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Demographic Analysis of People in Flood Prone Areas in Sri Lanka

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Abstract:
Floods, as a natural disaster that affects most of the Sri Lankans, undoubtedly have the biggest impact on the lives of Sri Lankans. Although floods affect all facets of life, including economic, social, cultural, and environmental factors, this study attempts to examine the demographic context of floods affecting people in flood-affected areas in Sri Lanka. Data were collected through questionnaires conducted with 440 households from three grama niladari divisions of Rathnapura divisional secretariate. The researcher chose this area as it was ideal for testing the hypothesis. 87% of households were affected by floods. The study further discovered that several other factors, including the employment status of the mother and father, income, and education level of parents. The results emphasize that most of the sample respondents were relatively low-income earners, and a high percentage of respondents within the sample have received at least some form of proper education, and in most cases, it is beyond the level of primary education. They also identified that the link between the educational level of the respondents in the sample and their income levels is substantially strong. This study recommended that the government take steps to secure these areas by implementing flood prevention methods. Those living in flood-prone areas must be moved to lands in other areas.

Keywords: *Employment status, household income, level of education, natural disaster, Rathnapura*

1. Introduction

Natural disasters are one of the main ways of disturbing a country's development process. Disasters mean a serious destruction of the functioning of a community or a society, causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. Although there are three types of disasters: natural disasters, man-made disasters, and technological disasters, natural disasters can be classified into three origins: hydrometeorological, geological, and biological. These natural disasters affect all sectors of an economy and hinder the continuity of the overall economic performance. Among the natural disasters, floods are one of the main ways of disturbing the economic performance in Sri Lanka.

Records show that in the past 34 years, 28 million people were affected by natural disasters. Occurrences of floods and landslides are higher in May, October, November, and December. 92% of the people affected by disasters are either affected by floods (48%) or droughts (44%) without taking into consideration the Tsunami. Extreme wind events are also responsible for affecting 6.5% of the disaster-affected people. The share of climatological disasters is 96%. The time series distribution with respect to people affected by disaster fluctuates from 0 to 4 million affected people as per the records. Furthermore, when we consider the Sri Lankan situation and the impact of natural disasters, we can see that droughts and floods have been the major causes of people's suffering for almost all years. The cyclical distribution of people affected by disasters has three peaks in May, August and November/December/January (even without taking the Tsunami into consideration). These peaks may have a direct correlation with the monsoon. The two peaks due to floods have a clear correlation with the monsoon rain, and the August peak caused by drought shows a relationship with the end of the southwest monsoon period.

Disasters appear to bring a variety of damage to education. Its impact on schooling especially generates detrimental results for poor people in developing countries. As UNESCO reveals, 69 million children worldwide are out of school due to war and natural disasters. For example, it reveals that education in Pakistan experiences a drop in enrolment ratio due to floods. This situation is severe in some districts of Sri Lanka due to their geographical characteristics. Rathnapura is one such district where floods affect the schooling of children in addition to the other types of results they have on the economy and society. This becomes serious when the number of days affected by flood in some villages or areas is high. Hence, floods can be considered one of the main disasters that adversely affect human capital formation in vulnerable areas. Therefore, this study examines the demographic context of flood-affected people in flood-affected areas in Sri Lanka with special reference to Ratnapura divisional secretariate.

2. Literature Review

While floods are the most common natural disaster, overall, an average of 131 floods affect human populations annually, with the majority (81%) occurring during or after the 1990s globally. Part of this increase can be explained by improved reporting and by the DFO reporting beginning in 1985. According to their view, there is a great variation in the number of events reported annually between EM-DAT and DFO. While the frequency of flood events has increased gradually over time, their impacts on human populations in terms of mortality and affected populations varied greatly between years and were often concentrated around large-scale events. According to the World Health Organization (WHO) regions, the Americas and Western Pacific regions have experienced the most flooding events, while the fewest have been reported in Europe. Deaths have been overwhelmingly concentrated in Southeast Asia, which accounted for 69% of global flood mortality, though both the Americas and Western Pacific had significant minorities of flood fatalities. According to their study, Western Pacific (59%) and Southeast Asia (35%) are the great majority of the flood-affected regions of the global total. When considered as an overall figure, the human impacts of floods in Europe, Africa, and the Eastern Mediterranean regions were limited; together, the regions accounted for no more than 8% of flood deaths and 4% of flood-affected populations, respectively.

Another study carried out on the impact of the flood on the human population shows that 2.8 billion people were reported to be affected by flood events between 1980 and 2009, including nearly 4.6 million rendered homeless. However, Doocy and others argue that these statistical figures likely substantially underestimate the true impact of floods on the human population because estimates of the total affected and homeless populations were reported in only 64.3% and 14.9% of events, respectively. Furthermore, Doocy has pointed out that the distribution of the number affected was highly skewed, with mean and median affected populations of 1,071,829 and 6,000 per event, respectively, which indicates that the median affected population may better reflect the impact of a typical flood event.

Also, bivariate associations between country-level characteristics and flood-related mortality from 1980 through 2009 have been presented. The findings of that study suggest that the proportion of events with high mortality (>50 deaths) has decreased over time. Income level was also significantly associated with flood mortality, where for both low— and lower-middle-income countries, a greater proportion of events fell in the medium and high death categories as compared to higher-income countries. Higher mortality events were concentrated in the Southeast Asian and Western Pacific regions.

When considering the findings of the above investigations, it can be pointed out that the human impact of floods is one of the most important discussions for development planning and organizations. On the other hand, not only the human impact but also the socio-economic impact of floods must be considered for development progress to become significant. Therefore, the dialogue on sustainable development plans is more sensitive. Socio-economic factors are a broad discussion; however, we chose one factor, such as human capital formation. In this context, we studied the impact of floods on human capital formation through education or any other human capital formation factors.

3. Methodology

The population of this study is people in flood-affected areas in Sri Lanka. Thus, the ideal solution would be to assess each and every household affected by floods in the whole country. However, given the enormity of the population, it was decided to take a sample from a specific geographical area that often faces floods to represent the country. The geographical area of the study was selected based on two criteria: the area having been continuously affected by floods for a considerable period of time and the area having a significant number of schools affected by floods due to their geographical location. Thus, the target population was selected from Rathnapura District, as it is one of the most frequently flooded areas in the country. The district is one of the regions that receive the highest rainfall in Sri Lanka.

The second step of the sampling procedure was selecting a divisional secretarial division in Rathnapura District. Rathnapura divisional secretariate division was selected out of seventeen (17) divisional secretariate divisions in the district, as it comprises the components needed for the study, such as socio-economic variance and types of flood affection. Rathnapura divisional secretariate division consists of fifty-three (53) grama niladari (GN) divisions. Three GN divisions, namely Rathnapura town, Muwagama, Weralupa and Dewalayagawa were selected as the third step of the procedure, for they were the divisions that best represented the study-related characteristics. Finally, households were chosen from a population of potential participants as the sample for the study. By employing a simple random sampling technique, 440 households were selected for the study sample. The researcher conducted a survey of households employing a structured questionnaire to collect data.

The study applied descriptive-analytical methods in four stages of the analysis; firstly, the simplest method of the numerical method of presenting data was used in the study in the forms of values and percentages. Secondly, the tables, which comprise simple-tabulation and cross-tabulation, are a method of analyzing data to organize, present, identify and compare the values related to variables of the study; they were used as a descriptive analysis method. Finally, the analysis was made using bar charts, column charts, pie charts, and line charts to identify the relationship and behavior of variables.

4. Results and Discussions

The sample survey of households based on gender reveals that 64% of the households are men-headed while the remaining households are women-headed households and the age range of these heads. Most household heads, accounting for 67%, are between the ages of 40 and 45, and the age distribution of the rest spreads around a mean value of 39.8 years. The results suggest that, although the structure of the families follows the common social practice of male-headedness, the decision-making process in these families is led mainly by the female partner; as revealed in survey data in 35% of the

male-headed households, the wife can be identified as the head of the household in decision-making. This trait is particularly noticeable in households in which the female partner is employed or self-employed because they play a dedicated role in improving the household economy as well as in maintaining the order of the household. According to the survey, the average size of a household is identified to be limited to approximately four members per family, which makes it safe to state that the sample consists mainly of nuclear families. In the study, we analyze household members through several dimensions. One member of the household is engaged in earning income, which is very typical and ordinary. In light of these, socio-economic factors, including the size and the dependents in the household, are also important. At least two members of a household are found living as dependents: members of 15 years or below the age of 15 years (below working age) and/or non-child members whose ages are 65 years or above. This indicates that at least one member in each household of the sample is engaged in educational work or activities, which makes him inevitably dependent. People who live away from the house doing educational activities tend to live as dependents on adults. When only one person in the family (who is, in most cases, the husband) is engaged in earning, he/she automatically becomes the head of the household and the partner (who is, in most cases, the wife), the dependent. The information presented here suggests that, in the selected sample, at least two persons have become dependents.

The income levels of the households have a considerably direct impact on the sample respondents' decision-making processes, and they have been used as the most important and decisive variable for the social science tests. In a range of the six different income groups, the highest percentage of respondents, i.e. 46%, belongs to the Rs.10,000 to Rs.25,000 per month. Similarly, the second highest percentage of respondents fall into the income category of Rs.25,000 to Rs.35,000 rupees per month, while only 5.6% of the respondents earn more than Rs.55,000 per month. According to the given information, most of the sample respondents are relatively low-income earners.

Out of all the household heads in the study sample, a majority have had no education above the level of grade 5, and as a percentage, it is 25%. The percentage of people who have not received formal school education is as low as 7%. However, the results emphasize the fact that a high percentage of respondents within the sample have received at least some form of proper education, and in most cases, it is beyond the level of primary education. The relationship between the level of education and the income level of the main income earner is a vital factor to be analyzed. Information in regard to the respondent's level of education has been acquired through several categories that include information about their income status. The following table 1 illustrates the relationship between the level of education and the income level of the main income earner.

Income Level	Level of Education					
	No Schooling	Up to Grade 5	Up to Grade 9	Up to O/L	Up to A/L	Graduate and Above
< 10,000	8.6%	42.7%	22.9%	14.3%	8.6%	2.9%
10,000-25,000	7.8%	25.6%	24.5%	21.6%	12.7%	7.8%
25,000-35,000	8.1%	18.9%	18.9%	24.4%	18.9%	10.8%
35,000-45,000	7.6%	15.4%	23.1%	23.1%	15.4%	15.4%
45,000-55,000	0.0%	0.0%	0.0%	16.7%	36.3%	47.0%
55,000 <	0.0%	0.0%	0.0%	30.8%	30.8%	38.4%

Table 1: Level of Education and Monthly Income

Out of all the categories, the educational level of most respondents who represent below 10,000 income level is only up to grade five, and, as a percentage, it is 42.7%. At the same time, a holistic analysis of the categories makes it conspicuous that respondents who belong to the categories of no proper education and education only up to grade five collectively hold more than 50% of the income level of below 10,000. In contrast, most of the respondents in the income category of Rs.45,000-55,000 have had education up to GCE Ordinary Level or above. Similarly, all the respondents in the highest income level, i.e. above Rs. 55,000, have received education up to GCE Ordinary Level or above, and at the same time, compared to other groups, a majority of respondents in this category – which is 38.4% as a percentage are degree or similar educational qualification holders. It is a noticeable speciality compared to the respondents in other income levels. The above information and its analysis indicate that the link between the educational level of the respondents in the sample and their income levels is substantially strong. The study reveals that most of the respondents employed in the government sector possess a graduate or equal level educational qualification, which is 47.1% of the total. Similarly, a percentage of 41.2% of respondents who have received education up to GCE Advance Level are also employed in the government sector. This can be identified as a result of certain recruitment regulations imposed by the government in terms of filling vacancies. Interestingly, most of the private sector employees in the sample studied only up to grade five or nine, and most of them were engaged in jobs such as providing security services or other minor jobs. In contrast, the respondents who engaged in business activities were educated only up to the GCE Ordinary Level, and a majority of 30.8% had not reached educational levels above that level.

Although all the self-employed respondents have had some form of proper education, a majority of 39.1% of respondents have not reached educational levels above the primary level. Similarly, the highest level of education reached

by the family heads who have chosen agriculture as their profession does not exceed grade six or nine; they have been unable to continue studies up to GCE Ordinary Level or above. Many heads who have chosen their profession to be masonry or carpentry or wood crafting have reached only the primary level of education. Further, a group of 18.25% in this employment category has had no proper education at all.

Categorizing the monthly expenditure of the households based on different patterns, followed by a meticulous comparison and analysis of data, contributes to a better comprehension of several standards of living. Collected data reveals that, in an average household, approximately an amount of Rs. 12695.00 is spent on food and food processing, as shown in the table below. The largest portion of the income is shared by this category when compared with other categories of expenditure.

Type of Expenditure	Average Amount (Rs.)
Food and food processing	12,695.00
Education	2,462.75
Fuel	2,394.00
Clothing	2,381.48
Other assets	2,113.56
Medical needs	1,651.25
Entertainment	1,345.35
Electricity and power requirements	1,222.41
Communication	952.73
Other	861.70
Furniture	718.86
House maintenance and construction	566.00

Table 2: Monthly Expenditure of Household

The categories of expenditure arranged in descending order in terms of monthly expenditure underline the fact that children's education is the second most spent category of expenditure; on average, it is Rs. 2,462.75 per month. Children's education is given priority because the number of children engaged in education is limited to one or two. As a percentage, it is between 20% and 70.50%. However, another significant feature observed in this sample is the expenditure on fuel, which is, on average, Rs. 2,394.00, a direct consequence of the comparatively high usage of vehicles and fuel-based services in Sri Lanka. The lowest expenditure in this sample is reported to be for house maintenance and construction, as they have already fulfilled their needs for houses. However, they generally allocate a sum of Rs. 566.00 per month for it. It can be concluded that an average household needs to spend approximately Rs. 29,365.00 per month. However, most of the households in the sample, as observed in the sample monthly expenditure, spend Rs. 19,500.00 per month.

Floods have a huge impact on the lives of ordinary people. The impact is powerful enough to damage their property and affect their livelihoods. This has become a general scenario during floods. The analysis of this sample is carried out on the victims of the floods, and the data will be reviewed in relation to several years close to these incidents. Damages to respondents' property during the flooding can be identified in three categories. First, it gathers data about the impact on the houses, which reveals the fact that 2014 was the year in which the respondents were most vulnerable to floods. The maximum estimated damage to the houses had been caused in 2014 and was approximately Rs.120,000. Eventually, the estimated monetary value given for the houses gradually declined with the decrease in the impact of floods; this can be proved through a comparative study of median data from the latter years.

Considering the financial effects of floods, the estimated monetary value for the damaged property has declined, which leads to the idea that the other impacts caused by floods have also gradually decreased. It is safe to suggest that the floods that occurred in 2014 caused the most severe damage, depending on the analysis that identifies the highest estimated monetary value given for damages in this particular year; the estimated monetary value for damaged properties was roughly Rs. 74,500.

Considering data on the damages caused by the vehicles, the highest median monetary value reported in the year 2014 was Rs. 90,500. Nonetheless, the analysis reveals that, compared to other years, 2014 is the year in which people in this sample had to spend the highest amount of money to recover their physical properties. This fact can be further strengthened by comparing the estimated monetary value with that of the other years, 2012 and 2013. The data collected from the sample can be reviewed in terms of the damages to property, loss of lives and effects on ordinary activity. The losses of family members, family members suffering long-term disabilities, and family members suffering short-term disabilities can be regarded as the three major scenarios discussed here. Approximately 08% of the households in the sample have experienced losses of family members, and 14% of them have family members who suffered long-term disabilities as a result of flooding. More than half of the flood victims, i.e., 56%, had suffered short-term disabilities. However, these figures were recorded in 2012, and a comparatively significant surge in these figures can be observed in 2013 and 2014. The collected information suggests that floods have had a huge influence on people's daily activities. Accordingly, it begs the question: how many working days of the household income earner have been lost due to floods? According to the responses, the median value of the lost days was 8. The information given by the respondents reveals that

the highest number of days they did not report to work, in mode value, is 7. However, when it comes to their financial loss due to flooding, most of the respondents have lost an amount of money, the median value of which is Rs. 7,565.00. The overall statistics suggest that the effects of floods are not limited to the loss of property; they also affect the daily activities of people.

5. Conclusion and Recommendations

According to the study, 92.5 % of heads of households have had some kind of education, which in turn indicates that the education level of the residents in the focused area is relatively high. Moreover, those who are living in the area place a priority on education, which is indicated by the fact that expenditure on education is the third highest budget allocation in monthly family expenses. Moreover, it was revealed that a significant number of families do not change houses, despite being affected by floods, because that would have a considerable impact on the child's education. Most of the sample respondents are relatively low-income earners. Special attention should also be directed to assistance and aid given to victims of floods and their quality and quantity. Although a number of governmental and non-governmental agencies assist flood victims, the public assessment of these interventions, apart from those on health and education, is usually negative. They often complain of delays in the arrival of food and other essential amenities and that there has been no mechanism to assist them in retrieving/replacing the damaged/lost documents. Previous studies and media reports indicate that a large number of documents essential for daily activities – from birth certificates to identification documents – are destroyed during floods. The destruction of these documents later makes it difficult for them to access the services provided by the state to assist flood victims, as they are unable to prove that they, too, were affected by floods. The researcher believes that the Ministry of Disaster Management should establish a Special Task Force for Disaster Mitigation to ensure the quality of the assistance and aid given to victims of floods. Although the Ministry of Defense and the Tri Forces play an important role in initial disaster assistance, things often get muddled as other activists/volunteers also step in. As private parties donate flood aid to various agencies, this often leads to corruption, replication and inefficient distribution of resources. Thus, if there is a significant possibility that an area might be affected by floods at any time of the year, this task force should prepare contingency plans. They should also set up mechanisms to prevent waste and corruption of resources and aid so that victims of floods receive the assistance they really deserve.

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