

The Impact of Major Housing Factors on the Dwelling Units of Industrial Workers in Bangladesh



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Abstract

Bangladesh is currently experiencing the industrial revolution like any other developing nation around the globe. As a result, the number of industries is growing rapidly causing a rise in the number of industrial workers. This vast population needs housing facilities, especially near their workplaces. To meet this growing demand, the quantity of housing is increasing without considering quality. Housing is a structure designed to accommodate human domestic activities while taking into account the external environment as well as to support such habitation. The dwelling unit is a small portion of housing which is a physical space where a single household lives. The quality of dwelling units has a significant relationship with the economic status of the residents and also with the demographic factors of a particular household. The study aims to find out how economic and demographic factors affect the space size and quality of dwelling units for industrial workers. At first, the primary data regarding demographic factors, economic factors and housing-related issues were collected through personal interviews and questionnaire surveys at 126 households in seven different locations of Bangladesh with major industries. The locations are Dhaka, Savar, Gazipur, Comilla, Chittagong, Khulna and Jashore. The housing issues taken into account in this study included the kind and material of the home, room size and occupancy, and related facilities and services such as electricity, water supply and fuel supply. Finally, through observation of how they use these spaces, some suggestions have been given. The key finding is that the size and quality of the dwelling units significantly depend on the economic factors of the household members rather than the occupancy number.

Keyword: Industrial Workers; Dwelling Unit; Household; Affordable housing; Economic Factors

Introduction

A house is a structure or location that denotes a person's home or ownership [1,2]. As Le Corbusier stated, "A house is a machine for living in." It provides people with a place to live, feel safe, and be sincere. The unit of a house where a single family resides is called a dwelling unit. Housing creates a sense of ownership, a sense of security for every human being [3,4]. For any person who is well off the first thing they invest in is their housing [5,6]. It is considered the most proper tangible asset for any person all around the world [7].

The major housing factors include From the economic point of view, people invest a major portion of their income and savings in housing [8]. A house is the symbol of social and economic status, especially for the middle-income and lower-middle-income groups [5,9]. For these two classes, the housing needs to be affordable [10]. When the housing-related expense is within 30% of their monthly income then the housing can be called affordable

[5,11]. But unfortunately for industrial workers due to low wages, they cannot afford quality housing for themselves [12]. Housing development is also related to the occupancy size, occupation, number of children etc. [13]. With the increase in family size, the space requirement also increases. The spaces within a dwelling unit primarily include a bedroom, toilet and kitchen [14]. In the case of low-cost housing, the bedroom is the primary unit that has multiple uses [8,15]. In some cases, the toilet and kitchen can be shared. With the increase in family size and household income additional bedrooms, living-dining spaces, balconies, individual toilets and kitchens can be included in the dwelling unit [15].

Background

Who are industrial workers?

After the Industrial Revolution, a large number of industries were built in the urban areas. There was a huge number of people

who migrated from rural to urban areas for better living standards and professional opportunities [16]. Any individual employed in an industry where goods are manufactured, altered, cleaned, mended, decorated, completed, or tailored for specific purposes is referred to as an industrial worker. Bangladesh's main industries are cotton, textiles, jute, garments, tea processing, paper newsprint, cement, chemical fertilizers, sugar and light engineering [17]. Among them, the garments industry is the biggest industry to contribute to the economy of Bangladesh [18]. 80% of the entire export is represented by this sector. Up to 3.5 million individuals are employed in this sector [18,19]. The paper mill industry and steel industry are the 2nd and 3rd highest industry followed by garments [20]. Also, the shipbuilding industry is another rising one for our country. All these industries are located around the nation, mostly in Dhaka, Khulna, Narayanganj, Chittagong, and Barisal [19].

Industrial workers belong to the middle and lower-middle-income group of society. According to economists and sociologists, those with a fixed income who are employed on a monthly salary, those who have no additional sources of income, and those who live above the poverty line are considered to be middle class. They represent 30% of Bangladesh's overall population. According to the Bangladesh Bureau of Statistics (BBS), 160 million people are living in the nation, with 20 per cent of them belonging to the middle class [20]. The lower middle class significantly contributes to the economy. They are actively participating in both formal and informal sectors. They support the SME sector, which accounts for 25% of our GDP [10]. However, no economic policy is adopted that takes into account this enormous population. They are not an influential group.

Present Condition of Housing for Industrial Workers in Bangladesh

With the growing demand for housing for industrial workers, the houses are being made by the landowners, but the quality is always compromised. The working condition of industrial workers has been investigated by many researchers but research on housing conditions has been ignored in most cases. However, in the book 'Industrial Housing' by Knowles, M [21] the following topics were discussed during the early period: the beginnings, growth, types, and benefits of industrial housing, as well as the physical traits (topography, soil conditions, demography, and communication methods), utilities (water supply, sewerage drainage, collection and disposal of municipal waste, gas and electric service), and management of the industrial towns [21]. In Dhaka city, most of the industrial workers are rural migrants [22]. Due to the scarcity of land and high living costs, they need to live compromising their living standard. Some researchers have identified accommodation problems for garment workers only [16]. According to these research, some of the common problems that have been identified are mentioned below:

Lack of Space: There is a lack of space where a single family can

live. From several researches on garment workers, it has been seen that they frequently live in groups. The others live in single-family homes [13]. A minimum of 5 and a maximum of 35 households (families) resided in each group housing, and a minimum of 12 and a maximum of 125 people lived there. In the homes of these workers, there was no set standard for room size. A family of four can barely fit comfortably in the room [22,23].

House Rent: In most cases, there was no established guideline for housing rent. The home's owner made all of the decisions. The workers receive very low wages and sometimes they get their salaries in the middle of the month. So a significant amount of their salary is invested in house rent [24]. The house rent occasionally depends on the style of the home, the size of the room, and the accessibility of utilities and facilities [25]. To save some money it is observed that most workers prefer to live in mess or group housing. In a study on the garment workers' accommodation in Savar, it was identified that the minimum and maximum rates for each room in shared housing were 16.70 USD and 21.19 USD respectively [8,22].

Problems in Using Shared Spaces: Though the workers prefer to live in group housing according to some researchers, they face serious problems while using shared spaces. Mostly they need to share a toilet and kitchen on a regular basis. The use of shared toilets sometimes creates privacy problems, especially for female workers [22]. In addition, in the case of cooking facilities, they have to fight to use each of the burners. Sometimes a single burner is shared by 8-12 families [26]. Also, the gas pressure remains low at some specific times which creates a problem for the users [27,28].

Problems in Utilities and Services: There is a lack of power supply in most of the places. Due to this reason, their day-to-day activities hampers a lot. They face severe water crises as well for which they are unable to fulfil the daily demand [23].

Poor Waste Management System: There is no proper garbage disposal system in these housings. In most of cases, the wastes are disposed of in front of the house which makes the living environment very unhealthy [22,28].

Improper Drainage and Sewerage System: Serious issues with sanitation and sewerage systems make life in general a miserable experience [29].

Privacy Issue: As many people live in small spaces there is no privacy for a family at all [30].

Lack of Safety and Security: Other than industrial workers, persons of other professions also live in this housing [31]. The spaces lack proper safety and security due to many illegal activities.

Methodology

The existing research is mostly based on garment workers in the capital city of Dhaka. In this study, the housing condition of

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all major type industrial workers has been covered all over the country in some major locations. The objective of the study is to identify the impact of the economic and demographic factors on the size and space quality of the dwelling units where the industrial workers reside. Most of the garment industries are located in Dhaka and the fringe areas of Dhaka city such as Savar, Gazipur and Narayangonj [16]. On the other hand, the rest of the industries are located in some other locations in Bangladesh. Due to being port district, Chittagong and Khulna are considered 2nd and 3rd

largest economic centers of the country with major industries in it. The study is part of an academic project. A total of 126 households were surveyed during the study phase in the following locations: Dhaka Central, Savar, Gazipur, Cumilla, Chittagong, Jashore, and Khulna (Figure 1). The highest percentage prevails in Gazipur (47%), followed by Dhaka (25%) and Savar (9%). The rest of the 19% of households are from Chittagong, Cumilla, Jashore and Khulna (Figure 2).



Figure 1: Location of the case study areas.

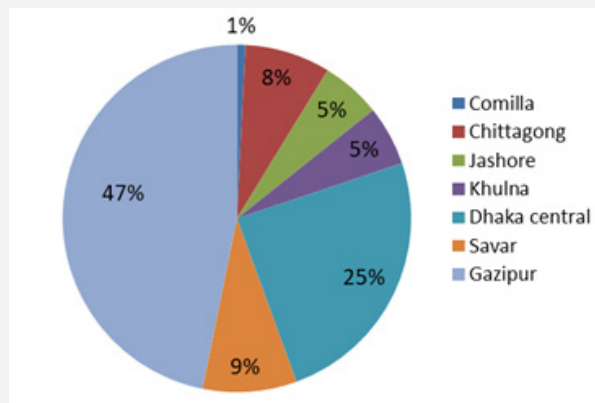


Figure 2: Percentage of case study households in different locations.

The study is designed in two phases. In the first phase through an extensive literature review of published articles, reports and journals some data has been collected. In the second phase, a field survey has been conducted in 126 households of the 7 mentioned locations. The primary data has been collected through questionnaire survey, personal interview and observation. Later on, the data was interpreted into house plans, images and descriptions of the spaces.

A. Phase 1: Literature review:

A literature review has been done to understand the present housing conditions of the industrial workers in Bangladesh. Secondary sources (e.g., published articles, reports, govt policies etc.) have been reviewed to get an understanding.

B. Phase 2: Field Survey:

A semi-structured questionnaire survey, in-person interview and observation have been made in this phase.

- Questionnaire survey: A semi-structured questions were asked to the respondents. The informal pattern of the survey has been followed for the convenience of the workers. They were asked questions regarding their household size, occupation, income, expenditure, savings etc. Their response has been noted down, and in some cases, it was also recorded the saving time.

- Personal interview: Some respondents had to go through rigorous interviews in an informal way to learn about the scope of improvement of the quality of the spaces they live in.

- Observation: Finally, through on-site observation of their accommodation, dwelling space and other utilities and services some recommendations have been suggested for future design

purposes.

Existing Spatial Distribution of Domestic Spaces in Housing

Mainly five types of domestic units can be found based on the space size. The spatial distribution will be analyzed under each of these categories.

- Type A: total area of less than 250 sqft
- Type B: total area is between 251-500 sqft
- Type C: total area is between 501-750 sqft
- Type D: total area is between 751-1000 sqft
- Type E: total area is bigger than 1000 sqft

TYPE A: <250 sqft

(Table 1) In this type of household, there are single bedrooms along with a kitchen and toilet. In this type, there are no separate living or dining spaces. Mostly the bedroom has multiple uses such as for resting, eating and also as storage. The bedroom size is approximately 100-140 sqft. Due to the multiple uses, serious space constraints can be seen in this type of unit (case A1, A2) (Figures 3-5). The toilet and kitchen are shared by multiple families in most of the cases. Sometimes the shared kitchen is open, especially the cooking area and has a separate tubewell to serve drinking water for multiple families (case A2). But when the family size is bigger, they prefer to have their own individual toilet and kitchen. Here the individual kitchen is closed or semi-closed type and has very compact working space causing problems for the users (case A4) (Figure 6).

Table 1: Basic information on Households of Type A.

Case No.	Location	House size (sqft)	Family size	Family type (Joint/Single)	Ownership	Toilet	Kitchen
A1	Textile, Byzid Thana, Chittagong	220	2	Single	Tenant	Individual	Individual
A2	Shafipur, Kaliakoir, Gazipur	186	4	Joint	Tenant	Sharing	Sharing
A3	Tatipara, Jashore	126	4	Joint	Tenant	Sharing	Sharing
A4	Dhamal-Court Mirpur-15, Kafrul, Dhaka.	215	4	single	Tenant	Individual	Individual

CASE A1

Figure 3

CASE A2

Figure 4

CASE A3

Figure 5

CASE A4

Figure 6

Type B: 251-500 sqft

(Table 2) In type B, mostly there are 2 bedrooms with individual kitchens and toilets (Case B1, B2) (Figure 7,8). In some cases, there is a single bedroom along with a living cum dining space. Some houses have a small attached balcony as well. The bedroom

area varies between 100 sqft to 250 sqft. Here the bedroom can be used both as a resting space and as a living-dining space (case B3, B4) (Figure 9,10). There is enough space for storage in the suspended ceiling. The kitchen and toilet are closed and compact

for tenant types (case B5) (Figure 11). The kitchen space is more elaborate (90 sqft) where the family members are the owners and the family size is bigger. An additional tubewell is also present in some houses (case B6) (Figure 12).



Figure 3: Unit plan and images of case A1.

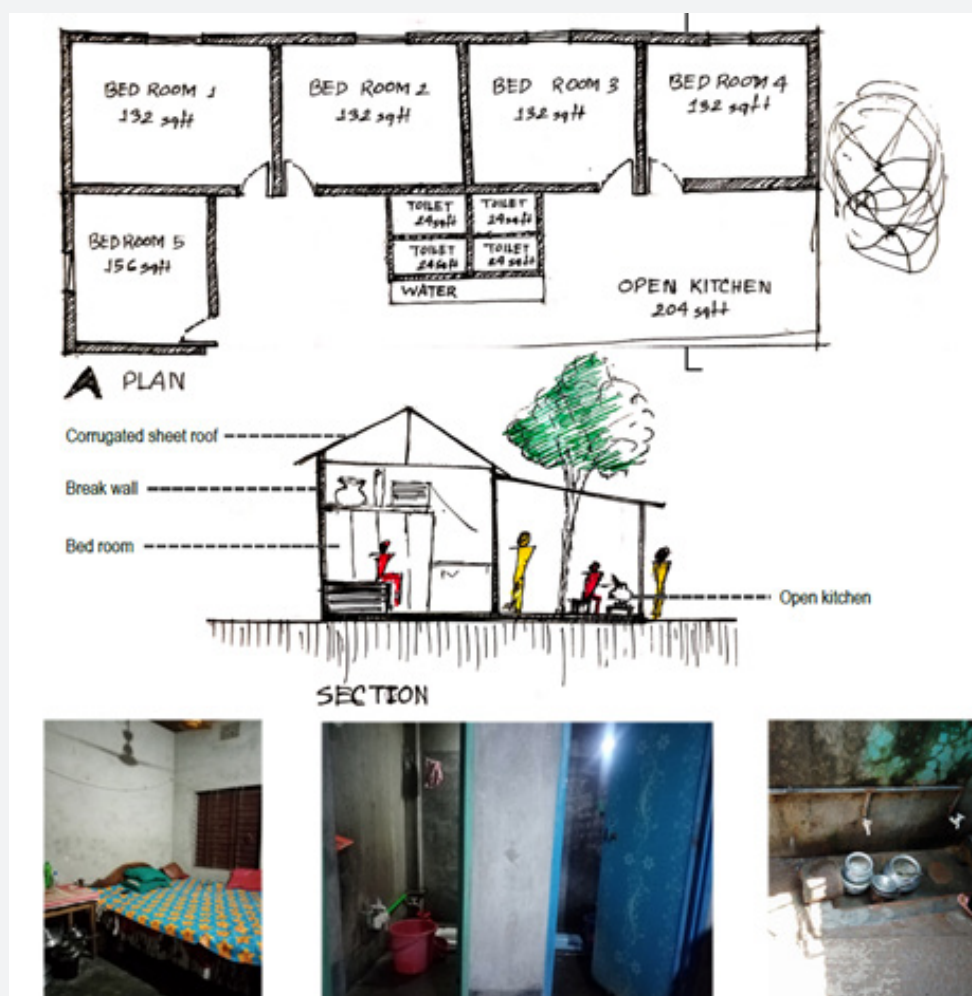


Figure 4: Unit plan and images of case A2.

Table 2: Basic information on Households of Type B.

Case	Location	House size (sqft)	Family size	Family type (Joint/Single)	Ownership	Toilet	Kitchen
B1	Textile, Byzid Thana, Chittagong	275	3	Single	Tenant	Individual	Individual
B2	Hemayetput, Saver, Dhaka	400	4	Single	Tenant	Individual	Individual
B3	Konabari, Gazipur	486	4	Joint	Tenant	Individual	Individual
B4	Tatipara, Jashore	334	4	Single	Tenant	Individual	Individual
B5	Abdullahpur, Comilla	437	5	Single	Owner	Sharing	Sharing
B6	Rail gate, noapara, khulna	270	6	Single	Owner	Sharing	Sharing



Figure 5: Unit plan and images of case A3.



Figure 6: Unit plan and images of case A4.

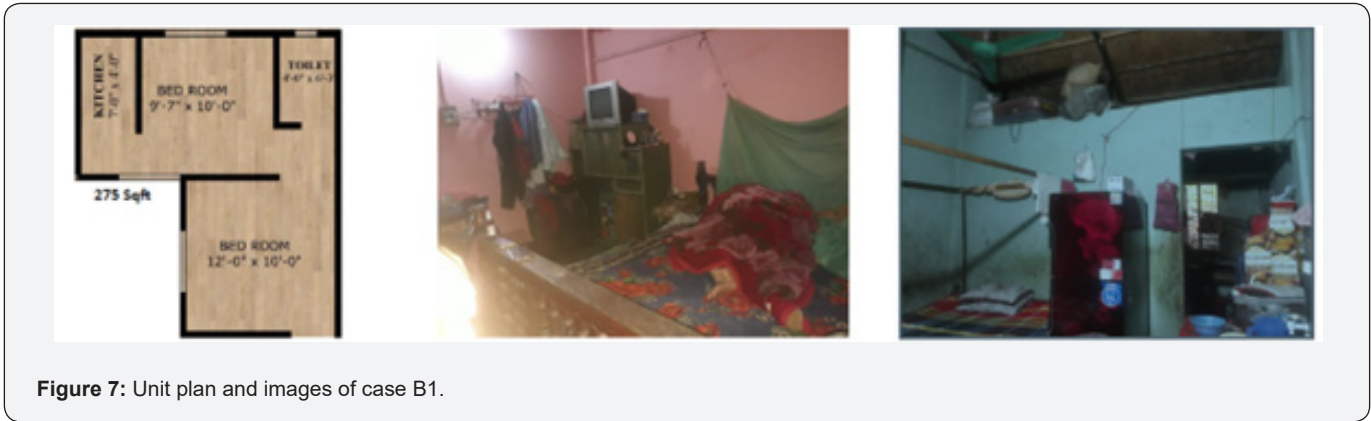


Figure 7: Unit plan and images of case B1.

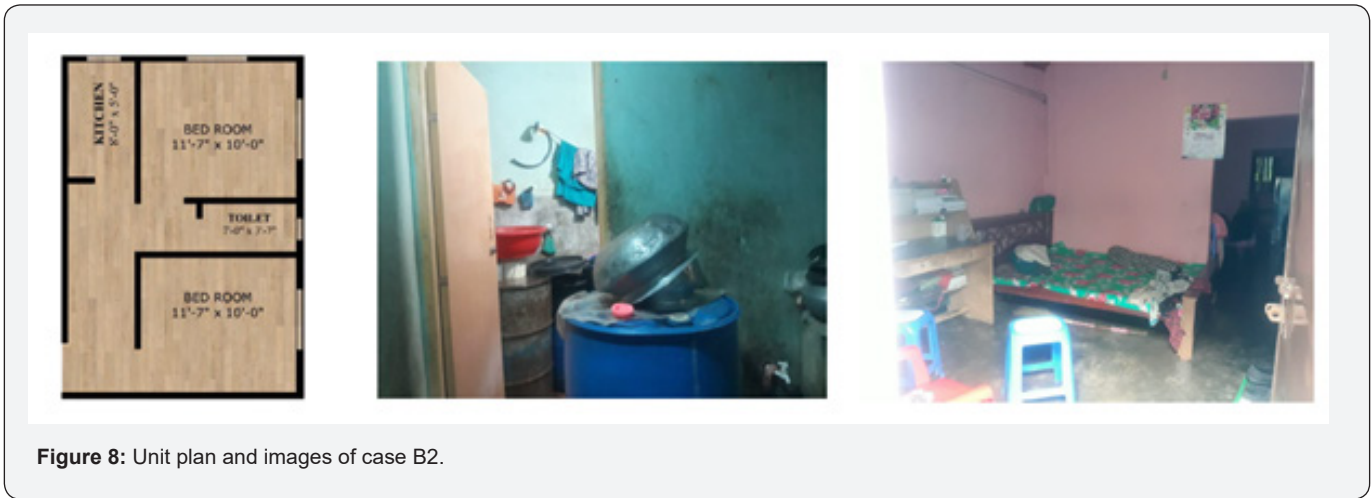


Figure 8: Unit plan and images of case B2.

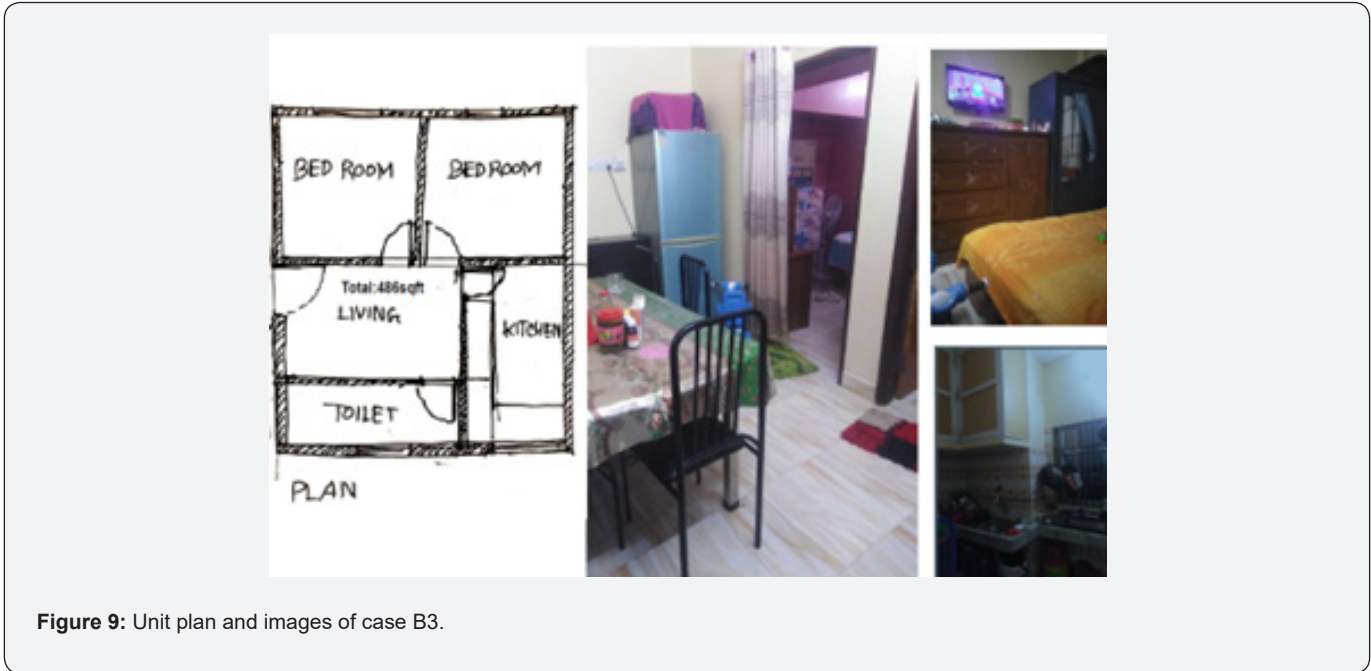


Figure 9: Unit plan and images of case B3.

CASE B1

CASE B2

Figure 7

Figure 8

CASE B3

Figure 9

CASE B4

Figure 10

CASE B5

Figure 11

CASE B6

Figure 12

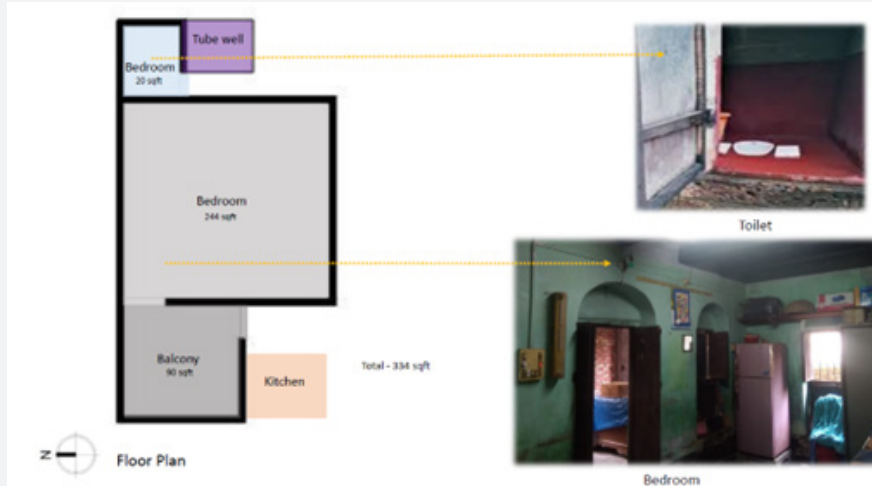


Figure 10: Unit plan and images of case B4.



Figure 11: Unit plan and images of case B5.

Type C: 501-750 sqft

(Table 3) Mainly 2 categories can be seen in the households of type C. In one category the spaces are like a single unit with 2 or 3 bedrooms along with individual kitchens and toilets. In some units, there is a separate living cum dining space and a balcony as

well. Here the bedrooms are 120-150 sqft in size mostly for resting purposes (Case C1, C4 and C5) (Figure 13-17). The other category is dormitory type. There are large bedrooms with multiple uses (resting, storage, eating etc.) with shared kitchen and toilets (Case C2) (Figure 14).

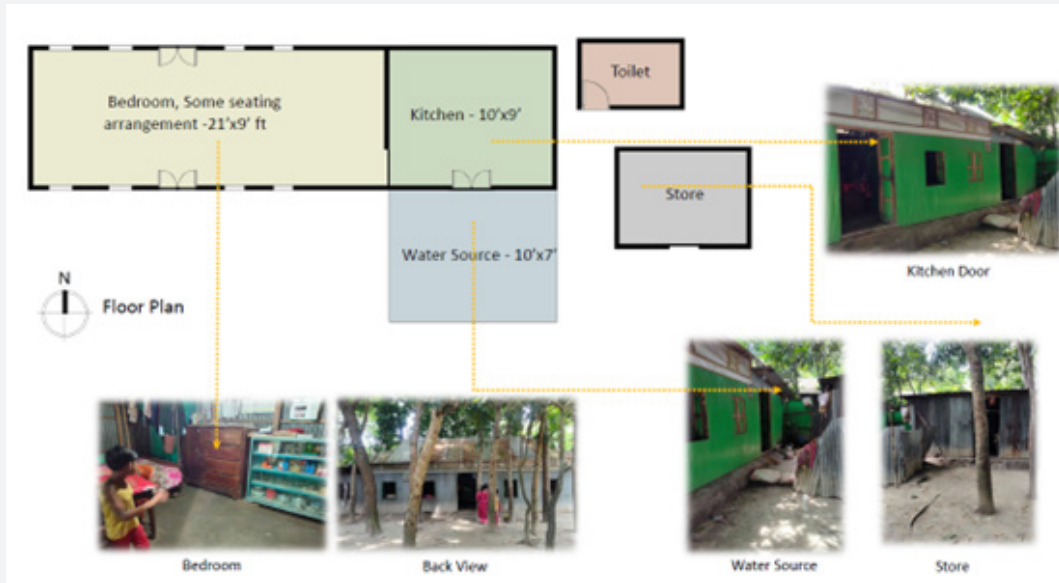


Figure 12: Unit plan and images of case B6.



Figure 13: Unit plan and images of case C1.



Figure 14: Unit plan and images of case C2.

Table 3: Basic information on Households of Type C.

Case	Location	House size (sqft)	Family size	Family type (Joint/Single)	Ownership	Toilet	Kitchen
C1	Textile, Byzid Thana, Chittagong	640	8	Joint	Tenant	Sharing	Sharing
C2	Aouchpara, Muktabri, Gazipur	670	7	Joint	Tenant	Sharing	Sharing
C3	Nilgonj Shahapara, Jashore	577	7	Joint	Tenant	Sharing	Individual
C4	T & T colony, Moghbazar, Dhaka	615	5	Single	Tenant	Individual	Individual
C5	Rail gate, noapara, khulna	556	6	Single	Owner	Individual	Individual

Another mixed type can be seen where the space works as a unit with multiple bedrooms and individual kitchens. Only the bathroom and toilet are shared by multiple families. A tube well is also present for shared use (Case C3) (Figure 15).

CASE C3

Figure 15

CASE C4

Figure 16

CASE C5

Figure 17

CASE C1

Figure 13

CASE C2

Figure 14

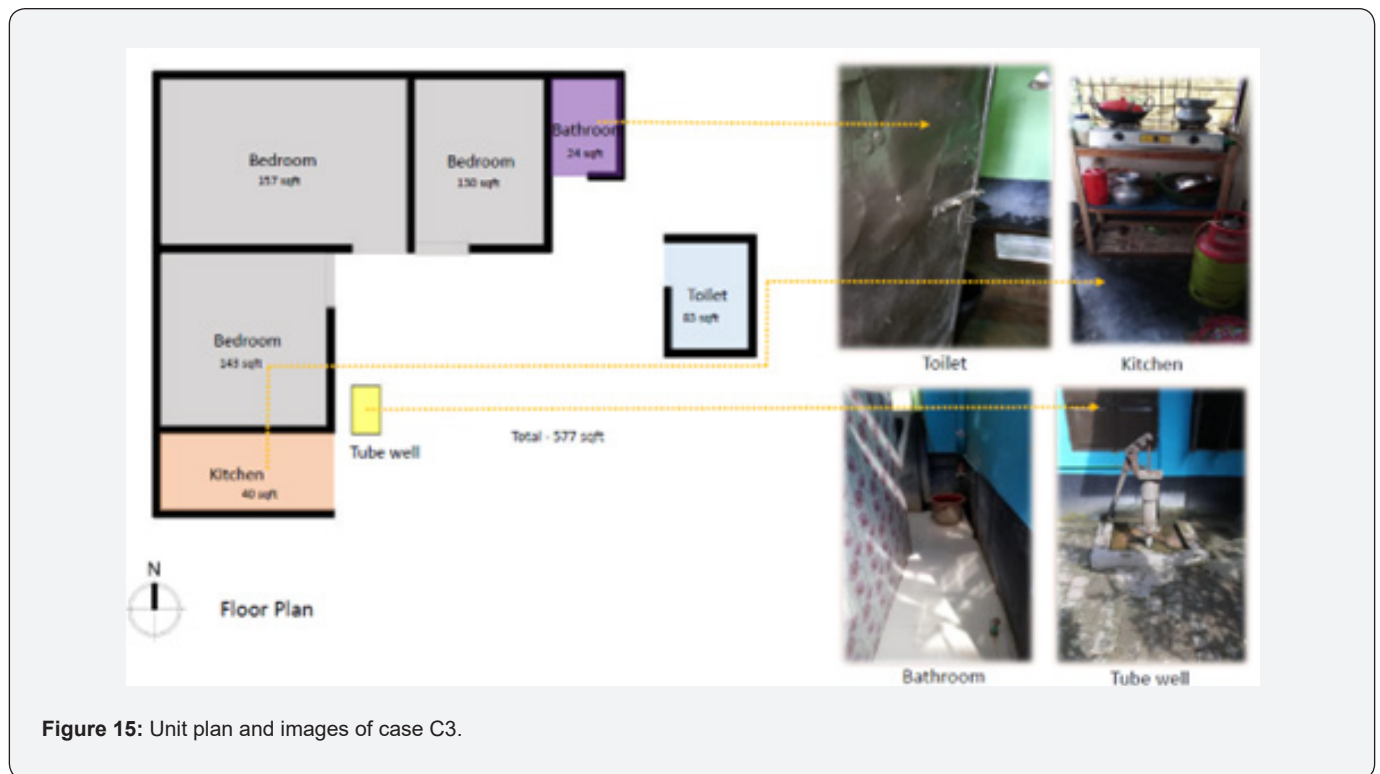


Figure 15: Unit plan and images of case C3.



Figure 16: Unit plan and images of case C4.

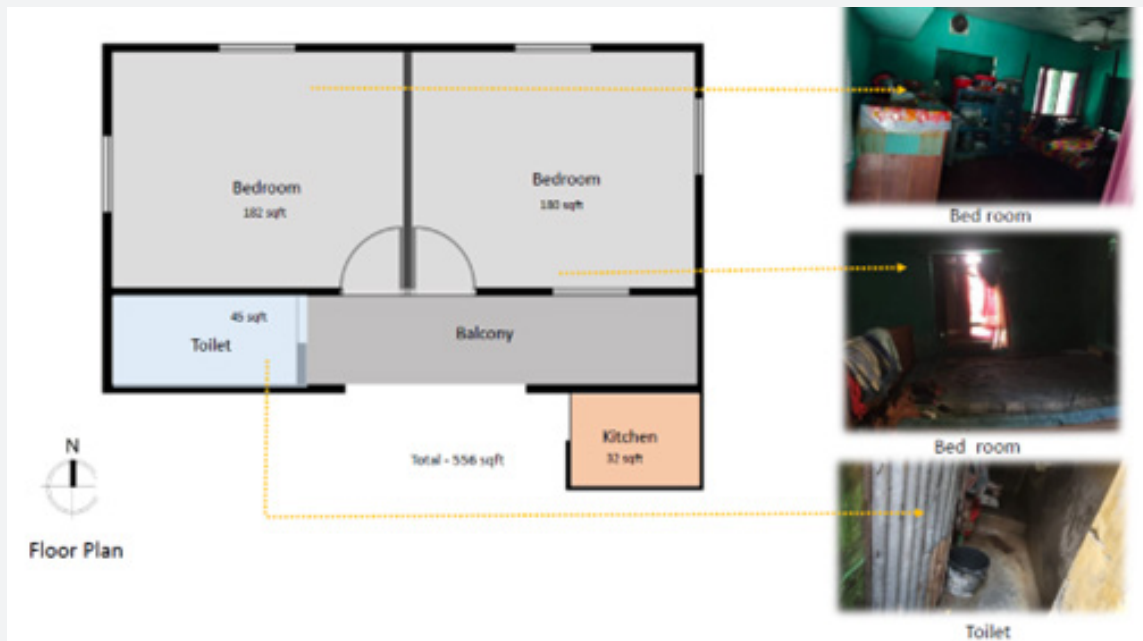


Figure 17: Unit plan and images of case C5.

Type D: 751-1000 sqft

(Table 4) The spatial distribution of type D households is similar to that of type C. Only the bedrooms are larger about 150-180 sqft. However, due to the large family size, the area per square foot is less and seems cosier and more compact (Figure 18-20). In some houses, there is a separate space which can be used as a veranda or sometimes as a living space.

CASE D1

Figure 18

CASE D2

Figure 19

CASE D3

Figure 20



Figure 18: Unit plan and images of case D1.



Figure 19: Unit plan and images of case D2.

Type E: >1000 sqft

(Table 5) In Type E similar two categories are found: unit type and dormitory type. In most cases of type E, there is a shared space which is used for income-generating purposes. Though the houses are for industrial workers, some members of the family work from home to have additional income and use these spaces for sewing,

making handmade crafts etc. (Figure 21,22).

CASE E1

Figure 21

CASE E2

Figure 22

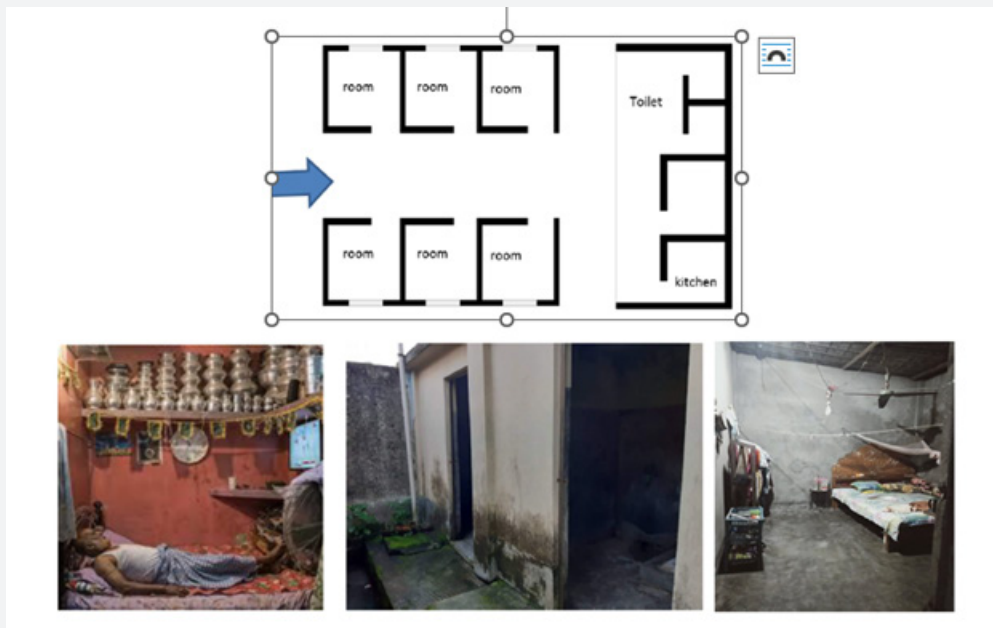


Figure 20: Unit plan and images of case D3.

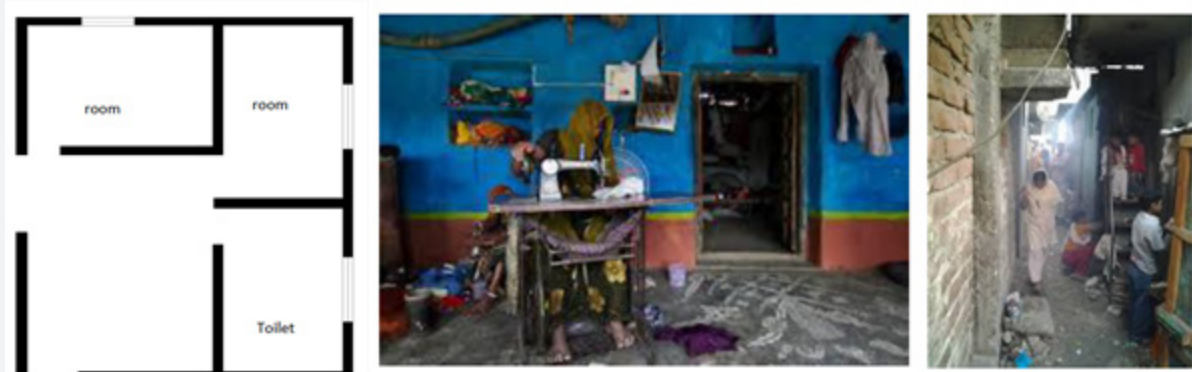


Figure 21: Unit plan and images of case E1.

Findings

Demographic Factors:

The demographic factors include the type of family, number of family members and number of school-going children.

Family Type:

Among the 126 studies, 83% of families are single families whereas 17% are joint families (Figure 23).

Family Size:

More than 50% of families have 3 and 4 family members (29.4% & 26.2 % with 3 and 4 members respectively) in the

case study areas. Only 8.8% of families have more than 6 family members (Figure 24).

Number of School-Going Children:

It is found that 42% of families have no school-going children in their family, 31% of families have one school-going kid in their family, 16% has two, 4% has three and 3% of families has four school-going children in their family (Figure 25).

Economic Factors:

The economic factors include monthly household income, expenditure, presence of any loan etc. The monthly amount of money received by each member of the household is termed

household income. Monthly salary, savings, and pensions are part of this income. From the case study it is noticed that for 126 households, 41 % of household income is spent on overall household expenditure, 22% on other expenditure (education expense, health expense etc.) and 23% is invested if they carry any loan. The rest of the 14% is the savings on average. For example, if the monthly household income of a family is 10,000 BDT, then the household expenditure is 4100 BDT, other expenditures 2200

BDT, loans 2300 BDT and savings 1400 BDT (Figure 26). The average earning member of each household is 2.1 persons. If the monthly income is calculated on a per person per day basis, then it is 430 BDT on average where 194 BDT is the lowest and 1033 BDT is the highest value (Figure 27). In the following pie chart, it is seen that about 44% of families have 2 earning members, 27% have 1 and 17% have 3 earning members. The rest of the 12% have more than 3 earning persons in their family.



Figure 22: Unit plan and images of case E2.

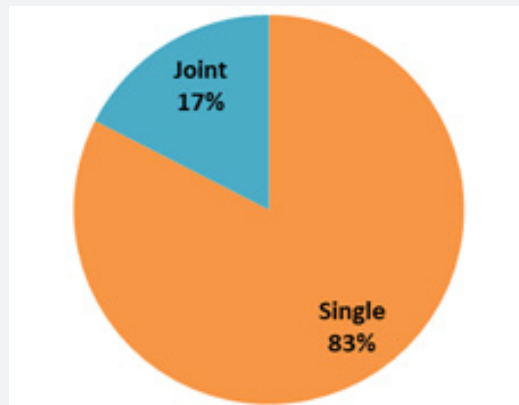


Figure 23: Percentage of family type.

Monthly Household Income:

The average monthly household income of the surveyed households is 24,535 BDT. Among them, 10,000 BDT is the lowest and 42,000 BDT is the highest amount. From the following figure, it is noticeable that 25.04% of households receive 15001-20000 BDT monthly income whereas 22.22% receive 20001-25000 BDT and more than 30000 BDT. Only about 11% of households are present where the monthly income is less than 15000 BDT (Figure 28). The average monthly savings of a household is 3505 BDT. The highest amount of savings is 8500 BDT. 35.71% of households

have 501-2000 BDT as savings whereas 22.22% of household has more than 5000 BDT. Only 4.76% of the household has no savings at all (Figure 29).

Household Expenditure:

Whereas the amount of money spent for different purposes of the household is termed as household expenditure. House rent and utility bills are termed as housing-related expenditures. The average monthly household expense is 9895 BDT. About 50% of families have monthly 5001-10000 monthly expenditures for

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various purposes. Only 1.6% of families have more than 20000 BDT monthly expenses. The highest amount is 22000 BDT whereas the lowest amount is 3000 BDT (Figure 30). The amount of money paid by a household for a house is termed as house rent. The average amount is 4805 BDT. From the following figure, it is seen that 9.52% of households need not pay for house rent because they are the owners of the house. 34.92% of households need to pay 2501-5000 BDT as house rent, 20.63% pay 5001-7500

BDT and 15.87% pay 1-2500 BDT. Only 5.56% give more than 10000 BDT as house rent (Figure 31).

The bill that is paid for different utility services such as electricity bill, water bill, and gas bill are termed utility bill. The average utility bill is 754 BDT. 30.95% of families pay 751-1000 BDT, 23.8% 251-500 BDT and 18.25% of households pay 501-750 BDT as utility bills (Figure 32). It is found that only 11% of households need to carry a loan.

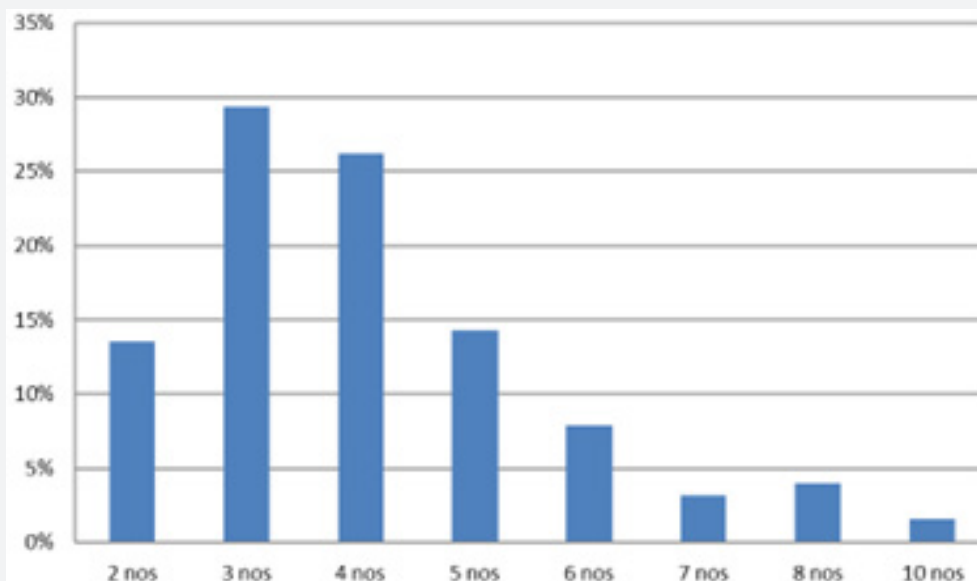


Figure 24: Comparative analysis of family size.

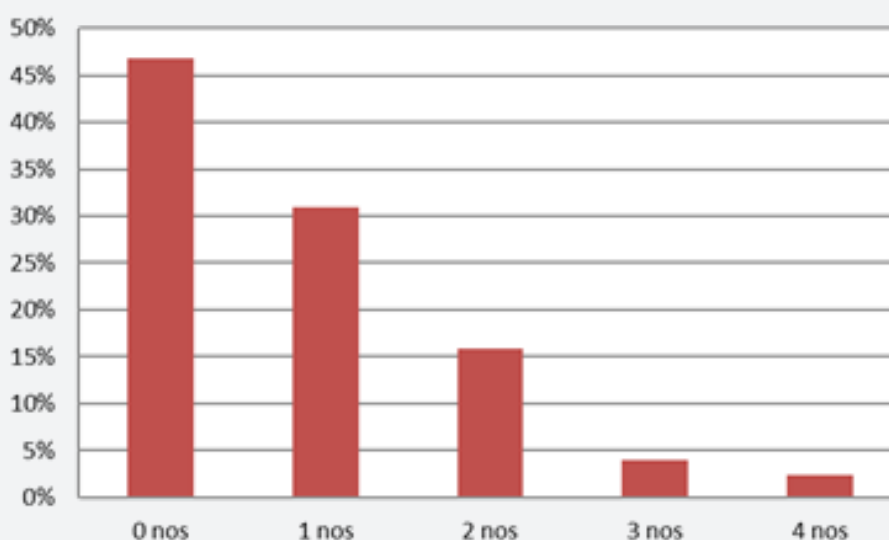


Figure 25: Comparative analysis of the Number of school-going children.

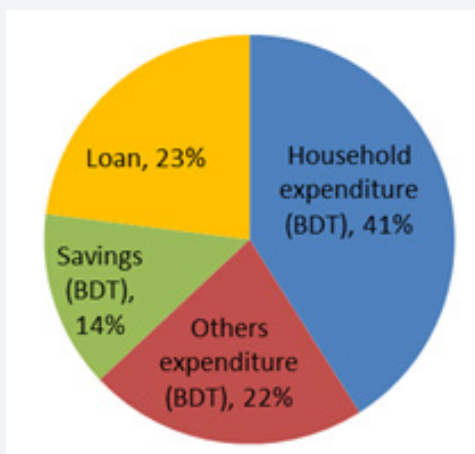


Figure 26: Proportion of different household expenses (per month).

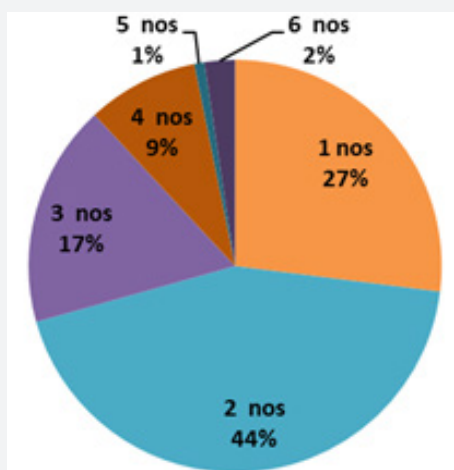


Figure 27: Percentage of number of earning persons.

Monthly Income & House Rent Ratio:

A certain percentage of household income is spent in the house rent sector. It is noticed that in these surveyed households mostly 10-20% of the income is spent on house rent in 41% of families. 20-30% of income is spent on house rent purposes in 27% of families. Only in 15% of families does the percentage exceed 30%. In 9% of families, they do not need to pay for house rent as they are the house owners.

Domestic Factors:

Area of Household:

The area of the total domestic space varies from household to household. 41% of the household has 251-500 sqft, 30% has less than 250 sqft and 22% has 501-750 sqft space (Figure 33).

Services:

Toilet and kitchen are termed as services. From the survey individual and shared uses are identified for this type of space. 52% of toilets and 48% of kitchens have individual use. The rest of the households have shared use of these spaces.

Materials:

Normally 2 types of material are used in households: temporary and permanent. CI sheet is a temporary material, whereas RCC, concrete, and tiles are permanent. Mainly CI sheet is used on the roof (in 64% of households), and only 7% of households use CI sheet on the walls. In most of the households (93%) brick is used as wall material. Apart from the CI sheet, 36% of households use RCC as a roofing material. In the case of floor

finish, 83% of households use concrete, 17% use tiles and 1% of houses have mud finish (Figure 34).

Utilities:

The utilities include electricity, water and fuel for cooking. The

source of electricity is WAPDA for 59% of households whereas the source of gas is Titas for 67% of households. On the other hand, WASA (37%) and tubewell (31% deep tubewell and 13% normal tubewell) are the main sources of water (Figure 35).

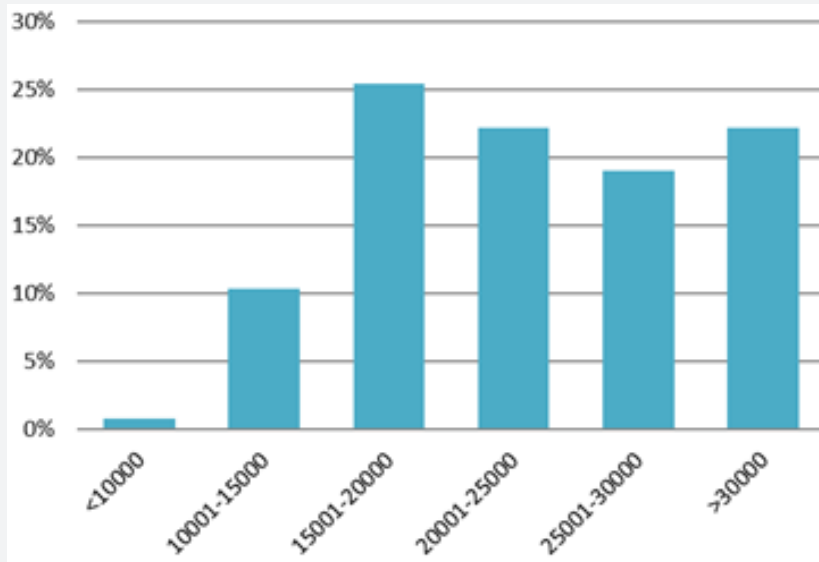


Figure 28: Comparative analysis of monthly household income.

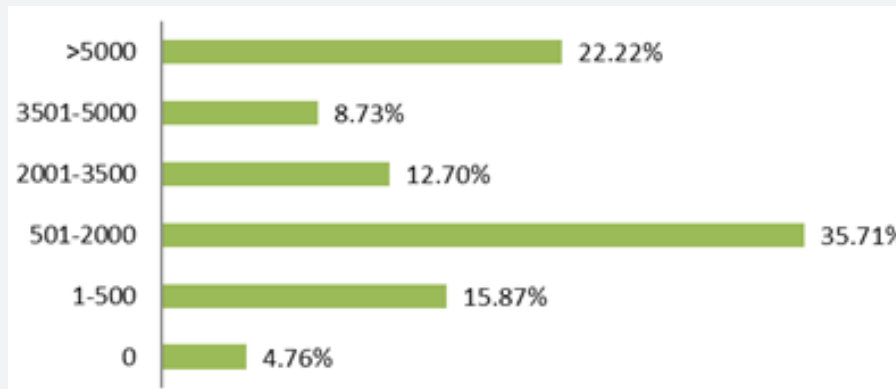


Figure 29: Comparative analysis of the amount of Monthly savings.

Results

Space-Demographic Factor:

Domestic Space Per Person:

Area per person is calculated by dividing the total area by the household members. For example, when the total area of a house is 500 sqft and the household members are 5, that means here

area per person is 100 sqft. The average area per person is 107 sqft. The lowest number is found in 44 sqft of area where 8 family members live in only 355 sqft. On the other hand, in a household, only 2 family members live in an 1150 sqft area (575 sqft per person) (Table 6). Among the 126 households, more than 50% of households have 50 sqft to 150 sqft of area per person. Very few families (only 3%) have more than 300 sqft of area for each household member (Figure 36).

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Table 4: Basic information on Households of Type D.

Case	Location	House size (sqft)	Family size	Family type (Joint/Single)	Ownership	Toilet	Kitchen
D1	Konabari, Gazipur	850	6	Single	Tenant	Individual	Individual
D2	Konabari, Gazipur	900	8	Joint	Tenant	Individual	Individual
D3	Konabari, Gazipur	900	3	Single	Tenant	Sharing	Sharing

Table 5: Basic information on Households of Type E.

Case	Location	House size (sqft)	Family size	Family type (Joint/Single)	Ownership	Toilet	Kitchen
E1	Konabari, Gazipur	1850	3	Single	Tenant	Sharing	Sharing
E2	Konabari, Gazipur	1150	2	Single	Tenant	Individual	Individual

Table 6: Calculation of area per person (sqft) for 20 households.

Sample no.	Family size	House size (sqft)	Area Per Person (Sqft)
1	3	275	92
2	8	355	44
3	3	260	87
4	10	580	58
5	2	220	110
6	4	460	115
7	5	420	84
8	6	610	102
9	8	640	80
10	2	230	115
11	4	400	100
12	4	390	98
13	5	530	106
14	3	480	160
15	2	1150	575
16	4	580	145
17	2	310	155
18	6	650	108
19	3	460	153
20	6	530	88

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Table 7: Calculation of space income ratio for 30 households.

Sample no.	Monthly Income	Monthly Income Per 1000 BDT	House Size (sqft)	Family Size	Area Per Person	Space Income Factor
1	19500	19.5	275	3	91.67	4.7
2	35000	35	355	8	44.38	1.27
3	17000	17	260	3	86.67	5.1
4	46000	46	580	10	58	1.26
5	13500	13.5	220	2	110	8.15
6	35000	35	460	4	115	3.29
7	28000	28	420	5	84	3
8	32000	32	610	6	101.67	3.18
9	42000	42	640	8	80	1.9
10	16000	16	230	2	115	7.19
11	26000	26	400	4	100	3.85
12	23000	23	390	4	97.5	4.24
13	70000	70	486	7	69.43	0.99
14	25000	25	607	2	303.5	12.14
15	54000	54	100	5	20	0.37
16	34000	34	80	4	20	0.59
17	15000	15	300	3	100	6.67
18	13000	13	500	3	166.67	12.82
19	20000	20	600	3	200	10
20	30000	30	600	4	150	5
21	17000	17	450	4	112.5	6.62
22	40000	40	900	8	112.5	2.81
23	17000	17	250	2	125	7.35
24	24000	24	750	3	250	10.42
25	34000	34	850	5	170	5
26	26000	26	400	3	133.33	5.13
27	22000	22	850	3	283.33	12.88
28	22000	22	900	3	300	13.64
29	17000	17	525	2	262.5	15.44
30	17000	17	200	2	100	5.88

Space-Income Factor:

There is a significant relationship between the economic condition of the residents and the space they live in. The space-income factor is a factor that denotes the relationship in terms of space per person and income per thousand taka [5]. For example, when a household of 4 members resides in a 400 sqft house and they have a monthly household income of 40,000 BDT, then the space income factor is 2.5. In this study, the average space-income factor is 4.88. When the space income factor is higher, that means

the dwelling space is much bigger in proportion to their income. But actually, where the highest factor is 15.44, in that household 2 family members live in 525 sqft space, which is not so spacious. On the other hand, the lowest factor is 0.37 means in that a household the space is smaller in proportion to the income (Table 7). For the case studies, the space income factor is divided into 4 categories: 0-4, 4-8, 8-12 and more than 12. The maximum (54%) household has a space-income factor is 0-4 followed by the 4-8 category in 31% households.

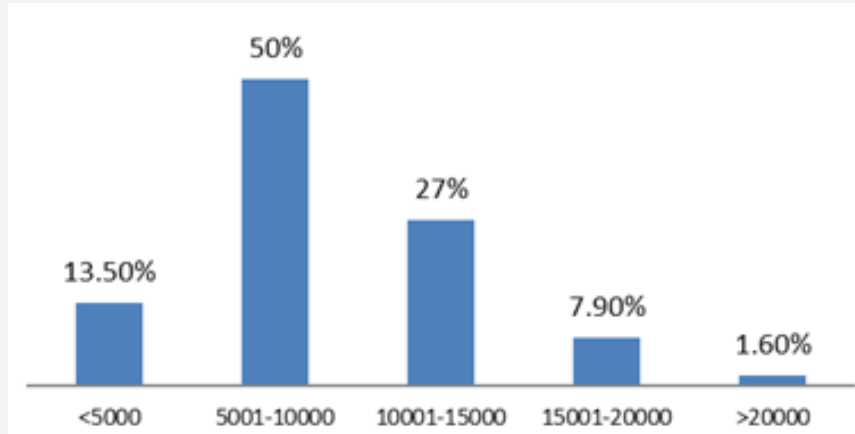


Figure 30: Comparison of the amount of housing expenditure (in BDT).

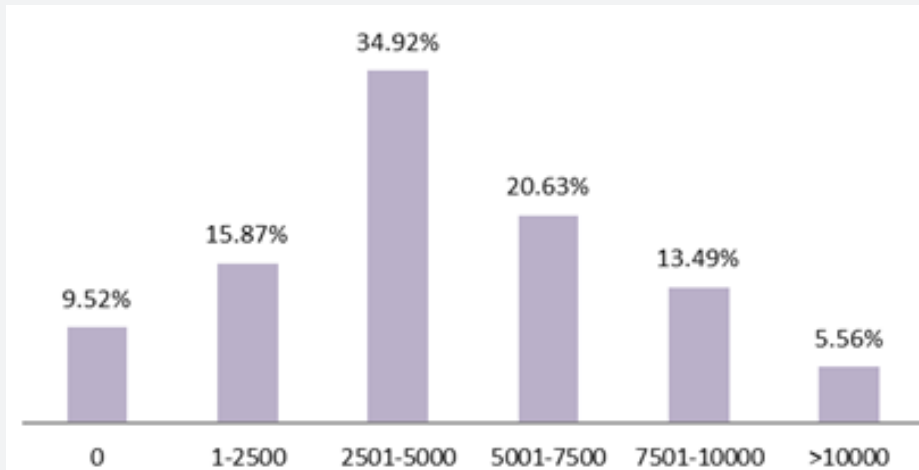


Figure 31: Comparison of the amount of house rent (in BDT).

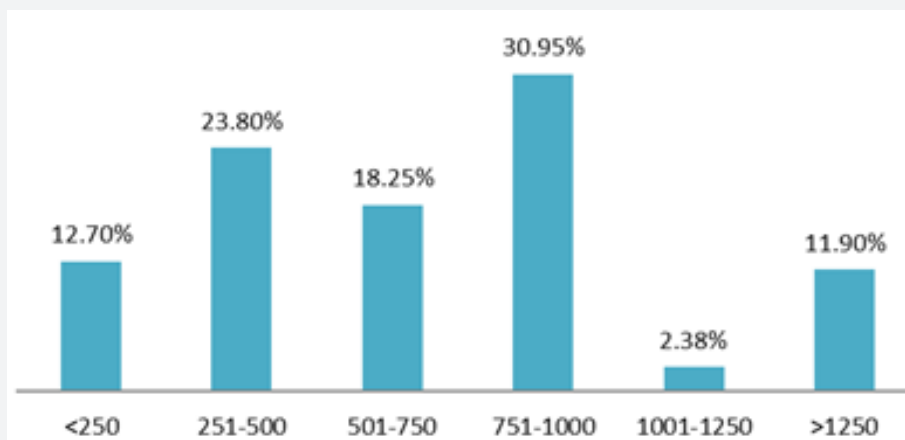


Figure 32: Comparison of the amount of utility bill (in BDT).

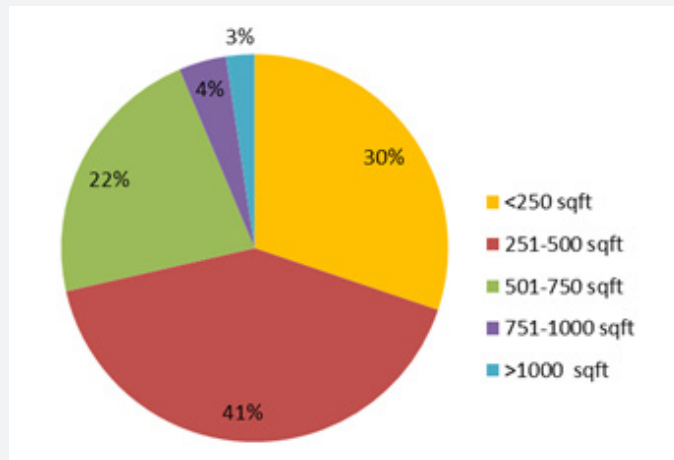


Figure 33: Comparison of the area of houses.

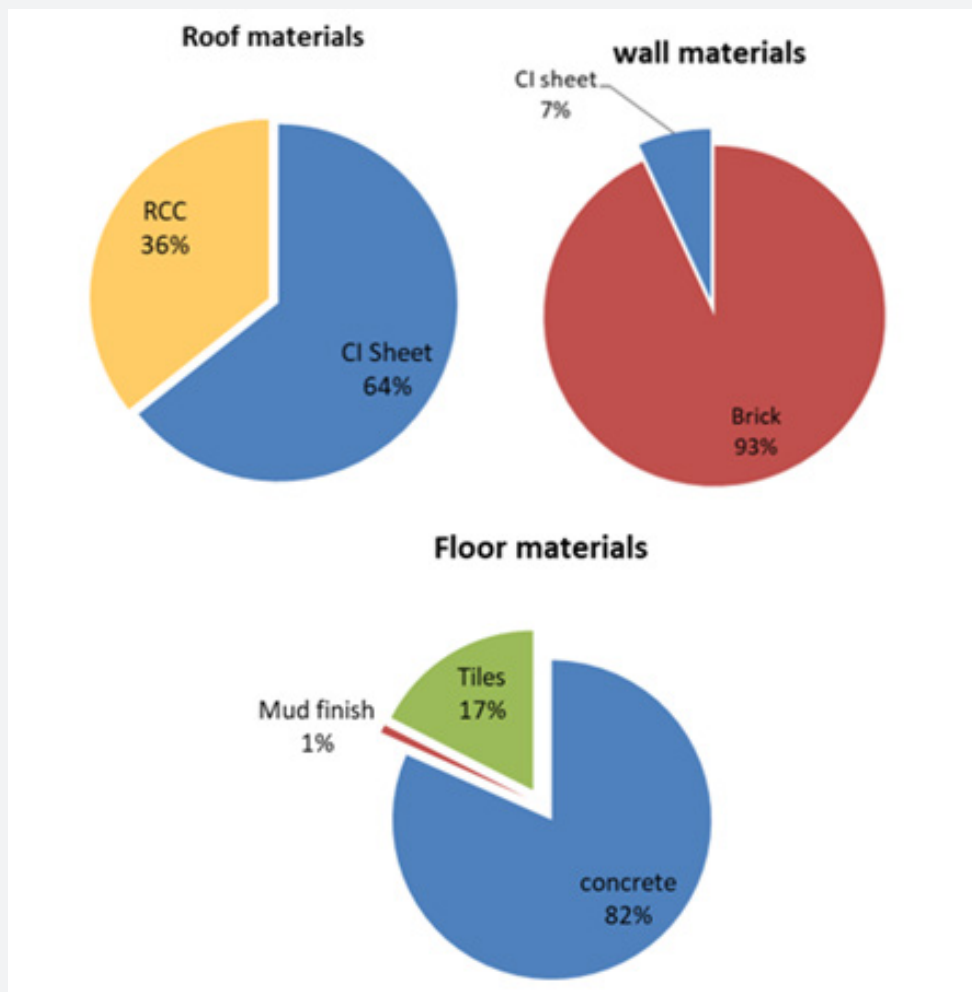


Figure 34: Percentage of different materials (roof, wall and floor).

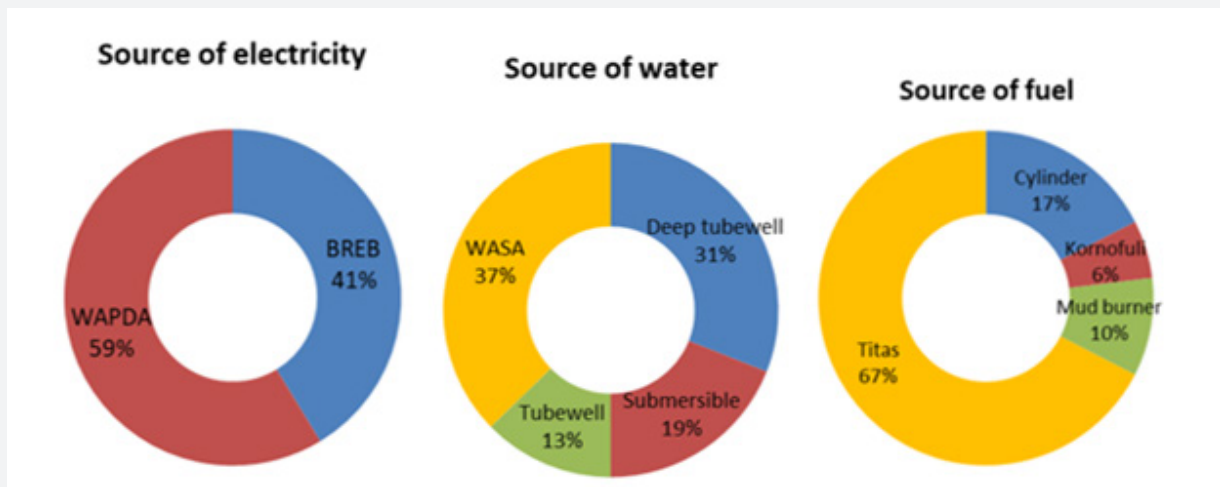


Figure 35: Percentage of electricity, water and fuel supply.

Conclusion

The major finding from the study is that the domestic factors of housing have a significant relationship with the economic factors of the household members. Comparing the space demographic factor and space income factor it is evident that the size of the space is dependent more on the income rather than the occupancy size or profession. From the existing spatial distribution, it is observed that the dwelling spaces of the industrial workers are mostly of multiple-use type. In some locations mess or group housing is preferred. The main services, toilet and kitchen are shared though they need to sacrifice their privacy to some extent.

The Industrial workers belong to the middle-income and lower-middle-income groups who need to fight constantly to grow further. Also, if we go through the monthly income and house rent ratio, most of the families in the study areas spend below 30% of their income for house rent purposes. They are not able to spend more than this amount for rent due to their low income, sometimes they can't even get their salary in due time. As a result, they choose to compromise their livelihood standard and living space to save more. For future design solutions the architects, designers and planners should propose some affordable solutions while designing the domestic units to maintain the optimum living standard.

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