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GEOSPATIAL STUDY OF ACCESSING SANITATION IN SLUMS OF JALGAON CITY : A GEOINFORMATICS APPROACH

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ABSTRACT

As per the 74th Constitution Amendment Act, the Urban Local Bodies (ULBs) are entrusted to provide basic urban services and amenities to all the citizens, including urban poor residing in the slums. The standard of the basic services provided by ULBs in slums often has been accorded low priority.

Poor sanitation is a major public health problem in slums & has considerable implications on health and environment. Poor awareness about sanitation among the slum dwellers has inherent linkages with public health.

Geoinformatics is backbone of urban planning & management. GIS (Geographical Information System) based urban management system manages spatial & non spatial data including- urban services, infrastructure and socio-economic information.

Located in western India, to the north of Maharashtra in Jalgaon District, Jalgaon city is headquarter of Jalgaon district. As per Jalgaon City Municipal Corporation (JCMC), in year 2011-12 about 19% of the total population of city lived in 30 slums.

Present research attempts to access the sanitation in a slum named Shanipeth Gurunanak Nagar (SGN) on Geoinformatics platform. GIS maps for the sample surveyed households from Shanipeth Gurunanak Nagar slum settlement are generated based on survey parameters.



Further categorical analysis of survey parameters is also conducted & key outcomes from the same are derived. Thus, GIS operate as a tool in the research context through two main methods: First, creating databases & secondly, analyzing the existing situation upon specific criteria and helping in decision making.

KEYWORDS :Urban Local Bodies, Basic Services, Urban Poor, Slums, Sanitation, Geographical Information System, Jalgaon City Municipal Corporation.

INTRODUCTION :

As per JCMC in 2011, 19% of the total population of the city lived in 30 slums of Jalgaon. Thus slum population forms an important & inseparable component of the city & is liable to enjoy the equity & quality of basic urban services.

But the shortage of basic services i.e. water supply, sewerage (sewage & drainage), solid waste management & storm water drainage in slums deteriorates the urban environment. This has led to unhygienic conditions in slums & informal settlements. Lack of education is another major problem faced by the urban poor living in the slums, which has adverse impact on the personal hygiene. The prevailing unhygienic condition in the slums along with the poor knowledge about the sanitation poses a threat to the health of the slums dwellers.

This paper focuses on the Geographical information system (GIS) as a tool for accessing the sanitation, its related practices & its awareness in a slum named Shanipeth Gurunanak Nagar on Geoinformatics platform. A sample survey is undertaken in Shanipeth Gurunanak Nagar slum by adopting a participatory approach for further planning. A questionnaire was designed for the same. The results from the survey are mapped on Geoinformatics platform & further analyzed to portray the exact sanitation situation in SGN slum. Geoinformatics generated maps offer broad view of the current situation & are visually more appealing, aids further planning. GIS can be that effective computer system capable of assembling, storing, and manipulating, analyzing and displaying geographically referenced information according to their locations and help in the decision making process.

PROBLEM STATEMENT:

Lack of sanitation, its awareness & sanitation related practices in slums

Lack of Geoinformatics as a tool in accessing sanitation in slums

Aiming this, a research was deemed to access sanitation in SGN slum of Jalgaon city to demarcate the related issues on Geoinformatics platform.

AIMS & OBJECTIVES:

Aim: Geoinformatics approach for accessing sanitation in a slum of Jalgaon city

OBJECTIVES:

- To study the sanitation in slum
- To collect & analyze sanitation related awareness & sanitation related practices conducted in slum on household level & map it on Geoinformatics platform
- Based on the sanitation issues as identified through analysis of GIS maps, conclude possible resolutions

MATERIALS & METHODOLOGY:

Study Area: Located in Jalgaon shiwar, near the railway line along the Mumbrahad drain, Shanipeth Gurunanak Nagar lies in 7th Prabhag of JCMC and is surrounded by residential area. The slum appeared in gazette on 18-07-92. As per census 2011, population of SGN slum is 2069 with 322 hutments. SGN slum is located on municipal land with status of land tenure as legal.

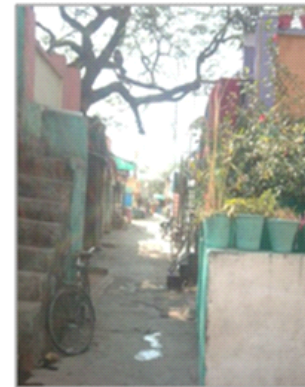
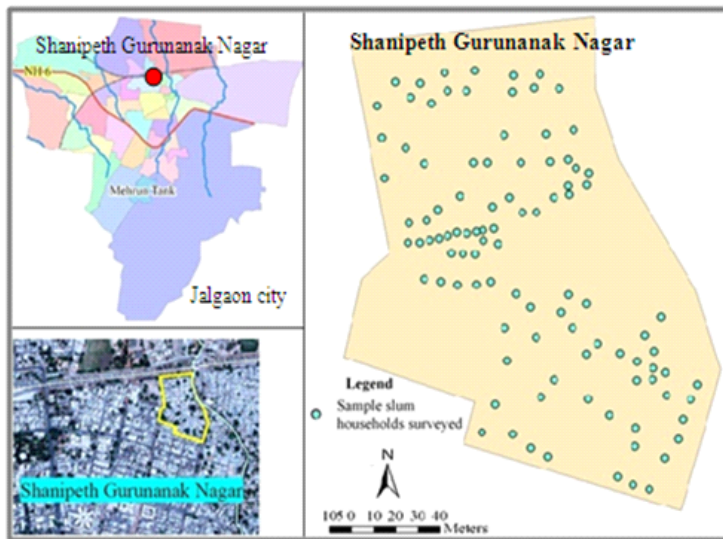


Photo 1: Shanipeth Gurunanak Nagar slum

Map 1: Locational map of Shanipeth Gurunanak Nagar slum

Materials:

Software: ESRI's ArcGIS 9.3 Desktop: Arc Catalog & ArcMap

Global Positioning System (GPS): Garmin GPS 72

Data Management Tool: Microsoft Excel 2007

METHODOLOGY:

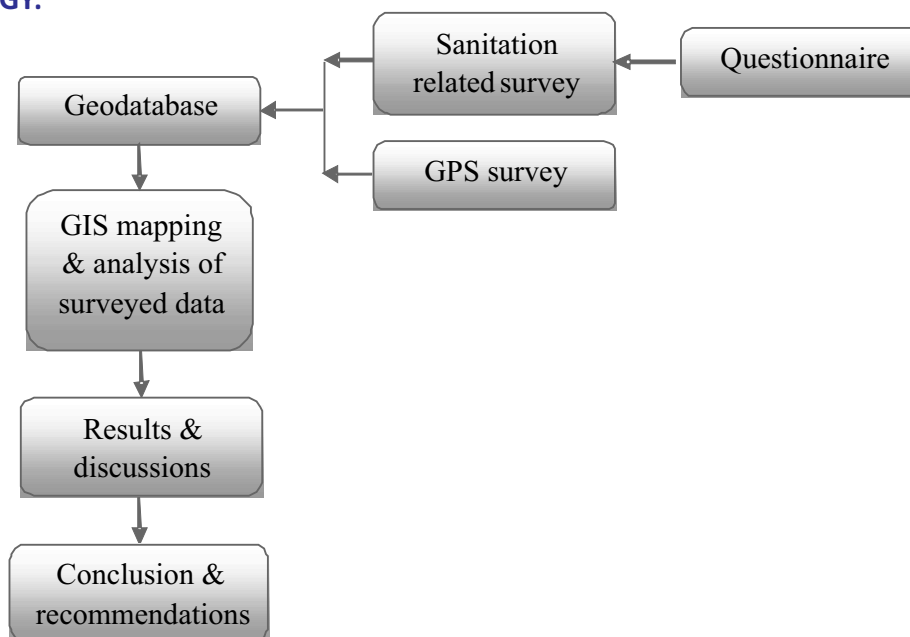


Figure 1: Conceptual framework of methodology

The above flowchart gives conceptual framework of methodology in which research was conducted.

Literature review gave a fine entry point for the study. To gain insight about the SGN slum, slum profiling was done for SGN from available secondary data.

For accessing sanitation in SGN slum, a questionnaire was drafted. The questionnaire comprises of fifteen sanitation related survey parameters which in-turn will give information about the sanitation, its awareness & sanitation related practices conducted by slum house holds. For survey purpose 30% sampling of total households from 322 hutments in SGN was done & 100 households were randomly sample surveyed. During the survey the questionnaire were duly filled with proper discussion with by adopting participatory approach. Simultaneously spatial point location of the sample survey household was collected on Garmin GPS 72. Survey was followed by data entry in Microsoft Excel 2007 & creation of sanitation related slum database. The GPS collected data was also converted into shapefile in ArcGIS 9.3.

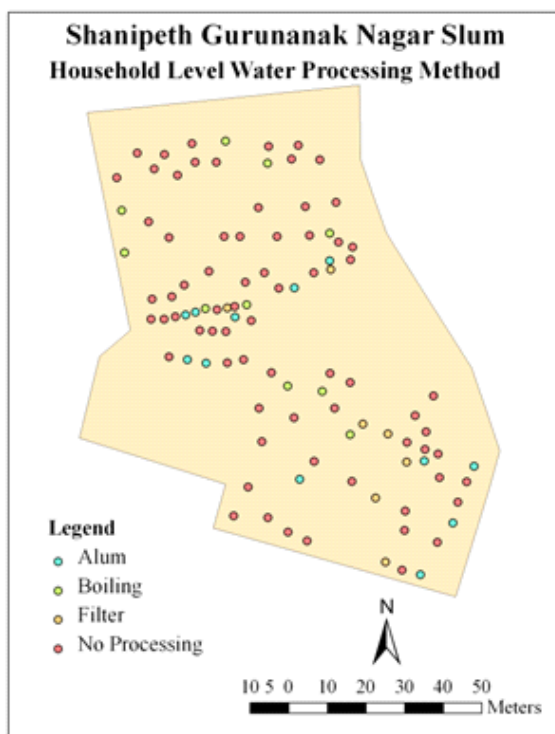
The created shapefile for sample surveyed households in SGN slum was appended with the household level surveyed data to create sanitation related slum geodatabase. Thus the Geoinformatics technology helps to integrate data from multiple sources into a single geodatabase.

Data collected from SGN slum is mapped parameter wise and GIS based maps are prepared for the same in Arc Map 9.3. After mapping, the data was analyzed parameter wise on GIS platform to evaluate categorical distribution of the parameter in percentage. Thus here Geoinformatics acts as a key tool for mapping, analysis and visualization of results.

RESULTS & DISCUSSION:

Given below are GIS generated maps for the sample surveyed households from SGN slum, based on survey parameters. Categorical analysis of survey parameters is also conducted & outcome from the same are discussed below.

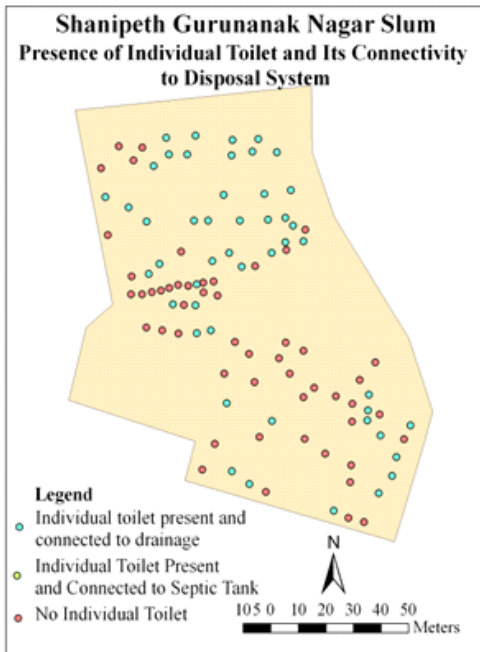
•Parameter: Household Level Water Processing Method



Category	SGN
Alum	12
Boiling	10
Filter	7
No processing	71

In SGN slum, out of total sample surveyed households, 71% households do not process drinking water before consumption

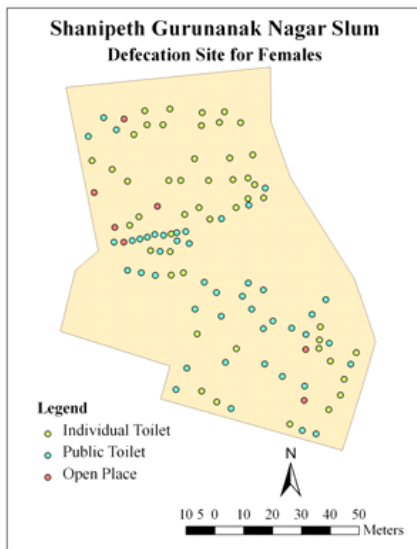
•Parameter: Presence of Individual Toilet & its Connectivity to Disposal System



Category	SGN
Individual toilet present & connected to drainage	48
Individual toilet present & connected to septic tank	0
No Individual toilet	52

In SGN slum, out of total sample surveyed households, 48% of them have individual toilet & all of them are directly connected to drainage. 52% of sample surveyed households do not have individual toilet.

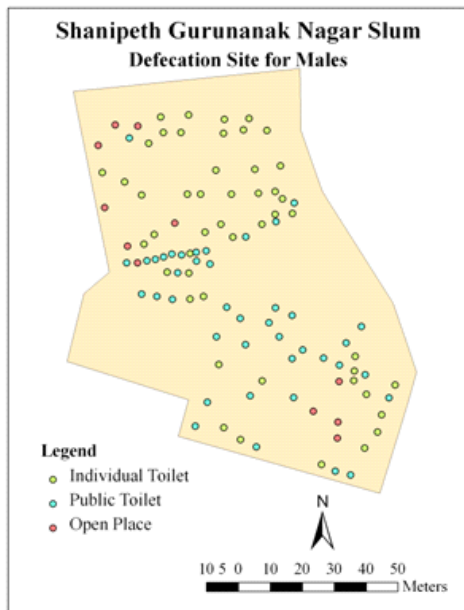
• Parameter: Defecation Site for Females



Category	SGN
Individual toilet	48
Public toilets	45
Open defecation	7

In SGN slum, out of total sample surveyed households, females from 7% households go for open defecation.

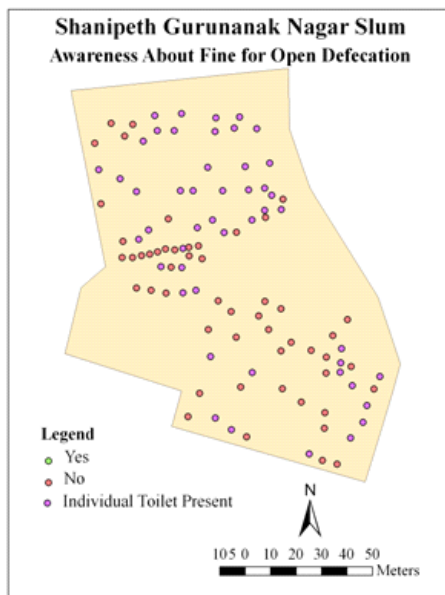
•Parameter: Defecation Site for Males



Category	SGN
Individual toilet	48
Public toilets	41
Open defecation	11

In SGN slum, out of total sample surveyed households, males from 11% households go for open defecation.

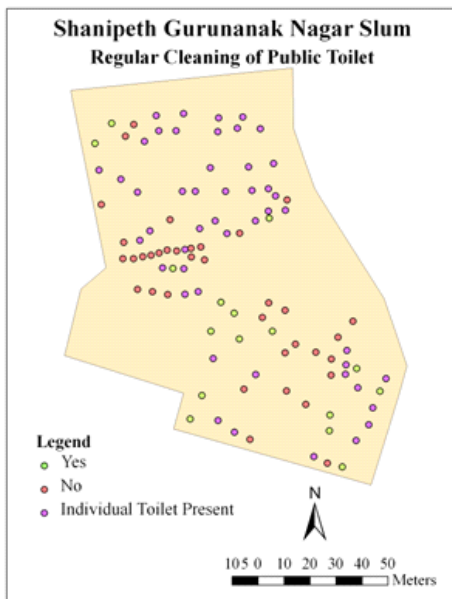
• Parameter: Awareness about Fine for Open Defecation



Category	SGN
Yes	0
No	52
Individual toilet present	48

In SGN slum, out of total sample surveyed households, 52% of sample surveyed households do not have individual toilet & all such households are unaware about fine for open defecating.

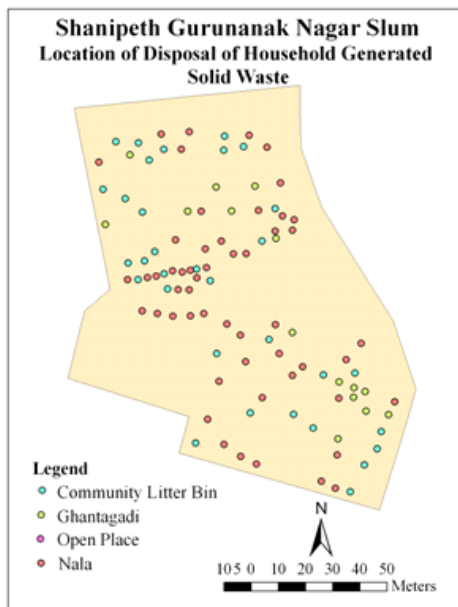
• Parameter: Regular Cleaning of Public Toilet



Category	SGN
Yes	16
No	36
Individual toilet present	48

In SGN slum, out of total sample surveyed households, majorly 36% of households using public toilets articulated its irregular cleaning

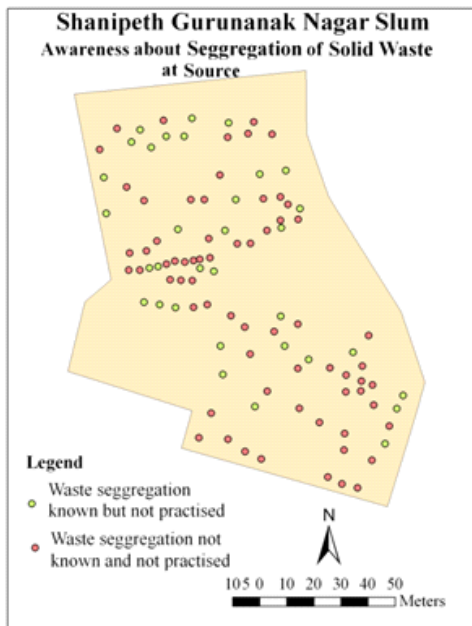
• Parameter: Location of Disposal of Household Generated Solid Waste



Category	SGN
Community litter bin	32
Ghantagadi	15
Drainage	53
Open place	0

In SGN slum, out of total sample surveyed households, majorly 53% of households throw household generated solid waste in drainage.

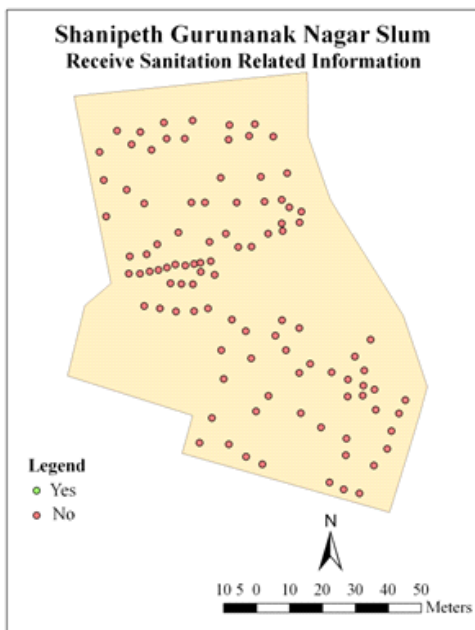
•Parameter: Awareness about Segregation of Solid Waste at Source



Category	SGN
Waste segregation known but not practised	33
Waste segregation not known & not practised	67

In SGN slum, out of total sample surveyed households, only 33% of households are aware about segregation of wet & dry waste, but none of sample surveyed households practice segregation.

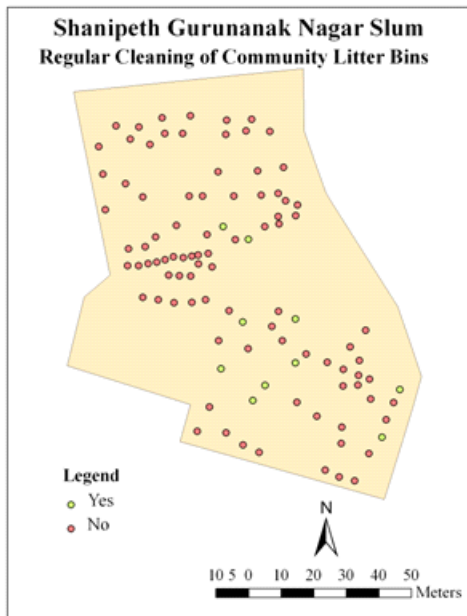
•Parameter: Receive Sanitation & Cleanliness Related Information from Local Corporator, ULB Officers/Workers



Category	SGN
Yes	0
No	100

In SGN slum, out of total sample surveyed households, 0% of slum households are given information about sanitation & cleanliness.

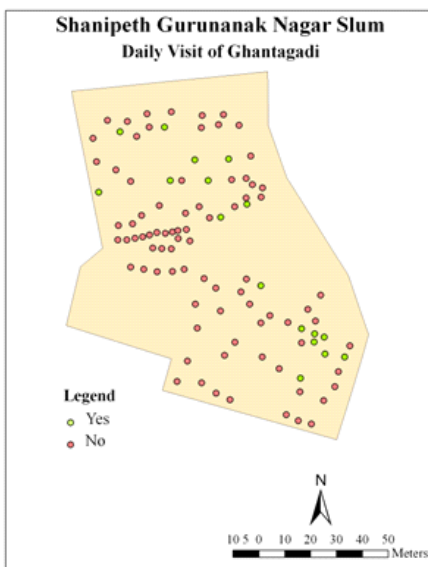
•Parameter: Regular Cleaning of Community Litter Bin



Categorical Distribution of Regular Cleaning of Community Litter Bin (%)	
Category	SGN
Yes	10
No	90

In SGN slum, out of total sample surveyed households, majorly 70% of households complaint of irregular cleaning of community litter bin by ULB.

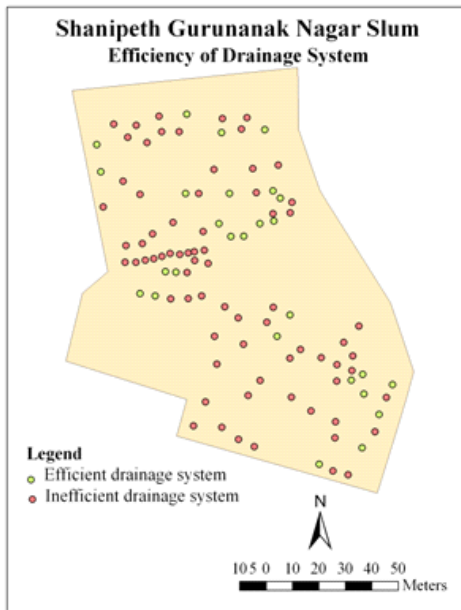
•Parameter: Daily Visit of Ghantagadi



Categorical Distribution of Daily Visit of Ghantagadi (%)	
Category	SGN
Yes	17
No	83

In SGN slum, out of total sample surveyed households, majorly 83% of households state that ghantagadi does not visit daily for collection of household level waste.

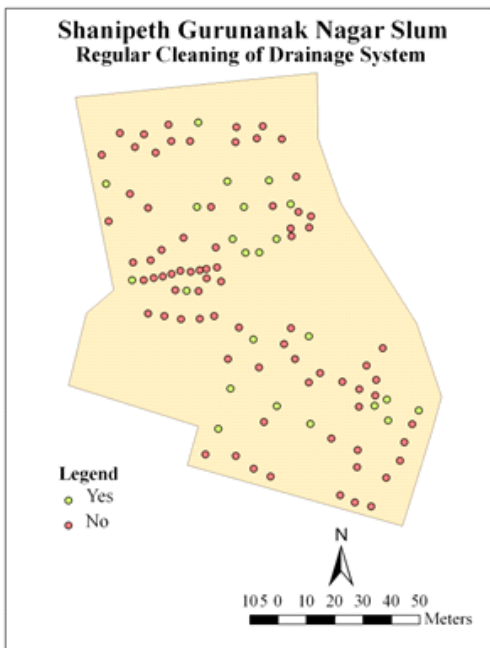
• Parameter: Efficiency of Drainage System



Categorical Distribution of Efficiency of Drainage System (%)	
Category	SGN
Efficient drainage system	27
Inefficient drainage system	73

In SGN slum, out of total sample surveyed households, majorly 73% households mentioned inefficient drainage system.

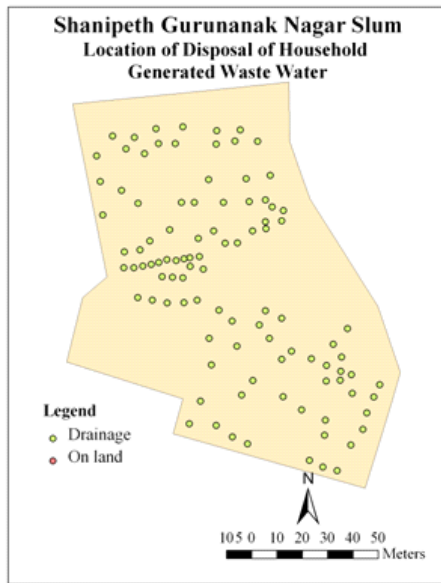
• Parameter: Regular Cleaning of Drainage System



Categorical Distribution of Regular Cleaning of Drainage System (%)	
Category	SGN
Yes	32
No	68

In SGN slum, out of total sample surveyed households, majorly 68% of households stated irregular cleaning of drainage system.

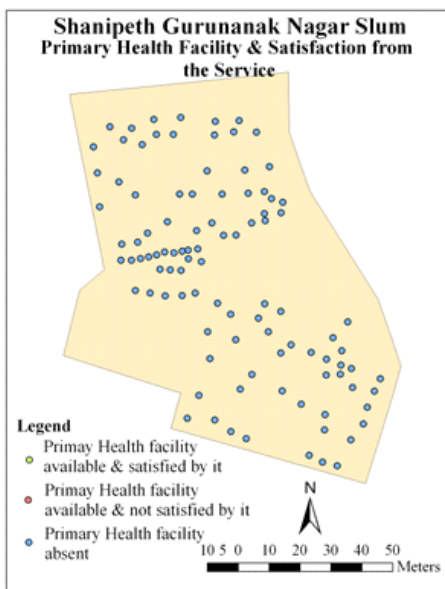
• Parameter: Location of Disposal of Household Generated Waste Water



Categorical Distribution of Location of Disposal of Household Generated Waste Water (%)	
Category	SGN
Drainage	100
On Land	0

In SGN slum, out of total sample surveyed households, 100% of households dispose household generated waste water in drainage.

• Parameter: Primary Health Facility in Vicinity & Satisfaction from the Service



Categorical Distribution of Primary Health Facility & Satisfaction from the Service (%)	
Category	SGN
Primary health facility available & satisfied by it	0
Primary health facility available & unsatisfied by it	0
Primary health facility absent in vicinity	100

In SGN slum, out of total sample surveyed households, all households ensured absence of primary health facility near the slum.

CONCLUSION & RECOMMENDATIONS:

The GIS mapping of the survey conducted in the SGN slum is analyzed & which concludes in following way:

- Sample surveyed households from SGN majorly do not process water before consumption. Thus monitoring water quality as per standards stated by government agencies is very crucial for JCMC to protect health of its urban poor.
- In SGN, all the sample surveyed households having individual toilets are directly connected to drainage. Drain blocks, seepage overflow are issues are faced by the residents. As space constraint is

issue for all of them, it is recommended that JCMC could work out for option of common septic tank to ensure proper hygienic condition in the slum settlement.

- In spite of having facility of public toilet block for females in SGN, few females & males from sample surveyed households without individual toilet opt for open defecation. Thus proper monitoring of functionality of public toilet seats needs to be taken to stop open defecation. The awareness generation campaign should be undertaken by JCMC with necessary involvement of females from such households (as identified from slum Geodata base).
- None of the sample surveyed households from SGN lacking facility of individual toilet are aware about fine for open defecation
- Efficiency of public toilet services provided by ULB can be measured from consumer's response. Majority of sample surveyed households from SGN lacking individual toilet facility & using public toilets complaints about insufficient seats & irregular cleaning of public toilets
- Primary drain passes along the SGN & majority of sample surveyed households throw the household level waste generated in it, which results in frequent blockages.
- JCMC conducts recycling of MSW for which segregation of waste at point source is important, but is not practiced in the city. Unfortunately majority of sample surveyed households from SGN are unaware about segregation of household level waste generated into dry & wet. ULB should formulate local policy for awareness generation & then provide colored bins.
- Majority of the slum dwellers are not well qualified to understand the importance of personal hygiene, toilet mannerism, disposal of waste & proper usage of public facilities. Here role & responsibility of local corporator, health officer & sanitation worker comes into play to disperse the sanitation & cleanliness related information ensuring the health of the slum dwellers. But regrettably none of sample surveyed households from SGN made certain that they ever receive such kind of information.
- The contracted services of Solid Waste Management in city by JCMC states that contractor is supposed to clean the community litter bin regularly & later spray germ kill & odor kill powder. But majority of sample surveyed households from SGN state that community litter bins are not cleaned on regular basis. Thus JCMC needs to effectively monitor the contracted services & is also liable to impose penalty on contractor for improper services.
- Majority of sample surveyed households from SGN complaint that ghantagadi does not visit daily for collection of waste.
- The entire sample surveyed households from SGN ensure presence of drainage network in their area & state that it is not cleaned regularly & is ineffective & are not satisfied by drainage services of JCMC.
- SGN lacks nearby access to health facility in vicinity. Provision of primary health centre is advised.

The various components of Geoinformatics like GPS, remote sensing & GIS deployed for capture of spatial location aid in accurate mapping of necessary field data & creating maps. Also Geoinformatics provides an efficient platform for creation of slum geodatabase. The sanitation related issues identified in the research at household level can be easily accessed by the planning authorities through maps & geodatabase for easy resolution.

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