5	5
USG	1	4	39	44
Dental x-ray	--	--	6	6
USA	1	4	40	45

ECG	1	--	40	41
Diagnostic Cytology/pathology				
Blood CBC	1	4	45	50
Urine RME	1	3	47	51
Stool RME	1	2	42	45

*Multiple responses

Emergency Service (Table 13):

- There was no service reported on ICU, NICU and burn unit in Jessore Municipality.
- 19 health facilities offered ambulance service for the patients
- Only 1 CCU service was reportedly present during the survey period; which was run by 250 bedded General Hospital (public).
- Out of total 9 EmOC, only 1 public facility (250

Table 13: Reported availability of emergency & critical care services

Nature of health status	Public	NGO	Private	Total
First Aid & Casualty	3	113	32	148
CCU	1	--	--	1
ICU	--	--	--	--
NICU	--	--	--	--
Burn unit	--	--	--	--
Ambulance service	2	3	14	19
EmOC				
BEmOC	0	0	5	6
CEmOC	1	0	3	3

*Multiple responses

bedded hospital) provided CEmOC service while rest 8 EmOC (5 BEmOC and 3 CEmOC) was provided by private facilities across Jessore Municipality.

- No NGO was reported for providing BEmOC and

CEmOC in Jessore Municipality.

Maternal health service (Table 14):

- Total 156 health facilities provided ANC service across all types of facilities.
- PNC service was provided by 157 health facilities, where NGOs (120) were major in number.

Table 14: Reported availability of maternal health services

	Public	NGO	Private	Total
NVD	2	3	22	27
ANC	3	120	33	156
PNC	3	120	34	157

*Multiple responses

- Most of the general curative health services were provided by NGOs
- Very few number of public health facilities provided general curative health services in Jessore Municipality.

Curative health service (Table 15):

Table 15: Reported availability of general curative services

Nature of general curative service	Public	NGO	Private	Total
Respiratory infection	4	102	42	148
Diarrhoea	4	104	23	131
Skin infection	4	112	35	151

*Multiple responses

Surgery Service (Table 16):

- Private health facilities were predominantly providing major surgery (general- 27, laproscopic-15 and CS-23) in Jessore Municipality
- Only 2 public health facilities were reported in providing dental surgery service and no NGO was reported for providing this service.
- D&C was mostly done by private health facilities (20 out of 26) where this service was rare among public facilities.

Table 16: Reported availability of surgery services

Nature of health status	Public	NGO	Private	Total
Major surgery				
General	1	1	27	29
Laparoscopic	1	--	15	16
CS	2	2	23	27
Minor surgery				
MR	2	4	5	11
Abscess drainage	1	3	28	32
D&C	2	4	20	26
Others	1	1	7	9
Dental surgery				
Dental	2	--	6	8

*Multiple responses

Family Planning, sexual & reproductive service and health education service (Table 17):

- Total 9 health facilities provided permanent family planning methods which included 2 public, 3 NGOs and 4 private health facilities.
- Both in temporary and long term family planning methods, NGOs were predominantly providing the service (120 out of total 126 and 18 out of total 24)
- Similarly, for Sexual and Reproductive Health,

NGOs were the main service providers in Jessore Municipality.

- A large number of NGOs reported offering health education service to various age groups particularly around adolescent (115), SRH (116), maternal health (123) and family planning (125)
- Comparing to the total number of facilities providing health education, very few public facilities reported providing this service.

Table 17: Reported availability of family planning, sexual & reproductive health services and health education services

Types of service	Public	NGO	Private	Total
Types of family planning				
Temporary Family Planning Methods	3	120	3	126
Long Term Family Planning Methods	3	18	3	24
Permanent Family Planning Methods	2	3	4	9
Nature of sexual & reproductive health service				
Sexual/reproductive tract infection	3	120	37	160
Family Planning counseling	2	121	24	147
Family Planning products	2	119	2	123
Health education				
Adolescent	2	115	1	118
Elderly	0	95	1	96
Sexual and Reproductive Health	2	116	--	118
Maternal	1	123	2	126
Family planning	1	125	2	128
Others	1	26	0	27

*Multiple responses

Service Cost:

Table-18 shows the comparative prices of selected services:

- Huge variation was found in terms of service cost for the same services across the facilities (public, NGOs and private).

- NGOs and private health facilities had differences in service cost range which was absent in public health facilities.
- NGOs and private health facilities had package and non-package service provision for NVD and C-Section (CS); where for CS (package) the range varied between 10000-11000bdt in NGOs facilities

Table 18: Cost of selected health services in BDT (n=166)

	Public (n=1)			NGO (n=103)			Private (n=62)			Total (n=166)		
	Mean	Median	Range	Mean	Median	Range	Mean	Median	Range	Mean	Median	Range
Blood grouping	50	50	--	54.7	30	20-130	86.2	100	50-150	77.7	80	20-150
Random blood sugar	60	60	--	26.2	30	20-130	100.7	100	60-180	56.7	30	20-180
Chest X-ray	70	70	--	--	--	--	326.2	350	130-400	319.5	350	70-400
MRI	--	--	--	--	--	--	7500	7500	--	7500	7500	--
CT scan	--	--	--	--	--	--	3320	3000	2000-6000	3320	3000	3000
UGS	110	110	--	475	450	350-650	584	600	250-700	563.3	600	110-700
Dental X-ray	--	--	--	--	--	--	125.8	87.5	60-350	125.8	87.5	60-350
USA	220	220	--	562.5	550	400-750	777.5	800	450-1000	746	800	220-1000
ECG	80	80	--	--	--	--	222.2	225	120-300	218.7	200	80-300
Blood Routine(Blood CBC)	150	150	--	157.5	150	130-200	238.6	250	40-400	230.4	250	40-400
Urine Routine	20	20	--	90	100	50-120	73.1	60	30-250	73	60	20-250
Stool RME	20	20	--	50	50	--	97.3	95	30-500	93.6	80	20-500
C-section(package)	--	--	--	10500	10500	10000-11000	13361.5	15000	8000-20000	12980	12000	8000-20000
C-section(non-package)	--	--	--	7000	7000	--	9594.7	10000	2400-18000	9465	9500	2400-18000
NVD (Package)	--	--	--	1833.3	2000	1000-2500	4450	4000	2000-10000	3846.2	3000	1000-10000
NVD (Non-Package)	--	--	--	1250	1250	500-2000	3738.9	2500	600-10000	3490	2500	500-10000
Blood Transfusion	250	250	--	--	--	--	437.5	450	200-650	400	300	200-650

*Multiple responses

and 8000-20000bdt in private facilities. For CS (non-package), NGOs had same service cost 7000 but range varied between 2400-18000bdt.

- In most of the NGO facilities, the costs for ANC & PNC services were included in the registration fee and the same situation was for private facilities where doctors' consultation fee covered up the ANC & PNC cost.

Service Package Cost

- Out of the total surveyed facilities, 17 facilities (3 NGOs and 14 Private) offered package services beside individual health services.
- Most of the facilities package includes ANC and PNC services.
- There is a wide variation in the cost of diagnostic services across the health facilities. Depending on the packages Different facilities charged different price. (E.g. FPAB offered package of Lipid Profile, total cholesterol, Ttg, HDL & LDL on 300 BDT; on the other hand Sunrise Diagnostic Center offered package of liver function test, lipid profile, T3, T4& cholesterol on 1500 BDT.)

Provision for the poor

Table-19 shows the number of facilities with special service provision for the poor. This analysis included only NGOs and private health facilities as public health facilities generally provided free services or offered nominal registration fee.

Table 19: Reported poor provisions at the NGO and private health care facilities (n=165)

	Public (n=0)	NGO (n=111)	Private (n=54)	Total (n=165)
Discounted medicine	--	1	--	1
Subsidy for services	--	100	50	150
Free services	--	15	15	30
Health cards	--	97	1	98

*Multiple responses

- Only 1 NGO health facility had provision of providing discounted medicine
- Out of total 165 private and NGO health facilities, 150 had subsidy for services, where NGOs were predominating in number of facilities.
- Majority of health cards provision service (97) was provided by NGOs.

CONCLUSION AND RECOMMENDATION FOR ACTION

This study report presented the comprehensive findings from a census listing and surveyed information of all health facilities in Jessore Municipality, which includes geospatial coordinates, updated location of facilities with road networks and basic service information: available health service, service duration, service providers including service costs and other information.

EPI program plays vital role in maternal and child health care services in immunization sector by government. This program is mainly provided by satellite health service provision. Government has contracted out some NGOs to provide this service in this municipality.

There is limited maternal bed facility and surgery facility in Jessore Municipality. There is no ICU, NICU and burn unit service available and only 1 CCU service is available in Jessore Municipality. Emergency services, such as ICU, NICU and Burn unit need to be made available in the municipality area. As there are only 1 CCU, this service needs to be located in the areas where coverage is low. Regarding emergency maternal health service, private facilities are providing the maximum coverage. Data on 24/7 service showed that its availability is prominent in private facilities compared to that in public and NGOs. NGO and government facilities should organize to provide after 5 pm health services in areas of the municipality where these are not available including poor urban settlements.

Variation of health service cost for same health service is observed across all types of health facilities. Cost regulation is needed for the private sector services. Linking registration and licensing information from the urban health mapping can help Jessore Municipality to ensure that all health facilities are legal and adhering to quality standard services and also generate revenue.

Urban Health Atlas has many potential uses. It can provide visual guidance for planning health services. Location maps will be helpful to identify gaps and duplicity in health service provision and provide the basis for evidence based decision making by health planners and regulators in Bangladesh. Geo-databases as these ones can be used for advanced GIS analyses that shed light on accessibility issues among marginalized populations such as the slum dwellers. Another possibility is distance measurement with proximity analysis (i.e. distance to the nearest health facility) which will be helpful to calculate distance to emergency care and identify emergency transport route which can be useful in case of referrals. Information on cost of basic services may also help to set new standards to control health service pricing especially in the private sector.

As a whole, Urban Health Atlas and institutionalization of the atlas can contribute in better and improved health service delivery, planning and oversight in Jessore Municipality. Effective mechanisms are required to keep health facility information up-to-date regularly which efforts to develop an effective health system in this city. A dedicated authority is needed to invest in building human resource and logistics capacity to maintain facility lists and applications, and to ensure that data is completely integrated into the Government's HMIS system. We envisage the development and implementation of an integrated mechanism to update maps by providing comprehensive information on new facility, service availability and cost will require collaboration between the Ministries of Health and Local Government, and Jessore Municipality.

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