Conclusion

This study has analyzed QOL in W-DSCC-15 and W-DSCC-28 of Dhaka city through complementary qualitative and quantitative techniques. A number of key messages have been emerged from this study. Socio-economic and environmental aspects such as employment, income, educational facilities, ease of availability of water, electricity, gas; transportation, medical facilities, recreation etc influence QOL. Most of the respondents (about 60%) of W-DSCC-15 were found to be highly educated and are engaged in Government/Non-government services (60%) and business (30%). On the other hand, only 10% of respondents of W-DSCC-28 are graduated and most of the respondents (76%) of W-DSCC-28 are engaged in business. About 70% of the respondents of W-DSCC-15 rated their overall health positively (good or Moderate) while only about 58% respondents of W-DSCC-28 described their overall health as good. The residents of the study areas are almost prefer to go private clinics to government hospitals. From the field survey it has been observed that the respondents of both W-DSCC-15 and W-DSCC-28 are facing some urban environmental problems such as traffic jam, public spaces for passing free time, air pollution, violence, social degradation etc. The scenario is more severe in W-DSCC-28 compared to W-DSCC-15. QOL is indisputably lower in W-DSCC-28 than that in W-DSCC-15. Policymakers must understand that QOL is a much broader concepts than 'income per capita', currently used as the standard indicator of a population's state of development. Thus the study can provide policymakers with a deeper understanding of people's needs and aspirations, and it underlines how investments in human and social capital are often the most effective ways to achieve income growth within the context of wider development gains.

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Electricity

Most of the respondents of W-DSCC-15and W-DSCC-28 (75% and 92% respectively) expressed their strong dissatisfaction on supply of electricity. They had to face load-shedding daily that hampered daily life and academic study of the students. As seen in the survey data, the situation of Ward-64 with respect to electricity is worse than that of W-DSCC-15.

Sewerage System

Figure 8 shows the opinion of the respondents on sewerage system. In W-DSCC-15 sewerage system is very good. Most of the respondents (75%) were satisfied with sewerage system. But, the sewerage system of W-DSCC-28 is very bad. About 55% of the respondents expressed their dissatisfaction. During the rainy season the scenario of W-DSCC-28 becomes worse. Rain water becomes stagnant for long time and residents of this area suffer a lot. Blockage of the drainage lines due to disposal of garbage is one of the important reasons behind it.

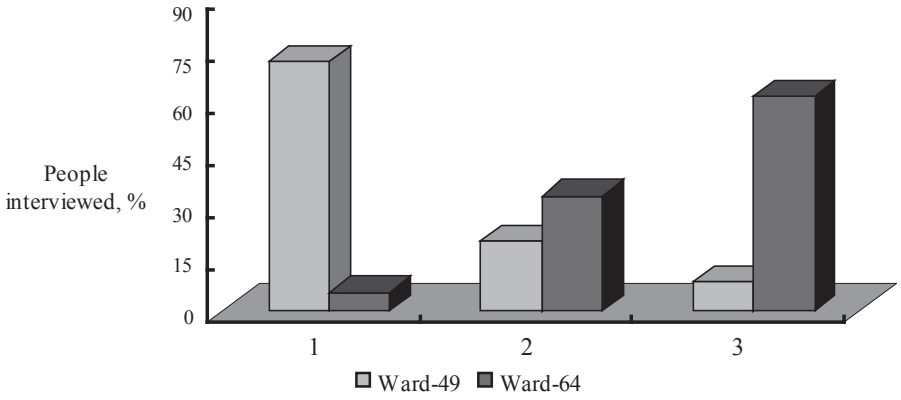

Figure 8. Comments on sewerage system.

Recommendations

What shall improve the quality of life of residents of different social classes? Not only resource flow and tapping, service provision but also equity and equality of distribution. Keeping this in mind after long discussion, consultations and debate the following measures can be taken to improve QOL:

- Economic growth
- Benefiting from globalization
- Pollution reduction
- Reduction of crime levels
- Availability of land, services and infrastructure
- Assistance to disadvantaged
- Increased participation
- Conservation of environment.

Roads and Public Transport

As W-DSCC-15 is modern and well-planned, roads are wider and of better condition compared to those of W-DSCC-28. Traffic jam is a severe problem in W-DSCC-28 while it is not so for W-DSCC-15. Figure 6 shows the perception of the residents of W-DSCC-15& 28 on access to transportation. Residents of W-DSCC-15 were most likely to agree or strongly agree that public transport was safe, followed by affordable and convenient. Where as most residents of W-DSCC-28 expressed their dissatisfaction on public transport facility in that area.

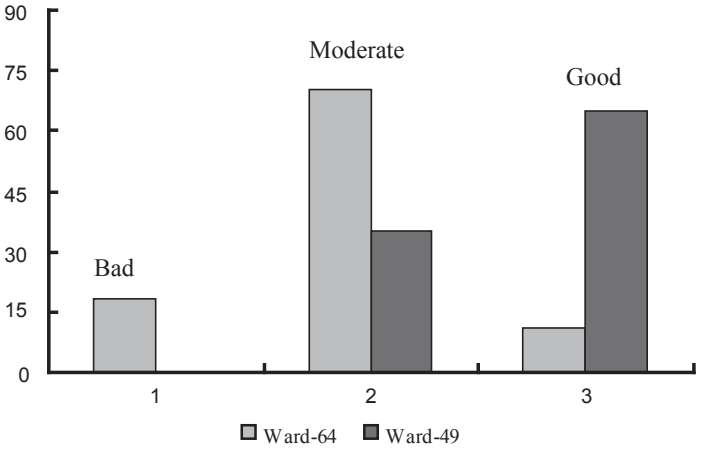

Figure 6. Comments of respondents of Ward-15 and Ward-28 on transportation.

Water Supply

Water supply in urban area is a prime concern for the authority. Water supply of Dhaka city is not sufficient. A large number of residents of W-DSCC-28 expressed their dissatisfaction (about 50%) on supply of water by DWASA (Figure 7). On the other hand, about 60% residents of W-DSCC-15 are satisfied with water supply and about (36%) are moderately satisfied. Only a very few about 3% are not satisfied. The scenario of W-DSCC-28 is totally reverse of W-DSCC-15. Most of the residents of Ward-64 expressed their moderate satisfaction or dissatisfaction on water supply.

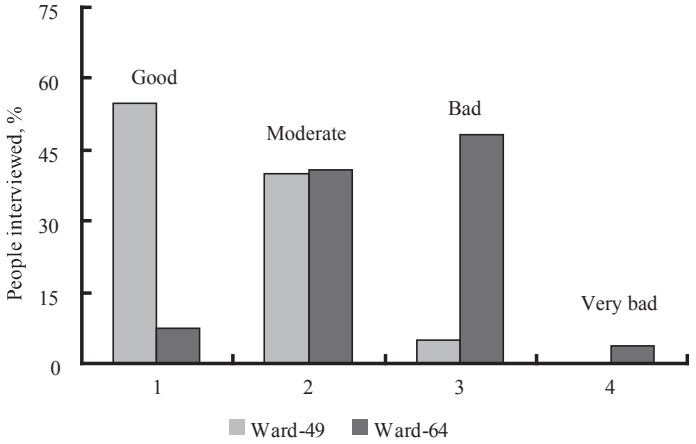

Figure 7. Comments on water supply.

Table 3: Income level of the respondents.

Income, Taka	Respondents, % (Number of respondents, N = 200)	
	W-DSCC-15	W-DSCC-28
3000 – 5000	5	11
5001 - 10000	25	22
10001 – 15000	25	37
15001 – 20000	5	19
> 20000	40	11

Source: Field Survey, 2007

Housing

Housing facilities of W-DSCC-15 are obviously better. Now a days multistoried apartments are becoming popular in this region. House rent is also high in this region. On the other hand, houses in W-DSCC-28 are very older and are not well planned.

Health

About 70% of the respondents of W-DSCC-15 rated their overall health positively (good or Moderate) while only about 58% respondents of W-DSCC-28 described their overall health as good. Most of the sick respondents were found to suffer from fever.

Experience of Treatment

Most of the respondents generally feel better to go to private clinics or health centre than to government hospitals. Figure 5 shows the comments of the respondents of the study areas on the service of nearest health centres/clinics. About 90% (50% highly satisfied & 40% moderately satisfied) of the respondents of W-DSCC-15 were satisfied with the service of the nearest health centres. On the other hand, about 78% (24% highly satisfied & 54% somehow satisfied) of respondents of W-DSCC-28 described their satisfaction on the service of the nearest health care centre. Only 10% of W-DSCC-15and about 20% of W-DSCC-28 expressed some level of dissatisfaction on the service of the nearest health care centres.

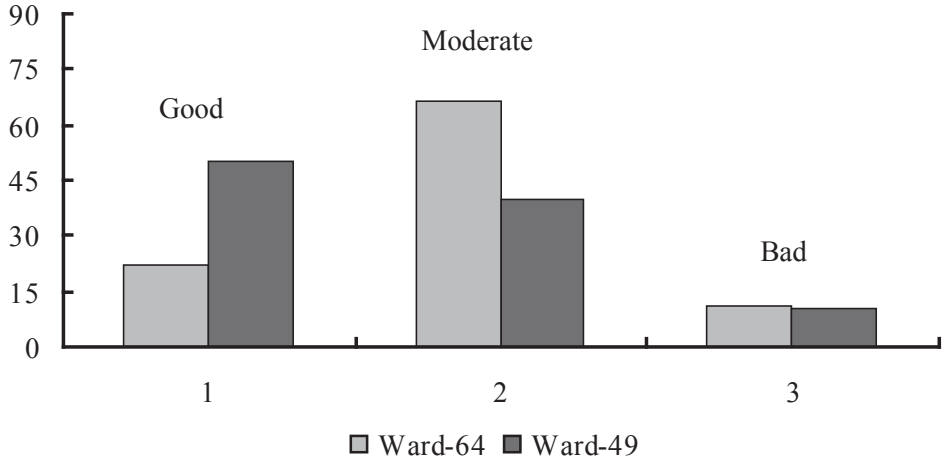

Figure 5. Condition of service of health centres.

level of 10 mg/L for nitrate as nitrogen (NO3-N) in drinking water. The nitrate contents of water samples of W-DSCC-15 as well as Dhanmondi lake range from 2-3 mg/L while that of W-DSCC-28 is 3-8 mg/L (Table 1 & 2). This means no pollution of water by nitrate contamination.

According to Parvin et al., Noise pollution of W-DSCC-28 was found to be more severe compared to W-DSCC-15 due to more traffic jam, mixed areas, etc. The noise level as high as 85 dB was observed in case of W-DSCC-28 during 12.00-2.00 pm (Parvin et.al 2016).

Analysis the Socio-economic Data

Academic Qualification

Figure 4 shows the academic qualification of respondents of W-DSCC-15 and W-DSCC-28. About 60% of the respondents of W-DSCC-15 are highly educated where as in case of W-DSCC-28only 10% of respondents are graduated. Even about 12% of the respondents of W-DSCC-28 were illiterate. Most of respondents (about 60%) of Ward-64 have academic level below SSC. Therefore, the perception of QOL is not clear to the people of W-DSCC-28.

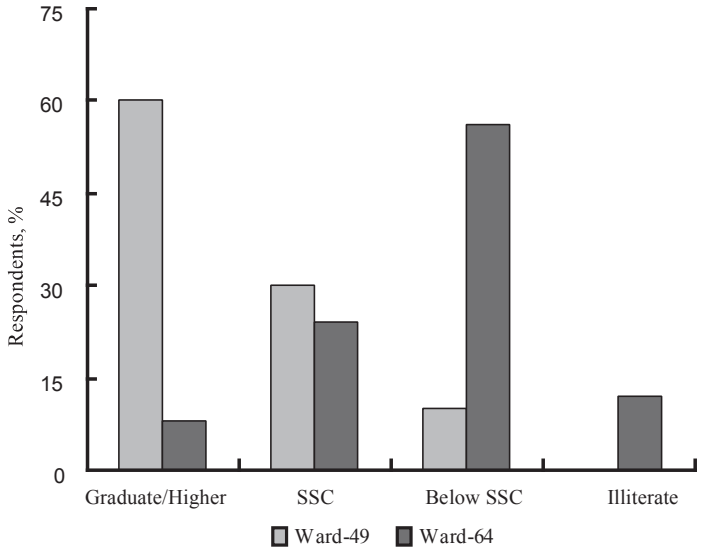

Figure 4. Academic qualification of respondents of W-DSCC-15 and W-DSCC-28.

Occupation & Monthly Income

Generally people don't like to let others know their income. That's why it is difficult to have an exact data on income level of the respondents. Anyway, as the data obtained through questionnaire, most of the residents of W-DSCC-15 (60%) are engaged in government/non-government service and 40% earn are based on business. In case of W-DSCC-28, about 76% are engaged in business whereas only 24% are involved in government/non-government services. Distribution of respondents on the basis of monthly income is stated in Table 3. As shown in Table 4 residents of W-DSCC-15 have higher monthly income than residents of W-DSCC-28.

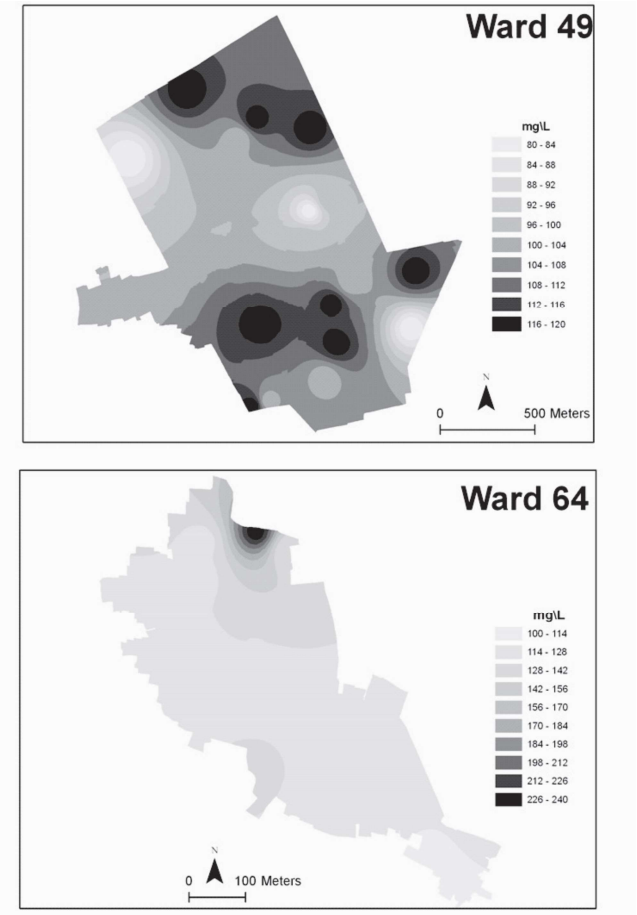

Figure 3. Spatial distribution of Chlorides in W-DSCC-15 &28.

Chlorides: Chlorides in reasonable concentration are not harmful to human. At a concentration of more than 250mg/L they give a salty taste to water, which is objectionable to many people. For this reason, chlorides are generally limited to 250mg/L in supplies intended for public use. In many areas of the world where water supplies are scarce, sources containing as much as 2000mg/L are used for domestic purposes without the development of adverse effects, once the human system becomes adapted to the water. According to Bangladesh Environment Conservation Rules (1997), drinking water standard for chloride is 150-600mg/L, but for coastal regions of our country this limit has been relaxed up to 1000mg/L. From Table 1 it is found that chloride contents of supplied water of both Wards range from 80-120 mg/L which is below the standard value for Bangladesh. The spatial distribution of Cl- in water samples of both study area is shown in Figure 3. Chloride content was higher (100-120) in Dhanmondi -3,4,5,7,8 and Dhanmondi-14,15,16 areas. In W-DSCC-28, chloride content was found as high as 240 in Khaja Dewan 1st lane area.

Tests for arsenic determination were done with the samples of both DWASA supplied and lake water. It was found that all samples were fully arsenic free.

Nitrate is highly soluble in water and is stable over a wide range of environmental conditions Nitrate reactions [NO3-N] in fresh water can cause oxygen depletion. The U.S. Environmental Protection Agency (EPA) has established a maximum contaminant

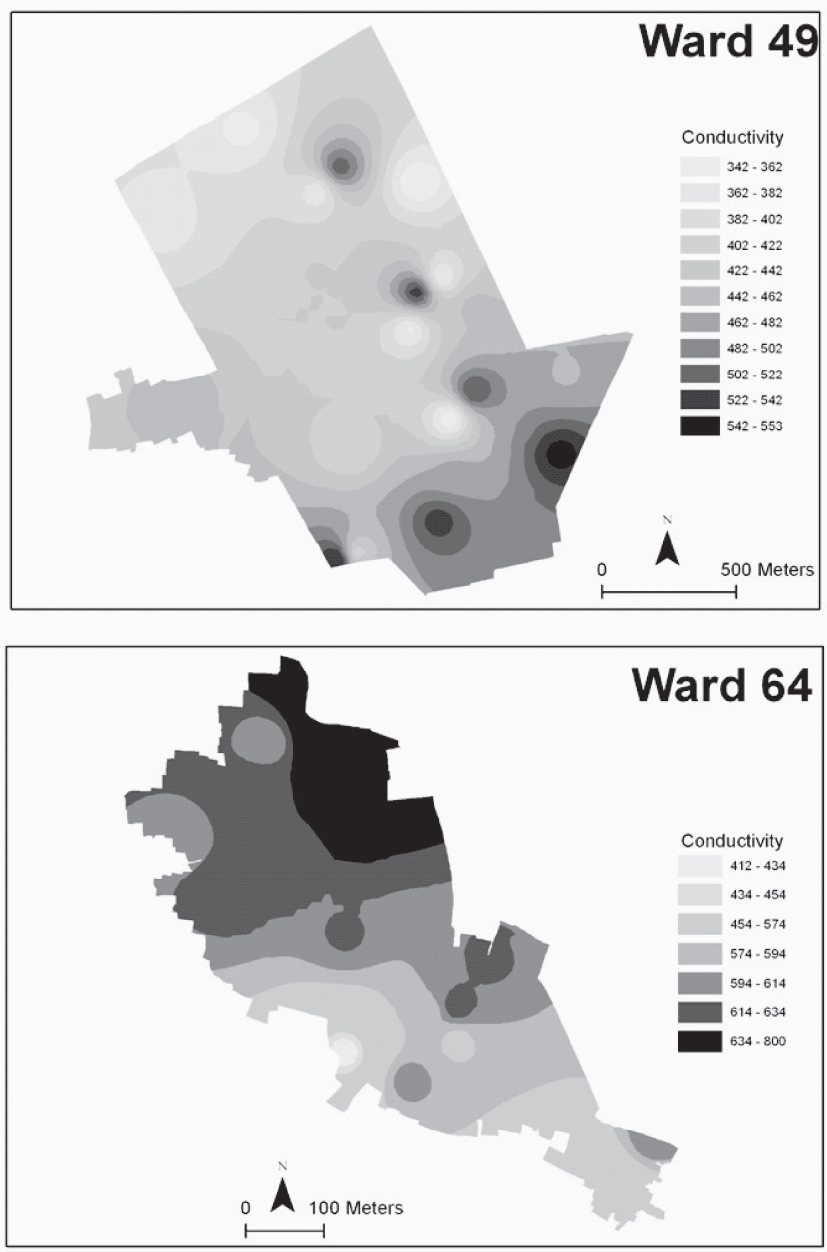

Figure 2. Spatial distribution of Conductivity in W-DSCC-15 &28.

Salinity: Salinity is an ecological factor of considerable importance, influencing the types of organisms that live in a body of water. As well, salinity influences the kinds of plants that will grow either in a water body, or on land fed by water.

Table 1 showed the salinity of water samples collected from W-DSCC-15 and W-DSCC-28. The salinity ranges from 0.2 - 0.5 ppt which are good accordance with the standard values for fresh water. Water samples of W-DSCC-28 showed a little higher salinity compared to those of W-DSCC-15. But the salinity of water collected from both the study areas are within the permissible limit.

Table 2: WHO guidelines and Bangladesh Standards for water quality parameters.

Water Quality Parameter	Drinking Water	
	WHO Guidelines Values,1996	Bangladesh Standard, 1997
pH	6.5 - 8.5	6.5 - 8.5
TDS, mg/L	1000	1000
COD, mg/L	-	< 5.0
Chloride, (mg/L)	250	150 - 600
Arsenic, (mg/L)	0.01	0.05
Nitrate-nitrogen, (mg/L)	50	10
Ammonia-nitrogen (mg/L)	50	10
Conductivity, m		500

From Table 2 & 3 it is found that pH of drinking water of both the wards ranges from 7.1 to 7.9 which is a good agreement with the standard value of drinking water. The lake water samples also showed pH within the standard values.

TDS: Total solids refer to the matter that remains as residue upon evaporation and drying at 103°C to 105°C. Total dissolved solid (TDS) is the portion of total solids that passes through the filter. In potable water, most of the solids remain in dissolved form and consists of inorganic salts, small amount of organic matter, and dissolved gases. Total dissolved solids content of potable water usually ranges from 20 to 1000 mg/L. Groundwater usually has higher dissolved solids.
To determine the suitability of water for domestic purposes, it is required to know its TDS content. According to Bangladesh Environment Conservation Rules (1997), potable water should not contain more than 1000 mg/L of TDS. Table 2 &3 shows that water samples of both W-DSCC-15 and W-DSCC-28 have higher TDS than the WHO and Bangladesh standard for potable water.

Conductivity: Conductivity is a measure of how well water can conduct an electrical current. Conductivity increases with increasing amount and mobility of ions. These ions, which come from the breakdown of compounds, conduct electricity because they are negatively or positively charged when dissolved in water. Therefore, conductivity is a measure of the presence of dissolved solids such as chloride, nitrate, sulfate, sodium, magnesium and iron, and can be used as an indicator of water pollution.Pure water would theoretically have a specific conductance (SC) value of zero µS/cm at 25°C; however, this water is very difficult to produce. Distilled or deionized water has a SC of at least 1µS/cm.

Table 2 reveals that most of the water samples of W-DSCC-28 showed higher conductivities than the permissible level. As we know conductivity increases with increasing quantity and mobility of ions in water. So, the results in Table 2 & 3 reveals that water samples of W-DSCC-28 contain more ions than that of W-DSCC-15. The spatial distribution of conductivities of water samples in Ward-49 & 64 are shown in Figure 2.

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Table 1: Characteristics of water of W-15 and W-28

ID	pH		TDS, ppt		COD, mg/L		Salinity, ppt		Conductivity, m		Chloride (Cl^-), mg/L		Nitrate (NO_3^-), mg/L	
	W-15	W-28	W-15	W-28	W-15	W-28	W-15	W-28	W-15	W-28	W-15	W-28	W-15	W-28
S1	7.2	7.3	0.29	0.34	20.45	0	0.3	0.4	551	622	120	120	3	8
S2	7.4	7.2	0.20	0.34	0	0	0.2	0.4	372	638	80	120	3	6
S3	7.5	7.8	0.24	0.29	0	0	0.2	0.3	452	560	100	120	3	4
S4	7.3	7.4	0.25	0.30	0	0	0.3	0.3	423	580	100	120	3	6
S5	7.2	7.3	0.20	0.32	0	0	0.3	0.4	355	610	120	120	2	4
S6	7.4	7.9	0.19	0.31	0	0	0.3	0.3	518	412	120	140	2	6
S7	7.5	7.5	0.23	0.34	0	0	0.4	0.4	540	620	80	120	2	6
S8	7.5	7.4	0.27	0.32	0	0	0.2	0.3	450	625	100	120	3	4
S9	7.6	7.1	0.20	0.32	10.24	0	0.2	0.4	530	605	100	120	2	2
S10	7.2	7.2	0.23	0.34	0	0	0.2	0.4	460	630	120	120	3	6
S11	7.6	7.3	0.25	0.32	0	0	0.3	0.4	553	590	80	120	3	4
S12	7.5	7.2	0.26	0.44	0	0	0.2	0.5	472	800	120	240	2	3
S13	7.3	7.1	0.21	0.28	0	0	0.2	0.3	535	626	100	120	2	4
DL_1	7.6	7.3	0.21	0.31	40.68	0	0.2	0.3	410	613	100	120	2	4
DL_2	7.6	7.1	0.20	0.23	30.69	0	0.3	0.3	400	451	120	100	2	3
DL_3	7.6		0.19		20.15		0.2		358		100		3	
DL_4	7.5		0.22		31.20		0.3		344		120		2	
DL_5	7.6		0.19		30.50		0.2		366		100		3	
DL_6	7.4		0.25		39.45		0.3		342		120		2	
DL_7	7.6		0.19		33.70		0.2		358		100		3	

Here, S_n - Water samples collected from household; DL_n - Water samples collected from Dhanmondi Lake. Source: Field data, 2007.

Data analysis and interpretation

For data analysis and interpretation GIS (Arc GIS 9.2) software was used. Contour map and surface were generated on the basis of water quality parameter of drinking water, which has been collected from the different households and important places of ward DSCC-15 and DSCC-28 area. The co-ordinate system projection was BTM. Other parameters of quality of life were collected from questionnaire survey and finally statistical analysis were done.

Results and Discussion

As the population of Dhaka city as well as Bangladesh increases, so do the processes of industrialization and urbanization, Manufacturing plants are multiplying to meet the growing needs of the population. The quality of water is of vital concern for mankind since it is directly linked with human welfare. It is a matter of history that faecal pollution of drinking water caused water-borne diseases which wiped out entire population of cities. At present, the menace of water-borne diseases and epidemics still looms large on the horizons of developing countries. Polluted water is the culprit in all such cases. Therefore, it is very much important to check the water quality parameters time to time.
Water is the key to socio-economic development and quality of life. Now a days, many cities of the world are facing an acute shortage of water. Dhaka, one of the mega cities of the world with a population of more than 12 million is one of them. The Dhaka Water Supply and Sewerage Authority (DWASA) is entrusted for supply of piped water in the Dhaka Metropolitan and its adjacent areas.

The water samples were collected from houses of both W-DSCC-15 and W-DSCC-28, and Dhanmondi lake to determine pH, Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD), Salinity, Conductivity, Chloride, Nitrate-nitrogen (NO3-N), Ammonia-Nitrogen (NH3-N), Iron, Arsenic etc. Table 1 shows the data of water quality parameters obtained by chemical analysis of the samples collected from the study areas.

Comparing water quality parameters with WHO and Bangladesh Standards

For an assessment of the current scenario on water pollution, sampled WQ parameters need to be compared with the recommended water quality limits suggested by WHO and Bangladesh. Table 2 shows the standard values of water according to WHO and Bangladesh standards.

pH: A controlled value of pH is desired in water supplies, sewerage treatment and chemical process plants. pH plays an important role in coagulation, disinfection, water softening and controlling of corrosion. pH also plays a significant role in biological treatment of waste water. Organisms involved in treatment plants are operative within certain pH range. According to Bangladesh Environment Conservation Rules (1997), the standard pH of drinking water ranges from 6.5 to 8.5.

Location of these two wards in Dhaka is shown in Figure 1. Both are in South City Corporation belongs to Zone 3 and 4 respectively. DSCC-15 is located between 23°44'12 and 23°45'22 north latitudes and between 90°22' and 90°23' east longitudes. DSCC-28 is located between 23°42'20 and 23°42'50 north latitudes and between 90°23'15 and 90°23'43 east longitudes. We selected two wards one from old Dhaka with mixed area and another having modern facilities.

A large number of important organizations, offices, hospitals, educational institutions, residences, lake etc. are situated in study area and associated major roads are very important for urban and national connectivity.

Objectives of the Study

Our research focuses on the determination of quality of life (QOL) and environmental quality of life (EQOL) of Ward-DSCC-15 & 28. The aim of this study is to measure the QOL and change in social conditions in large urban areas in Dhaka City especially W-DSCC-15 and W-DSCC-28 through the development and use of a series of key indicators:

- To present selected indicators and indices to track and monitor the development of QOL of Dhaka city.
- To provide information on existing level of some major QOL parameters.
- Comparison of the pollution situation of Ward-15 & 28, DSCC with particular regard to various water quality guidelines and standards (e.g. WHO, ECR-97).
- Development of a geographic information base that can serve as a guiding tool for environmental modelers and planners.

Methodology

The data obtained in this study were analyzed by Kriging which is a geostatistical method that uses a powerful statistical technique for predicting values derived from the measure of relationship in samples and employs sophisticated weighted average techniques. Before kriging is performed, a valid semivariogram model has to be selected and the model parameters have to be estimated. Determination of the spatial dependence structure of the considered variables and the semivariogram model as a measure of this dependence are the base of geostatistics (Vieira et al, 1983). Semivariogram model provides a quantitative estimate of the structure model (e.g., spherical model) required to characterize the spatial pattern from a series of points of data. Primary data of the study have been collected through questionnaire, checklist survey, key person interviews and field work. The secondary data and information used in this study were collected from various sources such as DCC, BBS, journals, magazines, newspapers etc. The questionnaire method was chosen to collect primary socio-economic data because it provides insights into people's beliefs, attitudes, values, and behavior (Sommer and Sommer, 1991). Another method that is available to answer research questions is the interview. However, the questionnaire was chosen over interview because questionnaires can reduce the possibility of interviewer influence over participants based on his or her way of questioning (Sommer & Sommer, 1991).

Environmental quality means a particular condition of physical environment, economic environment, social environment and so on. The EQOL assesses the quality of the neighbourhood, housing, school, safety and security, roads, transport, health services, street lighting, local employment opportunity and recreational facilities (Westaway, 2000). The quality of urban environment depends to a great extent on the quality of the essential infrastructure and utility services.

This imprecision is compounded by the fact that QOL is more than a synonym for well-being it is intended as a measure of it, allowing organizations to quantify how well-off people are and to track changes in levels of happiness over time. According to Land's survey of social indicators, this effort was born when the US National Aeronautics and Space Administration (NASA) decided, in the mid-1960s, that it needed to measure the effects of its space program on American feelings of well-being (Land, 2000). Researchers from the American Academy of Arts and Sciences responded to the challenge by developing social indicators, and a new form of social reporting was born (Bauer, 1966).

Study Area

The study area is comprised of DSCC-15 (Old Ward-49) and DSCC-28 (Old Ward-64) of Dhaka City. Both are different in many socio-economic and environmental aspects. DSCC-15 which belongs to Dhanmondi, the first planned residential area of DCC was designed in the early 1950s for high income and higher-middle income groups of people. On the other hand, DSCC-28, DCC which is in Lalbag Thana, is densely populated, mixed area of commercial, residential and industrial areas. QOL of these two wards will be surely different. Therefore, to study the QOL of DSCC-15 & 28 is significant.

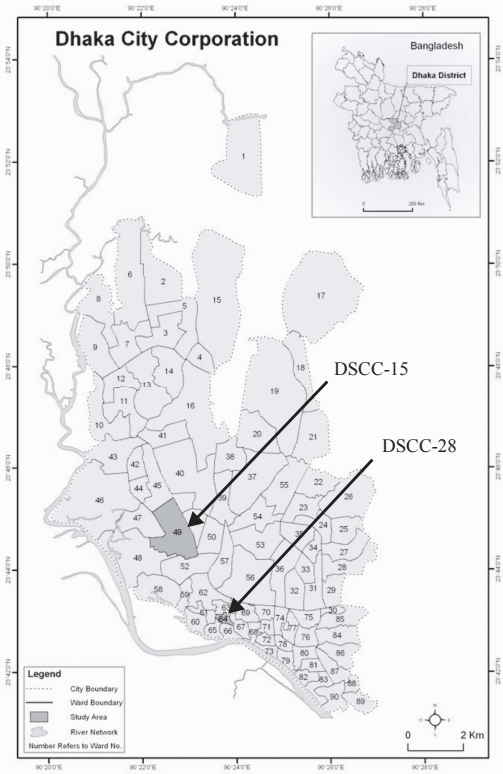

Figure 1. Study area

Comparative Study of Quality of Life between Old and New Dhaka: a case study

Mahmuda Parvin, Md. Iftekhar Hossain and Amanat Ullah Khan

Abstract: *Ensuring quality of life (QOL) among its residents is a critical part of all cities role. The aim of this study is to measure the quality of life in DSCC-15(old Ward-49) and DSCC-28 (old Ward 64) of Dhaka city through the use of a series of key indicators. Residents' perceptions of their QOL have been assessed through a survey questions, with a random sample of those living in the study areas. The results of the study corroborate the theoretical basis of cited literature. Various factors such as employment, income, educational facilities, ease of availability of water, electricity, gas, transportation, medical facilities, recreation etc influence QOL. About 60% respondents of Ward-49 were found to be highly educated while only about 10% respondents of Ward-64 are graduated. Even about 12% of the respondents of Ward-64 were found to be illiterate. As the academic qualifications of the respondents of two areas were different, their demands as well as their perception on QOL and EQOL were found to be different. Among the two studied areas QOL of DSCC-15 was better than DSCC-28.*

Key words: Quality of life (QOL), Environmental quality of life (EQOL), Monthly income, Water quality, Noise level.

Introduction

Quality of life is defined as: *"Individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns"*. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships and their relationship to silent features of their environment (The WHOQOL Group, 1995). According to Jonsen *et* al.: *Quality of life means subjective satisfaction expressed or experienced by an individual in his physical, mental and social situation*.

Improving QOL is now a common concern of international development. Identifying robust QOL indicators, or providing a coherent and robust definition of the concept, remains problematic. The difficulty is not a new one. Amartya Sen refers frequently to Aristotle's comment in the Nicomachean Ethics that "Wealth is evidently not the good we are seeking; for it is merely useful and for the sake of something else" (Sen, 1999).

That 'something else' is happiness, produced by living well and doing well. But as Aristotle warned "with regard to what happiness is [people] differ, and the many do not give the same account as the wise." Clearly, we are no nearer than Aristotle to deciding what constitutes human happiness or well-being and may not agree with his strictures. QOL can inevitably be conceived in different ways according to viewpoint, and the term is likely to remain controversial.

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