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Geographical Distribution of Public Libraries in Murshidabad District, West Bengal: An Evaluative Study of Location and Service Areas

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Abstract

This paper analyses the geographical distribution of public libraries in the Murshidabad district, West Bengal (India), to understand the geographical service areas (GSA) concerning population distribution. Population and area-related data are collected from census sources, whereas public library-related data is collected from the District Library Office (DLO). Applying a Geographic Information System (GIS), a geospatial analysis has been attempted. The analysis of data shows that there has been marked inter-sub-district inequality in the distribution of public libraries. Whereas Suti-I, Kandi, Bhagawangola and Murshidabad-Jiaganj sub-districts have fairly good conditions in terms of both the number of persons per public library and the geographical area covered under each public library, Khargram has the worst condition with over 90 thousand persons per library and nearly 100 square km geographical area under each public library. The present study adds to the existing knowledge of the geographical distribution of public libraries vis-a-vis population distribution in a backward and minority-dominated area that will help policymakers initiate affirmative action. At the same time, it also helps readers discover the areas of overserved and underserved by public libraries in the study area.

Keywords: Buffer Zone, Community Development Block, GIS, Geographical Service Area (GSA), Public Libraries

1. Introduction

The public library is an important organ of modern society. It works as a centre for the dissemination of much-needed information for societal development. The library resources are not ubiquitous in distribution. The accessibility of libraries is one of the key aspects of usability and actual utility of library resources. Public libraries in our time play multifaceted roles and are much more than just a place for the collection of books, information resources, and services; they immensely contribute to the social capital of their communities(Johnson, 2010). The role of libraries as social and public spaces in forming a well-informed society has been explored at a great length(Aabø and Audunson, 2012; Buschman and Leckie, 2007; Buschman, 2007). To many experts, a public library is an important institution for a locality, otherwise termed a 'Geographical Service Area' (GSA)(Donnelly, 2014), and plays several kinds of roles including public awareness, dissemination of information, and facilitating sustainable development. Varghese and Thirunavukkarasu (2021) found that a public

library contributes significantly to achieving sustainable development goals (SDG). On the other hand, Chisita and Fombad(2020) argue that a public library may be considered as an essential institution that every progressive community requires.

The term 'Geographic Service Area' (GSA) has been used in this paper to refer to a realistic catchment area or zone of influence of a public library. The word 'market' used in Christaller (1966) has been replaced by 'service' to portray the library's role as a public good as opposed to a substance of a private enterprise. In the study of GSA of a public library, getting the population for the buffer zone, i.e. the service area in circular/ hexagonal shape may be difficult. Some previous research outcomes shared the population of the census tract proportioned to land inside the buffer(Sin, 2011). However, for the present study, the population of the buffer zone i.e. GSA proportionate to the C D block population and area has been calculated. As such a good number of studies have examined and mapped spatial access to public libraries to highlight the extent of GSA of each library on the one hand and identify the neighbourhoods and regions having low accessibility on the other(Guo et al., 2017; Higgs et al., 2019; Park, 2012).

2. Scope and Context of the study

The present study is to study the distribution of public libraries in the different regions of Murshidabad district. The paper also studies the accessibility and usability of public libraries vis-a-vis the population served by each public library. In the Indian context, particularly in a predominantly minority-populated and socio-economically backward district like Murshidabad, no such study has been carried out so far. The present study, therefore, examines the geography of public libraries in Murshidabad district to probe the variations in library distribution based on administrative and geographic regions. Though a good number of studies have attempted to measure public library accessibility and usability in different geographical regions as well as socio-economic groups, very few of them have attempted to focus on analysing the actual geographic distribution of public libraries with respect to their GSA. The intensity of service in terms of service availability of public libraries has been worked out in this paper with the help of buffer zone analysis (BZA) based on travel distance using GIS (QGIS) software. Thus, studying accessibility and usability of public libraries in Murshidabad forms the kernel of the study.

3. Literature review

Application of GIS in LIS studies is relatively new with limited publications available in recent years. There are few studies specifically related to the locational analysis of public libraries examining their service areas. A study by Kwon and Song (2014) revealed that physical accessibility and the age of libraries have the greatest bearing on the use of public libraries in Korea. Das (2023) on the other hand studied the distribution of libraries across West Bengal utilizing geospatial technology and assessed library health in the districts based on the library-to-population ratio. The study highlighted spatial disparities in the districts that require the intervention of the policymakers. Plassche (2022) examined the library positions in any country using maps and geospatial information managed by Geographic Information System (GIS). To explore library research that uses GIS as a tool to evaluate library services and resources, Mandel et al (2020) found evidence of the growth of library research using GIS having two main streams of analysis of service areas and managing facilities and collections. Kinikin(2004) further used GIS tools to map the location of libraries along with the population to understand the service area that helps the librarians and policymakers. Owing to the association among objectives and functions and also tasks of public libraries, factors like civilization, urbanization and citizenship,

formation, and geographical distribution of similar libraries in urban centres are the vital exterior aspects that may practically enhance visitors and use of libraries (Johnson, 2010 & Koontz, 2007). Spatial locational analysis of public libraries showed that the prime reason for the lack of visitors to public libraries is the improper and inadequate positioning of libraries all over the areas(Aabo, Audunson, & Varheim, 2010; Audunson, et al., 2019). The study points out that position is likely to be the prime and vital benchmark for attracting library users and consequently enhancement of the rate of footfall and library use(Nasserabadi, et al, 2013). Studies also further show that the use of libraries declines with increasing distance, and at the same time, succeeding works have tied real access where distance plays a pivotal role in people's ability to approach library resources(Park, 2012). Such findings are in concurrence with the traditions in the ambit of geography where public libraries may be treated as gross (impure) public goods. As opposed to pure public goods, such as national defences, that are not exclusionary and freely available to the whole society, on the other hand, impure public goods and services are supplied at fixed geographical locations or often along fixed routes. A park is a public good, and so is a public transport service. However, due to distance decay, the further away a person lives from these immobile public goods, the less is usage of them, and their benefit (Gregory et al., 2009). Decision-making of usability in relation to location and spatial zone can be done effectively using GIS (Sharma, 2015). It can be used to analyse service areas and populations and manage facilities and collections (Johnston & Bishop, 2011). It is thus an integration of spatial technology and vast arrays of spatial data. The important factor regarding library location as visualised by Kinikin (2004) was accessibility including patron distance of the library and choosing a suitable location when a fresh library building is planned to be constructed. A review of presently available literature reveals well-identified gaps in the literature. Though there is literature studying the distribution of libraries in general and public libraries in particular, there is no study to explore how the distance influences accessibility and usability of a public library. Moreover, a backward, frontier-located, and minority community-populated area has not been focussed in such a study. Thus, this study is designed to study the issue in the Murshidabad district of West Bengal. The present study may be useful to the policymakers which may help to plan library networks more efficiently.

4. Objectives of the Study

The present study is designed in such a way to address the following objectives -

- To examine the variation in concentration in the distribution of public libraries in relation to geographical area and population served.
- To delineate the GSA for the public libraries.
- To find out the distribution pattern of underserved areas in the district based on 2.5 km and 5 km buffer zones of GSA.
- To examine the distribution pattern of over-served areas in the district based on 2.5 km and 5 km buffer zones of GSA.
- To map out the under-served and unserved areas in the Berhampore C D Block area based on 2.5 km and 5 km buffer zones as a more focused study.

5. Data Sources and Methodology

Two sources of data have been used for the present study. The primary sources have been visiting the libraries and interviewing the librarians as well as the library users. The secondary sources are the Census of India and the District Library Officer, Murshidabad. While the Census of India gives data on population, the information related to location, years of establishment, staff pattern, etc. has been collected from a list available with the DLO. A survey was conducted for all 157 public

libraries of the district of which 130 could be visited with an unstructured survey schedule during 2023-24. The remaining 27 were not considered for the respondents as the visitors were not found during the time of the visit. Similarly, 260 visitors, taking 2 from each of the 130 public libraries were surveyed during 2023-24. However, all 157 libraries were visited for a physical survey of the location, etc. The geographical coordinates have been collected from the Google Earth web platform and plotted on the QGIS platform.

Circular buffer zones of 2.5 km, as well as 5 km radii around the public libraries, have been drawn to demarcate GSA as the majority of the respondent-visitors opined that 2.5 km is generally considered easy to travel to visit a library, and 2.5 km to 5 km distance is considered moderately difficult but any distance beyond 5 km for library consultation is quite difficult (table 1). It is worth mentioning at this stage that the distance taken for drawing a buffer is Euclidean distance. The buffer zone analysis using QGIS has been done where given condition of the landscape, accessibility, availability of transportation facilities, working hours of the libraries as well as the socio-economic condition of the current readers are considered along with library visitors (n=260 respondents surveyed during 2023-24) and the opinions of the librarians.

6. Results and Discussion

The growth and development of public libraries in the district of Murshidabad largely occurred in the first few decades of post-independent India, particularly between the 1950s and 1980s. During the first three decades of post-independent India, as many as 80 public libraries were established throughout the district but in the subsequent decades, very few additional libraries were set up.

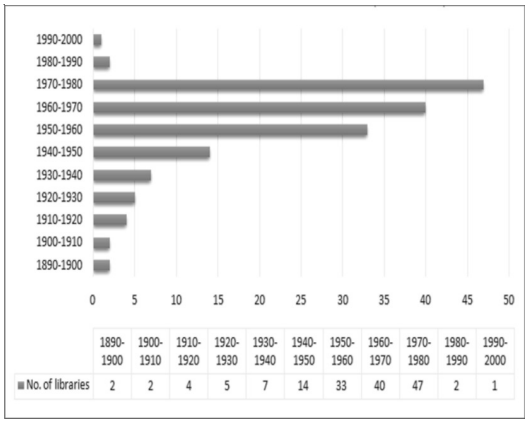


Figure 1: Growth of public libraries during the post-independent period

6.1. Distribution of public libraries and regional concentration

The distribution of public libraries in Murshidabad district, depicted in Figure 2b, clearly shows that the distribution is not spatially uniform. A clear axis around the national highway from Berhampore to Farakka can be seen (Figure 2a & 2b).

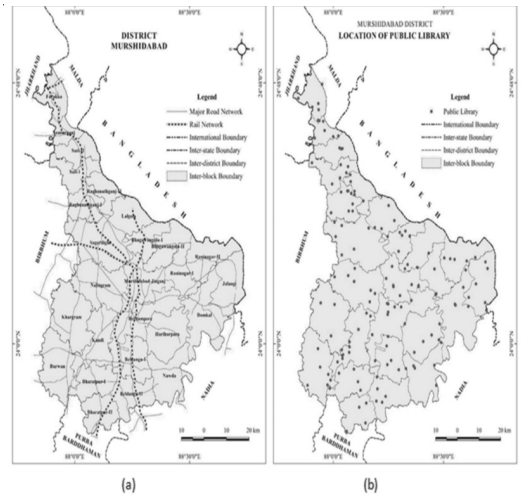


Figure 2a and 2b: Basic infrastructure and distribution of public libraries

In terms of the distribution of libraries, one may find an elongated core of high concentration and a far-flung periphery where the concentration is very low. Thus, many habitations in the core region enjoy being located within GSA of more than one public library whereas the habitations along the far-flung peripheries remain either unserved or under-served

Table 1 depicts block-wise number of public libraries, the zone of influence (geographical area served), and the population served by each of such public libraries. From the analysis, it is clear that Raghunathganj-I, Samserganj, Murshidabad-Jiaganj, Kandi, Bhagawangola - I, Suti-I, Farakka, Beldanga-I, Bharatpur-II, Raninagar-II, Berhampore, and Jalangi C D Blocks have relatively smaller geographical area per public library as compared to the district average of 33.33 sq. km per public library, a better library condition as the users have to travel shorter distance with the best condition in Raghunathganj-I (13.87 sq. km) and the worst in Kharagram C D Block (99.22 sq. km) (Figure 3a).

Table 1. C D Block-wise geographical area population served by public libraries

SL. No.	Block	Area (sq. km)	Population (2011)	Population Density (Persons per sq. km)	No. of Public Libraries	Population served by each library	Area served by each library (sq km)
1	Farakka	143.41	274111	1,911	6	45685	23.90
2	Samserganj	94.76	284072	2,998	6	47345	15.79
3	Suti - I	139.59	179908	1,289	6	29985	23.26
4	Suti - II	135.16	278922	2,064	4	69731	33.79
5	Raghunathganj - I	138.75	195627	1,410	10	19563	13.87
6	Raghunathganj-II	114.39	265336	2,320	3	88445	38.13
7	Lalgola	207.77	335831	1,616	5	67166	41.55
8	Sagardighi	332.73	310461	933	6	51744	55.46
9	Bhagawangola - I	149.31	202071	1,353	7	28867	21.33
10	Bhagawangola- II	168.02	158024	940	2	79012	84.01
11	Raninagar - II	199.12	190885	959	7	27269	28.45
12	Jalangi	226.19	252477	1,116	7	36068	32.31
13	Domkal	311.05	363976	1,170	6	60663	51.84
14	Raninagar - I	169.52	189105	1,116	4	47276	42.38
15	Murshidabad-Jiaganj	171.66	234565	1,366	10	23457	17.17
16	Nabagram	289.28	227586	787	7	32512	41.33
17	Khargram	297.65	273332	918	3	91111	99.22
18	Kandi	217.70	220145	1,011	11	20013	19.79
19	Berhampore	278.04	446887	1,607	9	49654	30.89
20	Hariharpara	252.72	257571	1,019	6	42929	42.12
21	Nawda	227.68	226859	996	5	45372	45.54
22	Beldanga - I	173.46	319322	1,841	7	45617	24.78
23	Beldanga - II	190.19	250458	1,317	4	62615	47.55
24	Bharatpur - II	155.45	176368	1,135	6	29395	25.91
25	Bharatpur - I	177.16	172702	975	5	34540	35.43
26	Burwan	271.51	257466	948	5	51493	54.30
All	District	5232.27	6544067	35115	157	41682	33.33

On the other hand, the C D Blocks of Suti-II, Bharatpur-I, Raghunathganj-II, Nabagram, Lalgola, Hariharpara, Raninagar-I, Nawda, Beldanga-II, Domkal, Burwan, Sagardighi, Bhagawangola-II, Khargram have a geographical area served by each public library higher than the district average, indicating poor condition.

Each public library in the district serves as many as 41682 persons (Table 1) where as many as 10 C D Blocks, out of a total 26, libraries serve fewer than the district average with a

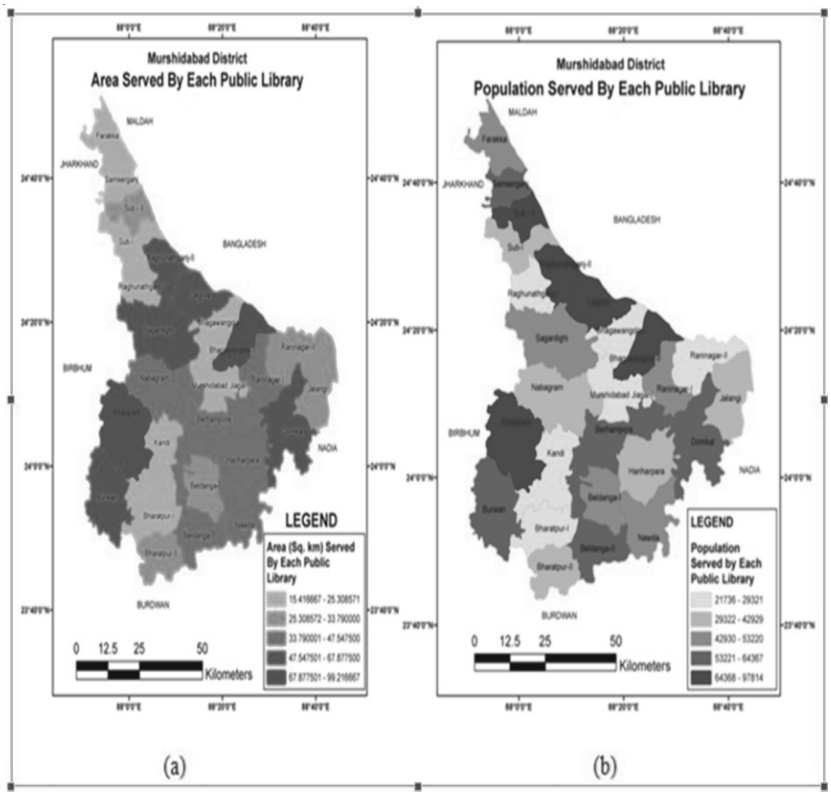


Figure 3a & 3b: Area and population served by public libraries

minimum figure of 19563 persons for Raghunathganj-I (Figure 3b). The remaining 16 C D Blocks serve higher than the district average with a maximum of 91111 persons in Khargram (Figure 3b). A similar pattern in terms of the geographical area served and population served per library found in the district. Thus, the C D blocks having more population per library and a larger geographical area to serve, exert double stress on the users as well as on the public libraries indicating poor health of the public libraries.

6.2. Library visitors' study

Profile of library visitors is one of the important aspects of evaluation of public library services. Based on selected attributes of the library visitors, namely age, gender, occupation, and distance covered, 260 library visitors have been distributed in different groups in Table 2.

Table 2: Distribution of library visitors by selected attributes

Group attributes	Group	No. of visitors	Share of visitors (%)
Age (years)	? 20	55	21.15
	20-30	90	34.62
	30-60	65	25.00
	> 60	50	19.23
	Total	**260**	**100.00**
Occupation	Student	15	44.23
	Retired persons	75	28.85
	Others	70	26.92
	Total	**260**	**100.00**
Gender	Male	165	63.46
	Female	95	36.54
	Total	**260**	**100.00**
Distance covered (km)	? 2.5	150	57.69
	2.5-5.0	60	23.08
	> 5	50	19.23
	Total	**260**	**100.00**

The profile of the library visitors shows (Table 2) that the overwhelming majority (56%) of the visitors are aged between up to 30 years of which nearly 21 percent are between 20-30 years. So far the occupation of the visitors is concerned, it has been found that nearly half (44%) of them are students who use the library for academic purposes and preparation for competitive examinations, and close to one-third are retired persons and senior citizens who use the library for recreation purposes. The gender segregation of the respondents shows that nearly 63 percent are male and the remaining 37 percent are female indicating the fact that females are still not used to visiting a public library regularly.

6.3. GSA through Buffer Zone Analysis

An attempt has been made to identify the GSA of each public library based on the study of sample public libraries through buffer zone analysis. A buffer zone of the radius of 2.5 km (easy access) based on the perception of 75.38 % of respondents (Table 3) has been drawn (Fig. 4a). This shows a GSA which is easy commuting in the local landscape, available transportation facility as well as in the opinion of 260 library users of the public libraries. Similarly, a circular GSA of 5 km was also drawn to indicate a moderate difficult-to-travel zone based on similar criteria.

Table 3: Perception of library visitors about distance as a prime determinant of accessibility

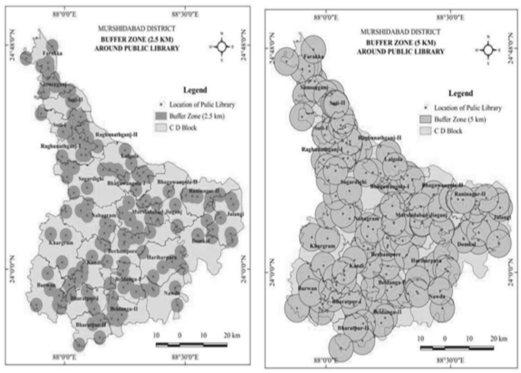
Perception Scale of (distance being an important controlling factor)	Strongly agreement	Agree agree	Neither/nor	Disagree	Strongly	Total
No. of visitors	145	50	34	18	13	260
Share of visitors (%)	55.77	19.23	13.08	6.92	5.00	100.00

Distribution of library visitors as per the perception of distance is an important factor

Perception Scale of agreement (2.5 km is considered suitable for ease of travel)	Strongly agree	Agree	Neither/nor	Disagree	Strongly disagree	Total
No. of visitors	196	28	12	16	8	260
Share of visitors (%)	75.38	10.77	4.62	6.15	3.08	100
Perception Scale of agreement (2.5-5 km considered suitable for ease of travel)	Strongly agree	Agree	Neither/nor	Disagree	Strongly disagree	Total
No. of visitors	6	8	14	42	190	260
Share of visitors (%)	2.31	3.08	5.38	16.15	73.08	100

In the analysis of the perception and opinion of the visitors related to the role of distance as a controlling factor in visiting a public library, the survey results reveal that as high as 55.77 percent of visitors strongly agreed that distance is a major controlling factor. Whereas, only 5 percent of those visitors surveyed didn't think that distance has an important role to play in deciding the ease and frequency of visiting the library. On the other hand, 75.38 percent (Table 3) of visitors believe that a 2.5 km distance is fairly good from the perspective of visiting a public library in Murshidabad environment under the given condition of the terrain, transportation, and the socio-economic condition of the people. Beyond 2.5 km, the overwhelming majority believe that it is inconvenient to visit the libraries for distance. The survey result shows that as high as 73.08 expressed strong disagreement with the suitability of a distance of 2.5 to 5 km to visit a public library in the given environmental condition. It's further observed that only 2.31 percent and 3.08 percent of respondents opined that up to 5 km distance may be suitable to visit a public library. These two groups of strong agreement and agreement are the result of the availability of personal travel arrangements.

It has also been found that no C D block has sufficient public libraries to cover their entire geographical area where all potential readers could find a public library within a 2.5 km distance. The thorough analysis conducted in the course of the present research reveals that only Raghunathganj-I, Kandi, Samserganj, and Murshidabad-Jiaganj C D blocks have less than 50 per cent of their area where the readers have to travel more than 2.5 km distance to avail library service.



(a) (b)

Figure 4a & 4b: Geographical Service Area of 2.5 km and 5 km radii

On the other hand, inhabitants from more than 75 percent of the areas of Sagardighi, Bhagawangola-II, Khargram, and Burwan C D block have to travel above 2.5 km distance to avail library services, indicating a relatively poor presence of the public library. Figure 4a clearly depicts that the C D

blocks with poor public library concentration are located along the fringe of the district and certainly away from the highways and main arterial roads. Further, a buffer zone of 5 km (Figure 4b) defining GSA has been drawn to indicate moderate access between 2.5 km to 5 km. These buffer zones are based on the given socio-economic condition, physical landscape, and transportation facility available, as well as considering the ability and willingness of users (n=260) to pay for transportation costs appears to be moderately difficult as expressed by the readers/users around the public libraries surveyed. A very low proportion of area is found to be out of GSA indicating an unserved (difficult access) area when it is identified based on a 5 km buffer (Figure 4b) zone. The spatial distribution pattern of such un-served areas shows they are located in the outflanked areas in the southeast, southwest, and north-east peripheries.

Curiously, a few un-served areas are also lying like 'voids' in the border regions of Berhampore and Hariharpara C D blocks, the trijunction region of Kandi, Khargram and Nabagram C D blocks, and in the Sagardighi C D block. It is further noticed that the over-served (double-served) areas in the form of overlapping can be seen primarily along the highways (NH 12) and other main arterial roads (SH 11 & SH 11A) in Berhampore, Kandi, Raghunathganj-I and Samserganj C D blocks.

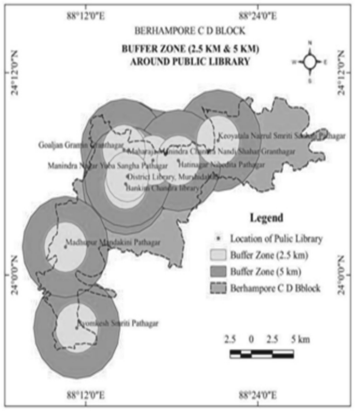


Figure 5: Geographical Service Area of 2.5 km and 5 km radii in Berhampore Block

A very high degree of anomaly in the concentration of public libraries is found in Berhampore C D block. The distribution pattern is nearly axial along National Highway 12 and State Highway 11, radiating from Berhampore. Buffer zones of a 5 km radius are having multiple overlapping in and around Berhampore and also within proximity of the state highways (Figure 5). The high concentration in the region may be due to the lobbying of the powerful-decision makers around the district headquarters that also favours the 'urban elite staff members' in terms of ease of commute to public libraries to join duty. However, the fringe areas of the C D block along the eastern and southern margins have multiple unserved and underserved areas.

7. Discussion

The outcome of analysis of data in this study is different from the previous studies (Park, 2012; Johnson 2010 & Koontz 2007; Aabo, Audunson, & Varheim, 2010; Audunson, et al., 2019; Nasserabadi, et al, 2013; Das, 2023) in terms of the analysis of variables to understand the accessibility and usability of a public library, as well as the spatial scale on which this study analysed variables. This study finds distance to be negatively related to the usability of the library, which aligns with the study by Park (2012). Similarly, the studies by Aabo, Audunson, & Varheim (2010) and Audunson, et al. (2019) found inappropriate positioning of the libraries in the study area. The results of these studies also conform to this study in the Murshidabad district, where we find that the spatial distribution of public libraries is unequal and that there are areas located in the frontier regions devoid of library services. Concerning the GSA analysis of libraries, the studies by Donnelly (2014), Johnston & Bishop (2011), Sharma (2015), Kinikin (2004), Guo et al. (2017), and Higgs et al. (2019) are comparable to our current study. Though the studies show that larger service areas attract more visitors and vice versa, the distribution of service areas for a given

standard of library is greater in Murshidabad. Even the population served by each public library is quite high and it is found to be over 90000 (Khargram). Therefore, our study recommends the establishment of more public libraries, particularly in the underserved frontier and far-flung regions to bring all desired populations and aspirant readers within a reasonable distance from their respective residences to enhance the accessibility and usability of public libraries.

8. Conclusion

Public Libraries undoubtedly play a vital role in the spread of information and dissemination of knowledge. Particularly, in the minority-dominated, socio-economically backward district of Murshidabad, they help students in their preparation for competitive examinations, assist in functional literacy, and contribute to the general awareness level of the people including dissemination of information. However, this precious institution is not uniformly distributed throughout the district. Our analysis of GSA shows that while some areas are double-served, many of the areas remain underserved or even unserved. Patterns of distribution of well-served areas are in the form of an axis, extended in the north-south direction along the NH 12. It has been observed that under-served and unserved areas are generally located in the far-flanked areas, particularly along the Bangladesh border and in the riverine region of River Padma where geographical factors have played an important deterrent role. The establishment of new public libraries in the underserved and unserved will enhance accessibility and extend service to the deprived people. Therefore, this study will be helpful to the decision-makers, particularly of the Department of Mass Education Extension & Library Services to take affirmative action.

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