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Factors Influencing Household Income in Poor Urban Slum Settlements in Bangladesh*

Sanzidur RAHMAN**

Abstract: The paper examines the influence of socio-economic factors on monthly total household income in poor urban slum settlements in four secondary cities of Bangladesh (i.e., Tongi, Jessore, Mymensingh and Dinajpur) based on a census survey of 33,049 households using a Tobit model. Results reveal that all levels of education, public sector employment, business, self-employment, homestead land ownership, family size, female occupation and urban agriculture significantly increases income whereas households with female heads, unemployed heads and children under 5 earn significantly less income. Migrant households do not earn significantly less than the local residents. Geographical variation exist as income is significantly higher in Tongi, Jessore and Mymensingh compared to Dinajpur. Policy implications include investments in higher education, expansion of employment opportunities in the public sector, business and self-employment activities, promotion of urban agriculture and targeted programs to enhance women's employment in order to raise income of these poor urban households.

Keywords: Household Income, Urban Slum Settlements, Secondary Cities, Tobit Model, Bangladesh

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Introduction

Goal 1 of the newly announced Sustainable Development Goals for the 21st Century (SD21) is to ‘End poverty in all its forms everywhere by 2030’ (UN, 2015) which is even a much stronger goal than Millennium Development Goal 1, which aimed at ‘Eradicating extreme poverty and hunger by 2015’ which had a target to reduce poverty by half from its 1990 level in 2015 (UN, 2015). It is a fact that there has been significant progress as extreme poverty has declined globally with the proportion of people living on less than USD 1.25 a day dropped to 14% in 2015 compared to almost 50% in 1990 in the developing world (UN, 2015). Also, the number of people living in extreme poverty has declined to 836 million in 2015 from 1.9 billion in 1990 (UN, 2015). However, the success of poverty reduction has not been uniform across all developing countries. For example, there are still large numbers of people living in poverty in Sub-Saharan Africa (51%), South Asia (40%) and East Asia (17%) (Krishna, 2013). Krishna (2013) further claims that past policies, which were successful in reducing poverty has lost their effectiveness and the “business as usual” scenario is not going to reduce poverty any further. Nicolai et al. (2015) also noted that without increased effort, none of the SDG21 goals are going to be achieved by 2030, but they provided optimism in meeting SDG 1 through further reform of the current trend. Payne (2005) noted that there were nearly 1 billion people living in slums in 2005, projected to increase to 1.5 billion by 2020 and to 2 billion by 2030. Therefore, achieving the goal of improved living conditions for 100 million slum dwellers by 2020 would only slow the increase in slum populations rather than achieve significant progress (Payne, 2005).

Bangladesh is a predominantly agrarian economy with a large proportion of its population vulnerable to malnutrition and hunger. It is worth noting that Bangladesh has made considerable progress in improving wellbeing of its population in recent years. The MDG Progress Report 2015 of Bangladesh noted that the inclusive growth policy has resulted in significant success in reaching the target of halving the number of poor living below the poverty line from 56.7% in 1990 to 29.0% by 2012, ahead of the 2015 timeline (PC, 2015). However, the report acknowledged that unemployment as well as underemployment is still persistent especially among young people between 15 to 24 years of age, which comprises 8.5% of the country's total population and 22% of the total labor force (PC,

2015).

In recent years, the physical evidence of increasing urban poverty and environmental decline has become apparent to the people living in the major and secondary cities of Bangladesh. The strong emphasis on rural policy initiatives and projects has tended to obscure the implications of a hidden demographic transformation that was taking place within Bangladesh. Arguably, the biggest social transformation underway in Bangladesh today is the demographic transition from rural to urban areas. Bangladesh is one of the most overcrowded and densely populated countries with an estimated 30% of its population living in urban areas including 15 million in the capital Dhaka alone. Although the level of urbanization in Bangladesh is one of the lowest in the world (Islam and Nazem, 1996), the rate of growth of the urban population is one of the highest (Islam et al. 1997). Nazem (1998) noted that more than 1 million people every year become urban dwellers because of in-migration and because of this, many cities are growing at a rate in excess of 8% per year with potential to double in size every 8 years.

A host of factors have contributed to rapid growth of the urban population in Bangladesh. These are: (a) large scale immigration of Muslims from India after the partition in 1947; (b) growth of trade centers, commerce and industries because of becoming a new country (the then-East Pakistan); (c) rural to urban migration; and (d) natural growth of the urban population (Islam and Nazem, 1996). It was estimated that about 60% of urban residents live in absolute poverty with 40% below the hard-core poverty line (CARE, 1999).

Most of the poor people in urban areas routinely turn to slums and squatter settlements for shelter with high population density, poor services and extremely insecure livelihoods. Being trapped in a low-wage low-skilled work with little job security, inadequate food and shelter, deprivations of basic education and health, these people are extremely vulnerable to pressures of ill health, economic dislocation and natural disasters (Rahman and Akter, 2012). The Census of Slum Areas and Floating Population 2014 noted a total of 13,938 slums covering all city corporations, municipalities, Upazila (sub-district) headquarters and all other urban areas, compared to only 2,991 slums recorded in the Census of Slum Areas and Floating Population 1997 (BBS, 2015). They noted that due to evictions of big slums in the cities of Dhaka, Chittagong, Khulna and Rajshahi, inhabitants were forced to move to smaller slums thereby

increasing the number of slums in 2014 (BBS, 2015). Nevertheless, Dhaka Division contains 46.5% of the slums in 2014 followed by Chittagong Division at 24% (BBS, 2015). Not only has the number of slums increased but also the slum population, increasing by 214% to 2,227,754 people in 2014, compared to 709,675 people in 1997 (BBS, 2015). This indicates that the claim of remarkable success in reducing poverty in the MDG report (PC, 2015) has not really translated into improving the lives of slum dwellers in Bangladesh.

A limited number of studies analyzing socio-economic aspects of slum dwellers are available in Bangladesh. For example, Alamgir et al. (2009) attempted to identify factors influencing livelihoods of the migrants to Dhaka city slums and noted that such populations have no formal education and are largely engaged in low reward jobs such as rickshaw pulling, wage laborers, petty business and small job services. Afsar (1999) reported that 33% of men and 16% of women of active age in the slum and squatter settlements were involved in the transport sector and garment factories in 1996. Rahman and Akter (2012) argued that livelihood security of urban slum dwellers in Tongi and Jessore districts are equally insecure and that the contribution of income security to overall livelihood security is highest. Similarly, Akter and Rahman (2017) also reported that high level of inequality exists between the bottom 20% and top 20% of the slum households with respect to livelihood security in Tongi and Jessore districts. Ahsanullah (2004) noted that a significant proportion of migrants live in slums in Dhaka city compared to any other places and both pull, and push factors influence migration which was also evident from the Census of Slum Population and Floating Population of 2014 (BBS, 2015). Chinnakali et al. (2014) noted that 77.2% of the slum households in North India are food insecure, but households with educated women and the number of earning members in the household are associated with less food insecurity.

It is clear from the above review that the research on socio-economic conditions of the urban slum households were centered on the capital city Dhaka. None has clearly identified the influence of various socio-economic factors on income for the urban slum dwellers in secondary cities of Bangladesh, which are also growing at an unprecedented pace (Nazem, 1998; PC, 2015). Also, the sample sizes used in these studies were modest ranging from 197–1200 households. Although Ravallion and Wodon (1999) and Wodon (2000) used large scale five rounds of nationally representative Household Income and Expenditure Survey (HIES) data covering the 1983

–1996 period for urban and rural areas to examine poverty and its determinants, the sample was not specific to urban slum or poor settlements, although some of these households may have been included but are not identifiable. Similarly, Islam et al. (2017) used Household Income and Expenditure Survey 2010 (HIES) with 12,240 households to identify the determinants of poverty and inequality in Bangladesh, but again the sample is not specific to urban slum populations.

Given this backdrop, the aims of this study are to: (1) examine the distribution of income with relation to a range of socio-economic factors of the poor urban slum households in secondary cities of Bangladesh; and (2) identify the influence of a range of socio-economic factors on the income of these poor urban slum households. This was done by utilizing large survey data of 33,049 slum households from four secondary cities of Bangladesh (i.e., Tongi, Jessore, Mymensingh and Dinajpur cities) collected jointly by the International Food Policy Research Institute (IFPRI) and CARE Bangladesh (CARE, 2001, 2004). The contribution of our study to the existing literature is that we have provided information on the distribution and socio-economic factors influencing income of the urban poor slum households for each city as well as for the whole sample to identify factors that are robust across the board and/or unique to each individual city.

The paper is organized as follows. Section 2 describes the methodology and the data. Section 3 presents the results. Section 4 provides conclusions and draws policy implications.

Methodology

Data was drawn from the SHAHAR (Supporting Household Activities for Health, Assets and Revenue) project implemented by CARE-Bangladesh during 1999-2004 aimed at improving livelihood security of vulnerable urban households. The SHAHAR Census Surveys were conducted in slums and low-income settlements within the municipal areas of Jessore, Tongi, Mymensingh and Dinajpur districts to serve as the sample frame for selecting households for project intervention (CARE, 2001, 2004). These four secondary cities were selected purposively to consider diversities in city characteristics. Also, with respect to larger administrative units, these four cities belong to four of the total eight divisions of the country pronounced in 2015. Jessore is in Khulna division,

Dinajpur is in Rangpur division, Mymensingh is in Mymensingh division and Tongi is in Dhaka division, respectively, thereby representing wide geographic coverage.

In the SHAHAR project, a site was defined as a cluster of poor and vulnerable households living within a geographic area. For defining each site, the existing road network was used as a geographic boundary. This led to selection of slums (*bastis*¹) as well as low-income settlements on the fringes of rich and middle-class housing in the municipality. Therefore, in this study, the term ‘slum’ refers to both *bastis* and low-income settlements within the geographic boundary of the project site, which is broader than the conventional definition of slum found in the literature. For example, the Census of Slum Areas and Floating Population 2014 of Bangladesh defined slums as a cluster of compact settlements of 5 or more households which expand unsystematically and haphazardly in an unhealthy condition on government and/or private vacant lands as well as on owner based household premises (BBS, 2015).

Studied Cities

Jessore is a city located in the southwest of Bangladesh on the main transport route linking Bangladesh to India. Being only 50 km from the border it is the closest large town to the markets of India. This proximity to India has a major impact both culturally and economically on the city. The slum communities in Jessore are to a large extent part and parcel of the city, located alongside middle-class and well-off neighborhoods. Also a few sites are located at the fringes of the municipality, which has a complex mix of urban and rural lifestyles, including crop agriculture. Administratively, Jessore is divided into 9 wards.² Of these 9 wards, some 63 slum communities known as *bastis* were identified. Surprisingly, the *basti* settlements were long-established, with 6 of them being formed around the historical time of partition in 1947. It is not clear whether the formation was linked to those series of events.

¹ A *basti* is often defined as an unplanned settlement of households typically without secure tenure, adequate sanitation and other urban services needed to maintain minimum environmental health standards.

² A ward is the smallest administrative unit in the urban/suburb setting in Bangladesh.

In contrast, Tongi is an industrial area located 25 km north of capital Dhaka and just 5 km from the main Hazrat Shahjalal International Airport. Tongi is characterized by the presence of large slum areas with distinct identities and are to a large extent spatially isolated from neighboring communities (Rahman and Akter, 2012). Many of its inhabitants including women work in the neighboring mills and factories. A total of 21 slum communities from 6 wards were selected for the survey and all households were included in the census. In Tongi, the two principal slum areas, Ershadnagar and Arichpur, have a long history. Ershadnagar was established by the national government in 1973 as part of a rehabilitation strategy for poor families who migrated to Dhaka City from different parts of the country. The Arichpur settlement was started before the independence of Bangladesh in 1971 and falls under the Dhaka Improvement Trust (DIT) authority.

Dinajpur is a city located in the northwest of Bangladesh. Its distance from the capital Dhaka is about 374 km. The total number of sites selected for intervention was 13 in Dinajpur and all households were included in the census. Like Jessore, slums in Dinajpur are a part and parcel of the city located alongside middle-class and well-off neighborhoods. *Basti* settlements in Dinajpur was established initially around the historical time of partition between India and Pakistan in 1947 with few households occupying the large settlement areas. Later, more *bastis* were formed from 1965 to 1970, and the density of these slums increased over time. The remaining *bastis* were formed around the time of the formation of independent Bangladesh. Migration to the Dinajpur is from various regions of the country with higher densities, as historically Dinajpur is relatively lightly populated.

Mymensingh is one of the oldest cities of Bangladesh, located 121 km northeast of capital Dhaka. In Mymensingh, the spatial form of *bastis* is like Tongi. They are characterized by the presence of relatively large slum areas, which have distinct identities and are to some extent spatially isolated from neighboring communities. However, some of the *bastis* also appear as part and parcel of the city, intertwined with middle-class and well-to-do settlements. A total of 17 sites³ that are considered as the most vulnerable in terms of overall livelihood security were chosen for

³ As with the case of Dinajpur, some of these sites include more than one *basti* that are in close proximity to each other.

SHAHAR interventions and all households were interviewed. As with the case of Jessore and Tongi, most of the bastis in Mymensingh were established around the partition of India and Pakistan in 1947, although it is not clear whether the formation was linked to that series of events. The remaining few *bastis* were formed during the formation of independent Bangladesh in 1971. Migration to Mymensingh city is mostly from the neighboring poor regions of Jamalpur, Sherpur, and Netrokona. Being one of the oldest cities in the country with no scope for expansion, thereby resulting in a process of densification and enlargement of existing settlements. However, in recent years, the government is considering expanding the city on the other side of the Old Brahmaputra river facilitated by the construction of the Bangladesh-China Friendship Bridge during early 2000.

Census Strategy

The total number of 114 slum sites were covered in this study distributed as 63 sites in Jessore, 21 in Tongi, 13 in Dinajpur and 17 in Mymensingh, respectively. The first stage in selecting the project sites consisted of a stakeholder consultation stage with the municipality officials, ward commissioners, representatives from Local Government and Engineering Department (LGED), non-governmental organizations working in the neighborhoods, representatives from USAID (the principal donor) and CARE senior management from the mission. Also, a set of selection criteria for slums and low-income settlements were developed to ensure that any chosen community meets the pre-conditions for successful project implementation (CARE 2001).

CARE-Bangladesh previously surveyed slums in Tongi during its Urban Livelihood Security Assessment study in 1997 (CARE 2001). A short follow-up reconnaissance by SHAHAR project staff finally selected 21 sites of widely varying sizes for intervention in Tongi.

In Jessore, a two-day reconnaissance of the municipality was undertaken by SHAHAR project staff literally travelling every road and footpath and fully covered the municipality area of 14.72 sq km and finally arrived at a total of 63 sites of widely varying size for intervention (CARE, 2000).

In Mymensingh and Dinajpur, SHAHAR first sought a list of underdeveloped neighborhoods from the municipality offices. Next, based

on reconnaissance of those listed slum locations, SHAHAR project staff came up with a shortlist of 13 project sites suitable for intervention in Dinajpur and 17 sites in Mymensingh based on extensive consultation with the key stakeholders in those cities.

The census was conducted door-to-door within the geographic boundaries of each of these sites. The total number of households covered in the census survey was 33,049 distributed as 11,228 in Jessore, 13,664 in Tongi, 3,744 in Dinajpur and 4,413 in Mymensingh (Table 1). Table 1 also shows that the family size varies significantly across cities ($p < 0.001$) with lowest family size of 4.24 persons in Dinajpur to a highest 4.62 persons in Jessore.

Questionnaire Design

A structured questionnaire was designed for the Census Survey following a series of discussions with field staff and the Technical Support Unit of CARE–Bangladesh. A detailed process of training of enumerators and pre-testing of the questionnaire was conducted in all the regions. Enumerators were chosen from among CARE staff who were supposed to be actively involved in the future implementation of the SHAHAR project itself. The questionnaire contained a total of 11 questions in Jessore and Tongi and 14 questions in Dinajpur and Mymensingh covering household demographics, literacy, gross monthly income, ownership of homestead land, housing, migration, water and sanitation facilities and practice of urban agriculture. The additional questions in Dinajpur and Mymensingh relate to water and sanitation facilities, which were not available in the same form in Jessore and Tongi and hence not included in the analysis.

Survey Administration

For quality control, a detailed survey administration plan was formulated. Field supervisors were appointed who were responsible for supervising enumerators, cross-checking, and conducting primary editing of the filled-in questionnaire on the same day of collection in consultation with the enumerator. Also, pairwise cross checking of the filled-in questionnaire among the enumerators was made before submitting it to the field supervisor. Finally, the supervisor checked for overall consistency of the questionnaire before submitting it for data entry. If any inconsistency of

information was detected during data entry, the same questionnaire was re-administered to the same household on the following day. The census surveys in Jessore and Tongi were conducted during June–July 2000 and in Dinajpur and Mymensingh during May–June 2001.

Although the data collected for this study are 15–16 years old, little has changed about the plight of the poor. This is particularly true for the urban slum areas, which has not only increased dramatically in numbers but also in terms of total population living there as reported in the Census of Slum Areas and Floating Population 2014 (BBS, 2015). Moreover, we have analyzed the underlying socio-economic factors influencing earnings of households residing in slums and low-income settlements in urban areas, which is less likely to be influenced by the timing of data collection. Therefore, we argue that our results can provide valuable information of relevance to policy makers and development practitioners alike at present.

Table 1.

Gender Distribution of the Population in the Study Areas

Locations	Households	Male members	Female members	Total members	Family size
Tongi	13,664	28,530	28,159	56,689	4.15
Jessore	11,228	26,486	25,346	51,832	4.62
Mymensingh	4,413	10,043	10,048	20,091	4.55
Dinajpur	3,744	7,934	7,932	15,866	4.24
Total	33,049	74,463	71,485	144,478	4.37

Community Profiles of Dinajpur and Mymensingh Sites

Prior to implementation of the SHAHAR project in Dinajpur and Mymensingh cities, SHAHAR decided to initiate a rigorous process of activities aimed at understanding the diverse needs and priorities of the communities. Participatory learning exercises in each community were conducted to compile comprehensive profiles of these urban communities. The main objective of these community profiles was to understand the context of interventions, their roles, aspects needing emphasis in the interventions and the adaptation of the interventions to suit needs of the communities. Topics included were: community context (historical, political, economic, social, environmental, and social services), economic security and other areas of livelihood security, such as shelter, health, education, nutrition and food security. The principal tools utilized were: (a)

key informant interviews, (b) large group discussions, (c) focus group discussions and (d) Venn diagrams. SHAHAR project staff were involved in conducting these sessions in both cities after receiving appropriate training on qualitative research methods. A total of 11 sessions per site (3 = key informant interviews, 1 = large group session of 20–25 persons, 3 = focus group discussions with only men, women and adolescents comprising of 7–12 persons per group and 4 = Venn diagrams with 7–10 persons for each diagram) were conducted over a five-day period in each site (Rahman, 2001).

Measuring Determinants of Income: A Tobit Model

Income of a household depends on a host of socio-economic factors with variable influences. In general, capital assets (e.g., land and homestead), education and employment are expected to positively influence income whereas the influence of demographic variables (e.g., experience or age, family size and number of dependents) are unclear (e.g., Rahman, 2015, 1999; Wodon, 2000). Kazal et al. (2017) also noted that poverty is relatively higher for the households characterized by landlessness, large family size, lacking durable assets, poor housing and sanitation, NGO membership, wage labor and illiterate heads. Income may also vary across geographic locations (Rahman, 2015, 1999; Wodon, 2000; Ravallion and Wodon, 1999). For example, income in large urban conglomerates located nearer to the capital city are likely to be higher than the secondary urban cities located further away from the capital and scattered across the country. Therefore, in order to identify the influence of socio-economic factors on income of these urban slum households, we postulate a reduced-form income equation as a function of these indicators as described below.

Among the limited dependent variable models widely used to analyze income, Tobit analysis has gained importance since it uses all observations, both those at the limit, usually zero (e.g., not earning any income), and those above the limit (e.g., earning positive income), to estimate a regression line, as opposed to other techniques that uses observations which are only above the limit value (McDonald and Moffit, 1980). In our case, households may not earn any income over the past 30 days, thereby reporting zero income which was found in 148 households in the census (see bottom of Table 3). In such cases, the application of Tobit analysis is

most suited because of the censored nature of the data (Rahman, 1999). The stochastic model underlying Tobit may be expressed as follows (McDonald and Moffit, 1980):

$$\begin{aligned}
 y_i &= X_i\beta + u_i && \text{if } X_i\beta + u_i > 0 \\
 &= 0 && \text{if } X_i\beta + u_i \leq 0, \\
 &&& i=1,2,\dots,n, \quad (1)
 \end{aligned}$$

where n is the number of observations, y_i is the dependent variable (total monthly income of the household), X_i is a vector of independent variables representing household specific socio-economic characteristics, b is a vector of parameters to be estimated, and u_i is an independently distributed error term assumed to be normal with zero mean and constant variance s^2 . The model assumes that there is an underlying stochastic index equal to $(X_i b + u_i)$ which is observed when it is positive, and hence qualifies as an unobserved latent variable. The relationship between the expected value of all observations, E_y and the expected conditional value above the limit E_y^* is given by:

$$E_y = F(z) E_y^*$$

where $F(z)$ is the cumulative density normal distribution function and $z = Xb/s$. Following the framework of McDonald and Moffit (1980), the effect of the k th variable of X on y led to decomposition as follows:

$$\delta E_y / \delta X_k = F(z)(\delta E_y^* / \delta X_k) + E_y^* (\delta F(z) / \delta X_k) \quad (2)$$

Results

Distribution of Income by Socio-Economic Categories

Table 2 presents distribution of mean total monthly income of the households by various socio-economic categories for each city as well as total sample and Table 3 presents the distribution of households with respect to these categories. It is clear from Table 2 that there are significant differences across cities with respect to all the categories considered. Overall, mean total monthly income is highest in Tongi (BDT 3367.98) and

lowest in Dinajpur (BDT 2351.22). Also, the mean monthly income is generally lowest in Dinajpur with respect to all categories with one or two exceptions whereas income is generally highest in Tongi with few exceptions (Table 2).

Asset Ownership and Income

When ownership of asset is considered, specifically homestead land ownership, households in Mymensingh reported lowest income which is about half of the mean income in Tongi. This is quite surprising since only 4% of the total households owned any homestead land in Tongi as opposed to 25% in Mymensingh (Table 3). Since homestead land price is much higher in Tongi (being near to the capital Dhaka), ownership of land implies that these households are relatively well-off. In contrast, when ownership of the main house is considered, mean monthly income is highest in Mymensingh and lowest in Dinajpur. Also in contrast, 50% of the households owned main house in Tongi and highest 67% in Dinajpur despite earning lowest income (Table 2).⁴

Income by Migration Status

Mean monthly income of the migrant households is lower than the local residents but at the individual city level, income is similar in Jessore and Dinajpur between the migrants and local residents (Table 2). Surprisingly, 89% of the total households in Dinajpur are migrants as compared to 74% in Tongi (Table 3) whereas the general view is that rural-urban migration is mainly one way from rural areas to capital Dhaka (Ahsanullah, 2004; Alamgir et al., 2009).

One may argue that since some of these slums were established to accommodate refugees from the Bihar region during the partition of India and Pakistan in 1947 and ‘stranded Pakistani’ citizens during the Liberation War of Bangladesh in 1971 (locally known as *Biharis*), they should be identified in the sample. This is because *Biharis* are Urdu speaking, have their own characteristics and dynamics and were stateless until 2008, after which a judgement by the Dhaka High Court gave them the right of citizenship. Unfortunately, we did not have specific question to identify whether the migrants were from India or were stranded Pakistanis.

⁴ Tables 2-5 included as appendices at the end of the article.

However, an analysis of the historical contexts of these settlements explored during the community profile sessions revealed that in Dinajpur only one site was established in 1948, two sites in 1972 mostly occupied by Bangladeshis instead of *Biharis*, two sites in 1800 and 1920 and the remaining eight sites between 1955 to 1965. Similarly, in Mymensingh, although four sites were established during 1947 with very few households initially which were actually occupied and populated by Bangladeshis during 1972, three sites during 1900 and the remaining 10 sites between 1958–1965 (Rahman, 2001). Therefore, failure to identify *Biharis* is not expected to have any major influence on the results of this study because they are likely to be very few in numbers.

Nevertheless, based on the answer to the question on ‘when the household first left the rural area to migrate to the city?’, we worked out the actual length of migration (Table 2). Table 2 shows that the average length of migration is 12.80 years with variation across districts with Mymensingh having the lowest average length of migration. Further categorization of the length of migration revealed that only 0.2% of the sampled households migrated during the partition of India and Pakistan in 1947-48; 6.7% around the time of the Liberation War of Bangladesh during 1971-1973 and 11.2% between 1900–1965 with substantial variation amongst districts (results not shown). About 52.0% of the total sample migrated to the cities from 1974 onward, therefore making them as the largest share of total migrants who moved to the cities in search of a better life. In fact, information generated during the community profile sessions conducted in Mymensingh and Dinajpur sites confirmed that the primary reason for settlement in these sites was in search for income and employment. Also many homeless people from various other places settled in these sites. Several respondents also mentioned availability of vacant land as their reason for settlement. Many also mentioned river erosion as the main reason for moving into these sites (Rahman, 2001).

Education and Income

Mean monthly income increases with an increase in the level of head’s education and is highest for heads with tertiary level of education, which is true for all cities and overall, implying very strong influence of education on earning capacity (Table 2). However, it is also true that more than half of the slum households (56% overall) do not have any education

and only 5% of the households have heads with tertiary level of education (Table 3).

Demographic and Family Structure and Income

Female headed households earn lowest level of monthly income as compared to all socio-economic categories considered in this study and this is true for each individual city and overall (Table 2). Households with children under 5 years old earn similar to the mean income level (Table 2) although 50% of all households have children under 5 years old (Table 3). The general expectation is that families with young children may face constraint in engaging with income earning activities, particularly by the mother, thereby earning relatively less. Also 18% of all households have adults above 59 years of age (Table 3) implying that these households have an extra burden of dependent family members. It should be mentioned that the official retirement age of public service in Bangladesh is 57 years in 2000 which was raised to 60 years for freedom fighters only in 2012 (BDNews, 2016).

Occupation and Income

Distribution of income by occupational category of the household head shows that earning is lowest for the unemployed followed by wage labourer while businessman earns highest income (Table 2). About 11% of all heads are unemployed while almost a quarter of all heads are wage labourers and 15% are businessmen (Table 3). However, households with female members also having an occupation seem to earn reasonably well in all the cities (Table 2) although the proportion of such households are highly variable across the cities ranging from 19% in Jessore to a high 39% in Tongi and 29% overall (Table 3).

Urban Agriculture and Income

Households who were engaged in agriculture, i.e., grew vegetables, also recorded higher earnings than the overall mean income in all the cities (Table 2) although only 4% of total households in Tongi grew vegetables as compared to 25% in Mymensingh (Table 3) thereby demonstrating sharp regional differences. It should be noted that the question asked was ‘did the household grow any vegetables over the past one year?’, which may be

either on own homestead land or any urban land where the household has access. Therefore, the results do not imply that these households are mainly farming families living in urban fringes.

Determinants of Total Monthly Household Income

Table 4 presents the parameter estimates of the factors influencing total monthly household income for each individual city as well as total sample using Eq. (1). A total of 68% of the coefficients on the variables are significantly different from zero at 10% level at least for the five models implying a very good fit. The values of the Chi-squared statistic presented at the bottom panel of Table 4 also confirms that these variables jointly explain variability of household income in each of the cities as well as for all the households. Parameter estimates presented in Table 4 can provide information only on the direction of influence but not its true magnitude. Therefore, actual elasticities or responsiveness of income w.r.t. these socio-economic variables were computed and presented in Table 5.

Ownership of homestead land significantly positively influences income, but the effect is not significant in Dinajpur. Ownership of land positively influences income and/or welfare in rural areas of Bangladesh (Rahman 2015; 1999). In contrast, ownership of the main house negatively influences income, but the effect is not significant in Jessore and Dinajpur (Table 5). The implication is that ownership of the main house includes building houses on government owned land or unused/vacant private properties, which are of generally very low quality. Therefore, ownership of house does not imply that these households are wealthy as compared to those who own homestead land, which is a major source of wealth in Bangladesh as well as in South Asia (Rahman, 2010).

Migrant households in Tongi earns significantly less than the local residents whereas in Mymensingh they earn significantly more although there is no influence of migrant status on income in Jessore and Dinajpur (Table 5). Overall, migrant households do not earn significantly less than the local residents as indicated by the figures in Table 2. This is in contrast with the literature where the general claim is that migrants are poorer as compared to local residents (Chinnakali et al., 2014; Alamgir et al., 2009). Such argument may be true for analyzing migrants in capital city Dhaka, which commensurate with the results for Tongi as it is located close to the capital. Length of migration has a significantly negative influence on

income only in Mymensingh but not anywhere else.

The influence of education in raising income is robust for all levels of education for all the cities and for the total sampled households (Table 5), thereby confirming observation made in Table 2. The magnitude of influence is generally higher for heads with secondary level of education, which constitutes 22% of all households (Table 3). But heads with primary level of education also earns significantly more than uneducated heads. Wodon (2000) also noted increased returns of education on per capita consumption in Bangladesh over time in urban areas. Rahman (2015) also noted positive influence of education on consumption in rural Bangladesh. Furthermore, urban households where both head and spouse have completed secondary level of education has the expected per capita consumption double that of heads with illiterate heads and spouse (Wodon, 2000). Similarly, Islam et al. (2017) noted that households with education is associated with better poverty outcome as compared to no education at all. Some notable Non-Governmental Organisations (NGOs), such as BRAC and Proshika, started to implement educational programs for the children of urban poor settlements since 2000, which is a step in the right direction.

Family size, implying more working age members perhaps, significantly positively influence income in all the cities and all households (Table 5). Chinnakali et al. (2014) noted that the number of earning members in the household are associated with less food insecurity, which implies better income. This is because they reported that 53.3% of the total income was spent on food (Chinnakali et al., 2014) and hence less food security implies higher income. In contrast, Islam et al. (2017) noted that households with large family size has the higher risk of falling into poverty.

Female-headed households earn significantly less except in Mymensingh, thereby, confirming information presented in Table 2. Wodon (2000) also noted that households with female heads have lower per capita consumption in rural areas. In contrast, Islam et al. (2017) noted that the male-headed households are more prone to falling into poverty than the female-headed households, which they solely attributed to receipt of remittances sent by the male members of the households. Table 5 also shows that households with children under 5 years of age earns significantly less in all cities and all households whereas presence of older adults do not have any significant influence on earnings. Although results in Table 2 showed that families with young children do not earn less, but the econometric results confirmed the underlying structural relationship. This finding clearly

demonstrates the challenge of families with younger children to engage in income earning opportunities, particularly in poor urban slum settlements where child-care support for families is simply non-existent. Rahman (2015) also noted that the number of dependents significantly reduces consumption in rural Bangladesh.

In Bangladesh, 'the head of household is not only the undisputed decision maker in the household but also in most of the cases the sole earner of the family' (Islam et al, 2017, p 6). Table 5 clearly demonstrates that household heads who are in the public sector, businessman and self-employed earn significantly higher income as compared to unemployed heads who earn significantly less except in Mymensingh. Heads with non-government jobs also earn significantly higher income in Tongi and Jessore whereas wage labourers earn significantly higher in Tongi but lower in Jessore. This may be due to the fact that households in Tongi work in mills and factories where wages are higher as compared to working as day laborers in agriculture in Jessore. Female's participating in the workforce significantly increases income except in Jessore. This clearly points towards the importance of engaging female population in income earning opportunities. Similarly, growing vegetables significantly increases income in Jessore and Mymensingh and all households, thereby implying importance of urban agriculture in influencing income in secondary cities of Bangladesh. Afsar (1999) recommended diversification of employment opportunities for the urban poor in slums.

Geographical location has a prominent influence on earnings. Income is significantly higher in Tongi, Jessore and Mymensingh as compared to Dinajpur (Table 5), which was also evident in Table 2. This finding resonates with the connotation raised by Ravallion and Wodon (1999) who noted significant and sizable geographic effects on living standards in Bangladesh even after controlling for socio-economic characteristics as done in this study. Similarly, Wodon (2000) also noted that households living in Dhaka district are better off than other districts, especially in urban areas, which conforms to our findings as Tongi is very close to Dhaka city. In contrast, Islam et al. (2017) noted that households living in Dhaka, Khulna, and Rajshahi divisions are more vulnerable to falling into poverty compared to households living in Barisal, Chittagong, and Sylhet divisions.

Conclusions and Policy Implications

The aims of this study were to examine the distribution of monthly total income by socio-economic categories of the poor urban slum households in four secondary cities of Bangladesh and identify the range of factors influencing household income using a large census survey data of 33,049 households by applying a Tobit model. Results reveal that there are significant geographical differences with regards to income earned by all socio-economic categories considered. The mean monthly household income is lowest in Dinajpur (farthest from capital Dhaka) and highest in Tongi (nearest from capital Dhaka) which is expected. Results also provided insights into the set of socio-economic factors, which are robust and significantly increases income across most of the cities and overall sample. These are: education (all levels), business, public sector and self-employment, female occupation, ownership of homestead land, family size and urban agriculture. Similarly, there are robust factors, which significantly reduces income, such as female-headed households and households with young children. Results also provided insights into the influence of socio-economic factors, which are unique to individual cities only. For example, wage employment, non-government jobs and migrated households.

Many policy implications can be drawn from the results. First, investments in education targeted for the urban poor and slum settlements should be a top priority. Although all types of education significantly increase income, thrust should be given to promote secondary and higher-level education because their impacts are higher than primary level education. Second, investments should be targeted to expand employment opportunities in the public sector, businesses and self-employed activities. This would imply higher level of education for the first category and skills training for the latter two categories as the main implementation strategies. Third, targeted investment in promoting female participation in occupation is important. Most NGOs in Bangladesh target women as their client (e.g., BRAC, Proshika) and promote engagement in self-employed activities, which are characterized by low returns. Therefore, emphasis should be directed to provide higher level of education and skills for women so that they can participate in activities that yield higher returns. Finally, investments targeted to promote urban agriculture (i.e., growing vegetables) as it significantly increases income.

Although realizing these policy options are formidable and challenging, however, improvement in the lives of the urban poor slum households will positively contribute towards reaching the SDG 1 target of ‘Eradicating poverty in all forms and everywhere by 2030’, which is a goal worth pursuing.

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Table 2.
Total Monthly Income by Socio-Economic Categories in Selected Cities of Bangladesh.

Variables	Tongi	Jessore	Mymensingh	Dinajpur	All sample	F-statistic
Ownership of Assets						
Ownership of Homestead Land	5578.14	4179.66	2718.89	4467.95	4210.50	50.752***
Ownership of Main House	3494.29	3880.79	3570.86	2478.89	3467.87	121.672***
Migration Status						
Migrated Household	3339.34	3238.93	3019.19	2340.03	3125.76	136.052***
Local Residents	3450.76	3272.74	3463.11	2441.47	3329.63	15.465***
Educational Attainment of Head						
No Education	2989.85	2502.93	2299.88	2060.62	2637.25	196.890***
Educated up to Primary Level	3438.41	3129.92	3391.67	2430.85	3198.07	26.922***
Educated up to Secondary Level	4128.02	3980.59	3940.92	3030.16	3949.86	21.564***
Educated up to Tertiary Level	5725.00	5994.69	7866.32	4083.57	6163.00	18.552***
Demography and Family Structure						
Female Headed Household	2341.53	2012.80	2210.96	1637.10	2140.56	17.871***
Have child under 5 years old	3296.45	3092.91	3079.20	2382.24	3088.89	82.327***
Main Occupation of Head						
Wage Labour	2983.93	2526.77	2289.14	1962.47	2618.26	130.849***
Government Salaried	4711.14	4875.48	5980.23	3982.69	4970.78	14.708***
Non-Government Salaried	3137.81	3002.99	3056.01	2297.81	3039.93	9.345***
Business	5383.09	5220.98	5245.55	3854.56	5151.19	16.691***
Self-Employed	2995.38	2576.48	2274.16	2012.78	2658.29	92.376***
Petty Trading	2977.73	2881.93	2058.05	1999.65	2678.60	85.375***
Unemployed	2747.97	2846.61	3048.32	1794.90	2766.18	14.743***
Female Member has an Occupation	3527.68	2868.05	2935.14	2386.10	3184.47	86.774***
Involvement in Urban Agriculture						
Grew Vegetables	3854.56	4218.76	3843.00	2534.73	3609.76	43.893***
Total monthly income	3367.98(2570.08)	3253.47(2918.04)	3167.77(3159.68)	2351.22(1566.65)	3186.82(2707.12)	143.403***
Number of Households	13664	11228	4413	3744	33049	

Note: Exchange rate USD 1.00 = BDT 53.96 in 2000-01 (BB, 2002).

*** = significant at 1 percent level (p<0.01)

Table 3.
Key Features and Descriptive Statistics of the Variables used in the Tobit Models.

Variables	Definition and measure	Tongi	Jessore	Mymensingh	Dinajpur	All sample
<i>Dependent Variable</i>						
Monthly Total Household Income	Earnings last 30 days (BDT)	3367.98(2570.08)	3253.47(2918.04)	3167.77(3159.68)	2351.22(1566.65)	3186.82(2707.12)
<i>Ownership of Assets</i>						
Ownership of Homestead Land	Dummy (1 = if own, 0 otherwise)	0.04	0.33	0.25	0.15	0.18
Ownership of Main House	Dummy (1 = if own, 0 otherwise)	0.50	0.45	0.44	0.67	0.49
<i>Migration Status</i>						
Migrated Household	Dummy (1 = if Yes, 0 otherwise)	0.74	0.60	0.67	0.89	0.70
Length of Migration	Duration in years since leaving rural area	14.63 (13.26)	13.02 (14.83)	7.32 (9.38)	11.91 (10.51)	12.80 (13.31)
<i>Educational Attainment of Head</i>						
No Education	Dummy (1 = if Yes, 0 otherwise)	0.60	0.49	0.57	0.60	0.56
Educated up to Primary Level	Dummy (1 = if Yes, 0 otherwise)	0.17	0.17	0.17	0.20	0.17
Educated up to Secondary Level	Dummy (1 = if Yes, 0 otherwise)	0.20	0.27	0.19	0.17	0.22
Educated up to Tertiary Level	Dummy (1 = if Yes, 0 otherwise)	0.03	0.07	0.07	0.03	0.05
<i>Demography and Family Structure</i>						
Age of the Head	Years	39.61 (12.92)	40.73 (12.54)	--	--	--
Family Size	Number of persons	4.15 (1.84)	4.62 (1.92)	4.55 (1.99)	4.24 (1.78)	4.37 (1.89)
Female Headed Household	Dummy (1 = if Yes, 0 otherwise)	0.13	0.10	0.16	0.14	0.12
Have Child under 5 Years Old	Dummy (1 = if Yes, 0 otherwise)	0.49	0.50	0.52	0.52	0.50
Have Older Person Above 59 Years Old	Dummy (1 = if Yes, 0 otherwise)	0.17	0.20	0.19	0.15	0.18
<i>Main Occupation of Head</i>						
Wage Labor	Dummy (1 = if Yes, 0 otherwise)	0.24	0.20	0.24	0.27	0.23
Government Salaried	Dummy (1 = if Yes, 0 otherwise)	0.01	0.05	0.06	0.04	0.04
Non-Government Salaried	Dummy (1 = if Yes, 0 otherwise)	0.19	0.10	0.10	0.08	0.13
Business	Dummy (1 = if Yes, 0 otherwise)	0.15	0.16	0.15	0.13	0.15
Self-Employed	Dummy (1 = if Yes, 0 otherwise)	0.20	0.21	0.15	0.21	0.20
Petty Trading	Dummy (1 = if Yes, 0 otherwise)	0.10	0.17	0.11	0.19	0.13
Unemployed	Dummy (1 = if Yes, 0 otherwise)	0.11	0.11	0.19	0.08	0.12
Female Member has an Occupation	Dummy (1 = if Yes, 0 otherwise)	0.39	0.19	0.21	0.30	0.29
<i>Involvement in Urban Agriculture</i>						
Grew Vegetables in Past One Year	Dummy (1 = if Yes, 0 otherwise)	0.04	0.07	0.25	0.23	0.10
<i>Location</i>						
Tongi	Dummy (1 = if Yes, 0 otherwise)	--	--	--	--	0.41
Jessore	Dummy (1 = if Yes, 0 otherwise)	--	--	--	--	0.34
Mymensingh	Dummy (1 = if Yes, 0 otherwise)	--	--	--	--	0.13
Dinajpur	Dummy (1 = if Yes, 0 otherwise)	--	--	--	--	0.12
Number of Households		13664	11228	4413	3744	33049

Note: Variables in the italics are not included in the models in order to avoid perfect collinearity. The influences of these variables are absorbed in the intercept.

Table 4.
Determinants of Monthly Household Income in Poor Urban Households in Selected Cities of Bangladesh

Variables	Tongi	Jessore	Mymensingh	Dinajpur	All sample
Constant	854.6599***	-139.8369	-305.5127*	627.9864***	-99.4366
Ownership of assets					
Ownership of homestead land	1405.7980***	489.0355***	969.9349***	87.3598	730.3818***
Ownership of main house	-339.1595***	-25.4221	-504.8369***	-35.4756	-267.5232***
Migration status					
Migrated household	-112.1085*	77.0662	358.8964***	-11.7942	45.1321
Length of migration	-1.9777	2.2664	-11.0490**	0.5817	-0.6650
Educational attainment of head					
Educated up to primary level	390.1671***	382.2261***	507.3388***	210.9251***	377.3824***
Educated up to secondary level	930.0420***	990.9591***	899.3510***	573.1105***	908.8548***
Educated up to tertiary level	2227.5890***	2856.3910***	4312.7420***	1739.2920***	2887.0200***
Demography and family structure					
Age of the head	2.6699	9.9836***	--	--	--
Family size	559.6186***	507.8021***	543.3798***	334.5576***	527.8819***
Female headed household	-492.8194***	-179.6482*	-130.5378	-321.7253***	-329.3221***
Have child under 5 years of age	-929.5529***	-599.2436***	-752.2474***	-414.9265***	-774.6567***
Have older person above 59 years of age	-78.0772	-95.8276	113.5192	108.3180	3.0732
Main occupation of head					
Wage labour	144.1648**	-167.5402**	155.0654	-24.8740	-5.9237
Government salaried	775.6858***	557.2463***	1313.6490***	1336.8490***	911.6944***
Non-government salaried	120.3906*	-83.0098	285.4661	131.7406	36.2380
Business	1903.4630***	1561.2690***	2194.4670***	1466.8710***	1747.9170***
Self-employed	175.5763***	105.7090	333.1618**	97.3260	140.1223***
Unemployed	-275.7757***	-537.1423***	286.2568*	-54.6358	-207.1171***
Female member has an occupation	472.1892***	-4.5253	171.8095*	370.7978***	313.4421***
Involvement in urban agriculture					
Grew vegetables	-107.9972***	185.4896**	225.5847**	-3.6447	70.6157*
Location					
Tongi	--	--	--	--	1050.2870***
Jessore	--	--	--	--	273.5531***
Mymensingh	--	--	--	--	416.4654***
Model diagnostics					
Log-likelihood	-123755.6300	-102862.9200	-40654.0010	-31924.9910	-300614.1400
Chi-square statistic	5020.34***	4105.37***	2168.45***	1847.57***	12785.79***
Sigma	2145.0990***	2441.4800***	2474.9210***	1224.0760***	2237.2170***
Left censored observations at zero	56	80	11	1	148
Number of households	13664	11228	4413	3744	33049

Note: *** = significant at 1 percent level ($p < 0.01$)
 ** = significant at 5 percent level ($p < 0.05$)
 * = significant at 10 percent level ($p < 0.10$)

Table 5.
Tobit Elasticities of the Determinants of Monthly Household Income in Poor Urban Households in Selected Cities of Bangladesh.

Variables	Tongi	Jessore	Mymensingh	Dinajpur	All sample
Ownership of Assets					
Ownership of Homestead Land	0.0153***	0.0504***	0.0778***	0.0057	0.0413**
Ownership of Main House	-0.0502***	-0.0035	-0.0702***	-0.0100	-0.0415**
Migration Status					
Migrated Household	-0.0248*	0.0142	0.0755***	-0.0045	0.0099
Length of Migration	-0.0086	0.0091	-0.0256**	0.0027	-0.0027
Educational Attainment of Head					
Educated up to Primary Level	0.0195***	0.0197***	0.0275***	0.0178***	0.0204***
Educated up to Secondary Level	0.0565***	0.0823***	0.0550***	0.0413***	0.0632***
Educated up to Tertiary Level	0.0170***	0.0622***	0.0890***	0.0194***	0.0420***
Demography and Family Structure					
Age of the Head	0.0314	0.1254***	--	--	--
Family size	0.6903***	0.7228***	0.7818***	0.6030***	0.7253***
Female headed household	-0.0191***	-0.0053*	-0.0066	-0.0196***	-0.0128***
Have child under 5 years of age	-0.1350***	-0.0917***	-0.1244***	-0.0924***	-0.1217***
Have older person above 59 years of age	-0.0040	-0.0059	0.0069	0.0071*	0.0002
Main occupation of head					
Wage labour	0.0105**	-0.0103**	0.0118	-0.0029	-0.0004
Government salaried	0.0028***	0.0092***	0.0239***	0.0240***	0.0102***
Non-government salaried	0.0067*	-0.0025	0.0089*	0.0043	0.0015
Business	0.0825***	0.0749***	0.1028***	0.0830***	0.0813***
Self-employed	0.0107**	0.0067	0.0159**	0.0085	0.0087***
Unemployed	-0.0090***	-0.0185***	0.0171*	-0.0020	-0.0077***
Female member has an occupation	0.0547***	-0.0003	0.0115*	0.0478***	0.0285***
Involvement in urban agriculture					
Grew vegetables	-0.0014	0.0042**	0.0180**	-0.0004	0.0023*
Location					
Tongi	--	--	--	--	0.1365***
Jessore	--	--	--	--	0.0292***
Mymensingh	--	--	--	--	0.0175***
Number of households	13664	11228	4413	3744	33049

Note: *** = significant at 1 percent level ($p < 0.01$)

** = significant at 5 percent level ($p < 0.05$)

* = significant at 10 percent level ($p < 0.10$)