



Tsunami Impact on Demography - Sri Lanka

This book illustrates the impact of tsunami disaster on demography of Sri Lanka and thus those who are interested in studying the relationship between natural disasters and demography will find this book very useful. This book also provides a sound scientific base for the population planners to adjust their plans according to the demographic impact of the Tsunami disaster on future population growth. Most importantly, the methodology proposed to compute risk of death associated with disasters can be used to compute the same for other disaster affected areas. Furthermore, the social planners will undoubtedly find this study very useful because it reveals how elderly women become more vulnerable due to a natural disaster in the context of accommodation, livelihood and health aspects of the elderly population.

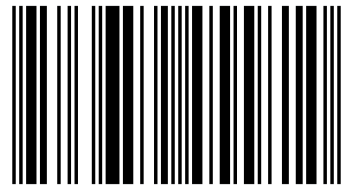
Manori K. Weeratunga

# The Impact of Tsunami Disaster on Demography of Sri Lanka



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978-3-659-45581-0

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Bibliografische Information der Deutschen Nationalbibliothek: Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über <http://dnb.d-nb.de> abrufbar.

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Bibliographic information published by the Deutsche Nationalbibliothek: The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <http://dnb.d-nb.de>.

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Coverbild / Cover image: [www.ingimage.com](http://www.ingimage.com)

Verlag / Publisher:

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OmniScriptum GmbH & Co. KG

Heinrich-Böcking-Str. 6-8, 66121 Saarbrücken, Deutschland / Germany

Email: [info@lap-publishing.com](mailto:info@lap-publishing.com)

Herstellung: siehe letzte Seite /

Printed at: see last page

**ISBN: 978-3-659-45581-0**

Zugl. / Approved by: Colombo, University of Colombo, 2010

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**THE IMPACT OF TSUNAMI DISASTER ON  
DEMOGRAPHY OF SRI LANKA**

By

K.D.M.S. K. Weeratunga

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## TABLE OF CONTENTS

TABLE OF CONTENTS.....	ii
LIST OF TABLES .....	vii
LIST OF FIGURES .....	ix
LIST OF MAPS.....	xii
LIST OF CASE STUDIES .....	xiii
ACKNOWLEDGEMENTS.....	xiv

### CHAPTER ONE: INTRODUCTION

1.1 Introduction.....	1
1.2 Demographic Changes .....	3
1.2.1 Changes in fertility.....	5
1.2.2 Changes in Mortality.....	6
1.2.3 Changes in Migration.....	6
1.2.4 Changes in Demography of the Family .....	6
1.3 Problem Statement .....	7
1.4 Rationale .....	7
1.5 Objective of the Study .....	14
1.5.1 Major Objective .....	14
1.5.2 Specific Objectives .....	14
1.6 The Setting.....	15
1.6.1 Galle District.....	17
1.6.2 Hikkaduwa DS Division .....	18
1.6.2.1 General Information .....	18
1.6.2.2 Housing.....	20
1.6.2.3 Divisional Specific Information .....	21
1.7 Organization of the Thesis.....	22
1.8 Conclusion .....	23

**CHAPTER TWO: CONCEPTUALIZATION OF NATURAL  
DISASTER AND DEMOGRAPHY**

2.1	Introduction .....	24
2.2	Influence on Fertility .....	24
2.3	Influence on Mortality .....	27
2.4	Influence on Migration .....	33
2.5	Influence on the Family .....	35
2.5.1	Extended family System .....	35
2.5.2	Single Parent Families and Female Headed Households.....	36
2.5.3	Elderly Population and their dependent Status .....	36
2.6	Evolutionary forms of fertility, mortality and migration with the Tsunami disaster .....	38
2.7	Conclusion .....	39

**CHAPTER THREE: SOURCES OF DATA AND METHODS**

3.1	Introduction .....	40
3.2	Nature of the Study .....	41
3.3	Significance of the Study Area .....	41
3.4	Data collection procedure .....	44
3.4.1	Observations on Mortality .....	44
3.4.2	Observations on Fertility .....	45
3.4.3	Observations of Migration .....	46
3.4.4	Observations On The Changes In Family Composition .....	48
3.5	Nature of the Secondary Data Used for the Study .....	49
3.5.1	Census and Vital Registration data .....	50
3.5.2	A survey conducted by the Department of Census and Statistics in the Tsunami Affected Areas .....	50
3.6	Limitations .....	52
3.7	Conclusion .....	52



**CHAPTER FOUR: INFLUENCE OF TSUNAMI DISASTER ON  
MORTALITY**

4.1	Introduction.....	53
4.2	Theoretical Perspectives .....	55
4.3	Mortality from 1968-2004 .....	57
4.4	Age Specific Mortality in the District before the Tsunami Disaster .....	59
4.5	Comparison of the Age Specific Mortality Before and After the Tsunami .....	61
4.6	Changes in Infant Mortality Rates .....	65
4.7	Cause-Specific Death Ratio .....	66
4.8	Risk of Death due to Tsunami .....	67
4.9	Changes Observed in Life Years .....	70
4.10	Impact on Population Growth.....	73
4.11	Conclusion .....	75

**CHAPTER FIVE: INFLUENCE OF TSUNAMI DISASTER ON  
FERTILITY**

5.1	Introduction.....	77
5.2	Theoretical Perspectives .....	80
5.2.1	Few Examples of Disaster related Fertility Changes.....	80
5.2.2.	Theoretical Perspectives on Fertility Change.....	81
5.2.3.	Community Influence, Replacement/Insurance Theory and Terror Management Theory .....	84
5.3	Demographic-Economic Relationships .....	86
5.4	Positive Impact on Fertility.....	90
5.5	Changes in Population Growth.....	91
5.6	Changes in the Total Number of Births.....	92
5.7	Changes in the Age-Specific Fertility Rates.....	99

5.8	Changing Fertility Behaviour .....	103
5.8.1	Age of Mother and Child Mortality.....	103
5.8.2.	Fertility Desires.....	104
5.9	Conclusion .....	112

**CHAPTER SIX: INFLUENCE OF TSUNAMI DISASTER ON  
MIGRATION**

6.1	Introduction.....	113
6.2	Literature Review.....	114
6.2.1	Migration and Displacement after the Disaster .....	114
6.2.2	Migration and Environment Hazards.....	116
6.2.3	Theoretical Foundations: Migration and Environment Hazards.....	118
6.2.4	Migration as a Response to Natural Hazards.....	125
6.3	Magnitude of Displacement.....	131
6.4	In-Migration to Resettlement Areas .....	136
6.5	Place of Origin of the Migrants .....	140
6.6	Occupation Before Migration .....	143
6.7	Present Occupation of the Migrants.....	144
6.8	Receptiveness of the Host Community.....	145
6.9	General Problems at Place of Destination .....	150
6.10	Conclusion .....	152

**CHAPTER SEVEN: INFLUENCE OF THE TSUNAMI DISASTER ON  
THE FAMILY STRUCTURE**

7.1	Introduction.....	154
7.2	Vulnerability due to Tsunami Disaster .....	155
7.3	Factors influencing the Family Size .....	158
7.4	Changing Family Structure.....	160
7.5	Elderly Population and their Dependent Status.....	162
7.6	Elderly Population and their Health Status.....	163
7.7	Conclusion .....	165

**CHAPTER EIGHT: CONCLUSION: TOWARDS AN  
UNDERSTANDING OF THE IMPACT OF TSUNAMI DISASTER  
ON DEMOGRAPHY OF SRI LANKA**

8.1	Introduction.....	166
8.2	Achievement of the Study Objectives .....	167
8.3	Theoretical Implications .....	173
8.4	Methodological Implications .....	176
8.5	Policy Implications .....	177
8.6	Future Research Directions.....	179
8.7	Conclusion .....	180

<b>BIBLIOGRAPHY .....</b>	<b>181</b>
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## LIST OF TABLES

### TABLE

1.1	Impact of Tsunami Disaster 26 <sup>th</sup> December 2004 .....	2
1.2	Impact of Natural Disasters in Asia and the Pacific .....	12
1.3	Total Number of Reported Disasters by Continent and by Year( 1991-2001).....	13
1.4	Total Number of People Reported Killed by Disasters by Continent and by Year ( 1991-2001).....	13
1.5	Population in the Affected Census Blocks before and after Tsunami, Galle District.....	17
1.6	Tsunami Affected DS and GN Divisions in Galle District .....	18
1.7	General Information in Hikkaduwa Divisional Secretariat as at 2001 .....	19
1.8	Impact of Tsunami Disaster Hikkaduwa DS Division .....	20
1.9	Housing Situation Hikkaduwa DS Division.....	20
2.1	Available Educational and Public Health Services .....	32
2.2	Vulnerable Groups in Hikkaduwa .....	37
3.1	Place of origin of the Resettlers in Galagodawaththa Resettlement Scheme .....	47
4.1	Impact of Tsunami Disaster 26 <sup>th</sup> December 2004 .....	54
4.2	Distribution of Dead/Displaced Persons by their employment which they have engaged before the Tsunami Disaster .....	64
4.3	Risk of Death, 2001 prior to Tsunami .....	68
4.4	Changes in Life Years, 2001-2005 .....	71
4.5	Changes in Life years females 2001-2005.....	71
5.1	Population in 2011 in the absence and presence of Tsunami Disaster .....	92
5.2	Number of Children lost due to Tsunami by age of mother...	104
5.3	Number of Children desired by age of mother .....	104

7.1	Orphans in the Hikkaduwa DS Division .....	155
7.2	Vulnerable Groups in Hikaaduwa DS Division.....	156
7.3	Problems encountered in the social protection .....	157

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## LIST OF FIGURES

### FIGURE

1.1	Demographic Transition in Sri Lanka, 1900-2006.....	3
2.1	Crude birth rate, Sri Lanka, 1960-2000.....	25
2.2	Annual percentage decline of the TFR, 1953-1991, Sri Lanka.....	27
2.3	Probabilities of massive fatal discontinuities during the next 50 years.....	29
2.4	Impact on Tsunami on future population growth.....	31
2.5	Conceptualization of Disaster and Demography.....	39
4.1	Mortality in the absence of the Tsunami disaster in Galle District.....	58
4.2	Mortality with the Tsunami Disaster in Galle District.....	58
4.3	Age-Specific Mortality Rates for males, Galle District 1981,1991, 2001.....	59
4.4	Age-Specific Mortality Rates for females, Galle District 1981,1991 & 2001.....	60
4.5	Distribution of Tsunami Deaths for Males in Galle District....	62
4.6	Distribution of Tsunami deaths for Females in Galle District..	63
4.7	Distribution of deaths by affected DS Divisions in Galle District.....	64
4.8	Infant Mortality Rate, Galle District, 2001,2004 and 2005.....	66

4.9	Risk of Death, Galle District by DS Division pre and post Tsunami situation.....	70
4.10	Life table Survivors at exact age x, Males , Galle District, 2001 & 2005 .....	72
4.11	Life table Survivors at exact age x, females, Galle District 2001,& 2005 .....	73
4.12	Estimates of Population by Incorporating Tsunami Male Deaths, Galle District .....	74
4.13	Estimates of Population by Incorporating Tsunami Females Deaths, Galle District .....	75
5.1	Trend in Total Number of Births, Galle District 2001-2006....	93
5.2	Age-specific Female population in the Child bearing ages 2001-2006 .....	96
5.3	Age-specific Female Population in the Child bearing ages, Galle District 2001 & 2006.....	97
5.4	Age-specific fertility Rates, Galle District in the absence of Tsunami Disaster 2004,2005, 2006 .....	100
5.5	Age-specific fertility rates, Galle District ( after incorporating Tsunami deaths).....	101
5.6	Age-specific Fertility Rates, Galle District 2001 & 2006 ( after incorporating Tsunami deaths).....	101
5.7	General fertility rate, Galle District 2001 & 2006.....	102
5.8	Fertility desire before and after Tsunami disaster .....	105

6.1	Displaced Population due to Tsunami disaster by District.....	132
6.2	Displacement due to Tsunami disaster by DS Division, Galle District.....	133
6.3	Displacement Pattern of the Population in Hikkaduwa DS Division by each GN Division.....	135
6.4	Pre-Tsunami population and displaced population within and outside GN Division.....	136
6.5	Immigration to resettlement area .....	137
6.6	Migration household population in Galgodawaththa Scheme by place of Origin.....	141
6.7	Whether satisfied with the new Settlement .....	142
6.8	Percentage distribution of Occupational status of sampled migrants .....	144
6.9	Opinion about the host community.....	145
6.10	Difficulties faced by the migrants.....	147
6.11	General problems at the destination.....	150
7.1	Reasons for not moving with the family in to resettlement area .....	158
7.2	Problems faced by the nuclear families in the resettlement area .....	160
7.3	Changing family structure, pre-Tsunami and post Tsunami situation.....	161
7.4	Reasons for re-marriage.....	162
7.5	Health problems of the Elderly Population.....	164



## LIST OF MAPS

### Map

1.1	Tsunami Affected DS Divisions in Sri Lanka .....	3
1.2	Galle District in Sri Lanka .....	16
1.3	Hikkaduwa Ds. Division in Galle District .....	16
3.1	Tsunami affected GN divisions in Hikkaduwa DS division.....	43
4.1	Number of reported deaths due to Tsunami disaster by district.....	55
4.2	Number of reported displaced persons due to Tsunami disaster by district .....	55
4.3	Changes in risk of death before and with the Tsunami disaster .....	69
6.1	Population in the affected census blocks before and after Tsunami 2004 by affected DS divisions, Galle district .....	134
6.2	In-Migration to Resettlement Schemes .....	138

## LIST OF CASE STUDIES

### Case Study

5.1 .....	94
5.2 .....	95
5.3 .....	98
5.4 .....	99
5.5 .....	105
5.6 .....	106
5.7 .....	107
5.8 .....	109
5.9 .....	110
5.10 .....	111
6.1 .....	139
6.2 .....	142
6.3 .....	147
6.4 .....	148
6.5 .....	151

## ACKNOWLEDGEMENTS

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My sincere gratitude to my Supervisor Professor Lakshman Dissanayake, Dean of the Faculty of Graduate Studies, University of Colombo, for his guidance and strong moral support, without which this research would have not materialized. The quality of this work would have been significantly reduced without the careful perusal of Professor Lakshman Dissanayake.

I also would like to thank Professor Indralal de Silva, Head of the Department of Demography, University of Colombo, for invaluable direction, guidance and support.

I also should thank Mr Nimal Gunatilake, Senior Lecturer, Department of Geography, University of Colombo, for his assistance in the preparation of maps.

I also would like to thank Ms. Susunatha Ranadeera, Deputy Director( Statistics), Registrar General Department for her kind cooperation in collecting relevant information, the Staff of the Registrar General Department and officials of the Department of Census and Statistics for their assistance in collecting relevant information. I would also like to thank the District Secretary of Galle District, Divisional Secretary of the Hikkaduwa DS Division, staff of Hikkaduwa Divisional Secretariat, Grama Niladari's of the Affected GN Divisions in Hikkaduwa DS Division and all the villages in the affected GN Divisions who helped me to successfully

complete this task. Their invaluable support helped me to produce a document of this quality.

A special word of appreciation is extended to Mr. Tirimadura Chandrasena de Silva, Grama Niladari of the Galagodawaththa Housing Scheme, the community leaders who gave me tremendous support and the villages who supported me by giving relevant information and spending valuable time with me.

I also should thank Ms. Ruki Salgado, who is always giving me moral support and editing the thesis, Charitha Shivanthi , Mithila Therani ,Amali Kaluthantiri, Saliya Sandaruwan, Suranji, and Kalpani who were my research assistants and helped me in successful in this task

I would like to thank my family for their love and support through this seemingly endless process. Especially, my husband Lakmal Weeratunga, whose personal courage, valuable suggestions and confidence was always an inspirational. My heartfelt appreciation is extended to my parents for their various supports. Last, but not least, I want to thank my little son, Yesith Dinsara Weeratunga for his support during this extremely stressful time.

# Chapter One

## Introduction

---

### 1.1 Introduction

The main Objective of this study is to examine the impact of the Tsunami disaster on the demography of Sri Lanka. In doing so, this study attempts to examine what changes can be observed in relation to fertility, mortality and migration behavior among the Tsunami affected population and also the demography of their families. Disasters have a large impact on the human population and great destruction has occurred worldwide. Due to the scale of and frequency of disasters, both environmental and man-made, in the contemporary world, its inhabitants are becoming increasingly vulnerable. From Tsunamis and earthquakes to floods and famines from technological and industrial disasters to epidemics humankind is never threatened by the forces of nature and their alterations by anthropogenic factors (Sinha 2006)

In Sri Lanka, the official records indicate that the 1142 villages in 13 districts were affected by the Tsunami disaster, which occurred on 26<sup>th</sup> December 2004 (Department of Census and Statistics, 2006) This is regarded as the natural disaster with the most loss experienced by the country in its recent past. Although other natural disasters, such as cyclones, floods and earthquakes have been recorded to have transpired earlier, the magnitude of the Tsunami outweighed all previous occurrences. Therefore, the people of the country were shocked and the Government also was unable to bear such a big disaster on the spur of the moment. A large number of people died, were injured and their resources (such as

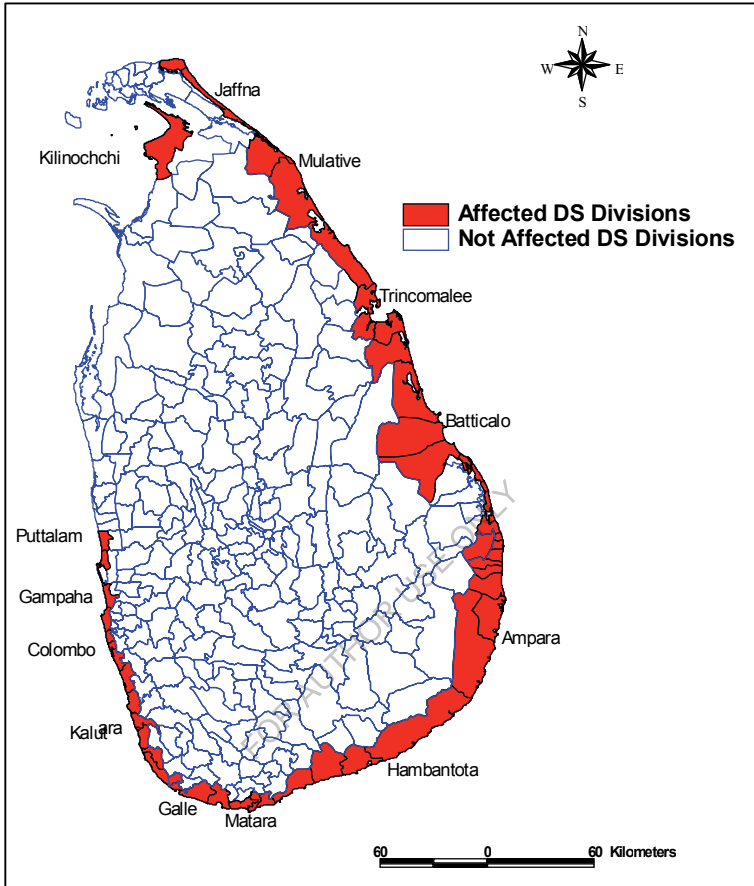
buildings, infrastructure, houses etc), were damaged due to the disaster. This has affected mainly the coastal areas of the Island in the following manner.

**Table 1.1: Impact of Tsunami Disaster 26th December 2004**

<u>District</u>	No. of Families Affected	No. of Families Displaced	Number Displaced			No. of Deaths	No. Injured	No. Missing
			In Camps	With Friends & Relatives	Total			
Jaffna	13,485	10,640	11,360	28,760	40,120	2,640	1,647	540
Mullaitivu	2,295	318	305	1,298	1,603	560	670	1
Kilinochchi	n.a.	6,007	11,993	10,564	22,557	3,000	2,590	552
Trincomalee	30,130	27,746	19,915	62,084	81,559	1,078	n.a.	337
Batticaloa	63,717	12,494	26,889	35,957	62,846	2,840	2,375	1,033
Ampara	38,624	n.a.	73,324	n.a.	73,324	10,436	120	876
Hambantota	16,991	3,394	574	17,168	17,742	4,500	361	963
Matara	20,675	2,904	3,202	8,996	12,198	1,342	6,652	613
Galle	23,174	1,472	4,507	123,247	127,754	4,216	313	554
Kalutara	6,905	6,905	3,261	24,452	27,713	256	400	155
Colombo	9,647	5,290	5,812	25,885	31,693	79	64	12
Gampaha	6,827	308	876	573	1,449	6	3	5
Puttalam	232	18	66	n.a.	66	4	1	3
<b>Total</b>	<b>232,677</b>	<b>79,431</b>	<b>161,684</b>	<b>333,984</b>	<b>500,666</b>	<b>30,959</b>	<b>15,196</b>	<b>5,644</b>

Source: <http://www.cenwor.lk/TsunamiStat.html>, Department of Census and Statistics 2005

**Map 1.1 Tsunami Affected DS Divisions in Sri Lanka**



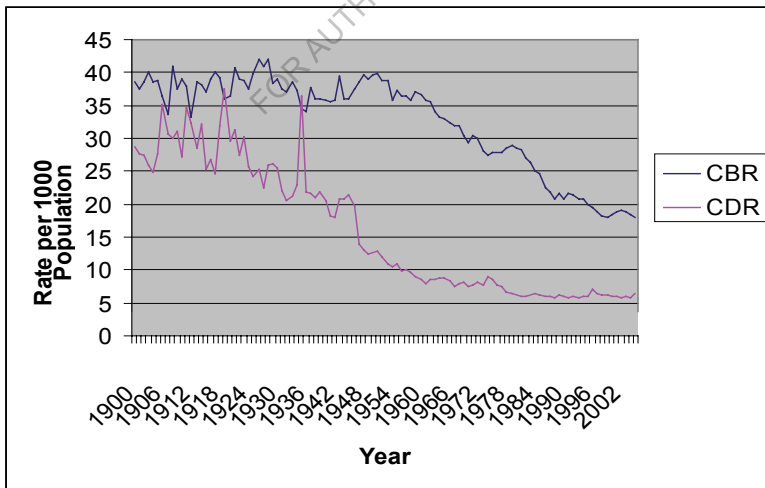
Source: Colombo University Community Extension Centre, 2005

## 1.2 Demographic Changes

Although Sri Lanka has experienced gradual changes in mortality and fertility as predicted by the demographic transition theory, this natural disaster may have produced some imbalance with regard to both levels and

patterns of fertility and mortality in the affected areas. In addition, it may have also influenced migratory patterns, as thousands of people were displaced due to this disaster. It is also predictable that these changes may have influenced the changes in family structures since deaths and displacement can have a significant impact on the family structures. There is also a need to look at how displacement discriminates women since they become more vulnerable with displacement (UNICEF, 1998). This is important because the level of fertility in such a situation can show a different behavioral pattern. It has also been noted that the displaced women who have adapted to a new role during displacement may face special difficulties returning to a social environment characterized by gender discrimination and sexual exploitation, and which does not recognize their new role in the social structure.

**Figure 1.1 Demographic Transition in Sri Lanka, 1900-2006**



Source: Data Obtained from Department of Census and Statistics and Registrar General Department



It is quite interesting to see whether fertility and mortality levels observed during the past are compatible with those predicted by the demographic transition theory. According to the above figure (Figure 1.1), it is visible that mortality and fertility were declining. The above figure (Figure 1.1) also exhibits that Sri Lankan mortality and fertility levels are very much compatible with the stages suggested by the demographic transition theory. It is also apparent that fertility has been declining continuously from 1960s but some fluctuations in that trend are observed during the late 1970s and early 1980s. No one has ever studied whether that has had any impact on the rapidity of the fertility decline from the late 1970s or, in other words, what could one expect about fertility in the absence of such a peak observed in that particular period. In addition, if one looks at the stability observed in relation to mortality after 1960s, it is quite discernible from the above figure that a little peak has appeared during the early 1970s. What happens to mortality if that peak is absent? Isn't it interesting to address these issues? These little obstacles can delay the process of fertility and mortality and also can have a significant impact on family structures.

### 1.2.1 Changes in Fertility

As mentioned by Dissanayake (1995), the fertility transition first occurred in the country where there were western influence for longer periods of time, starting especially from the South western part of the country. Since the fertility transition in Sri Lanka started in the early 1960's, by the time of the disaster, many changes may have occurred, and it may be quite interesting to examine those changes; especially in the Tsunami affected districts.

### 1.2.2 Changes in Mortality

In relation to changes in mortality, it is quite important to study the risk of deaths in the Tsunami affected areas. This will provide an opportunity to obtain a thorough understanding of the level of risk of deaths of the affected areas along the coastal line, which may minimize the effect of future disasters of this nature. In addition, similar investigations to the fertility study mentioned above can be carried out for the study of mortality as well.

### 1.2.3 Changes in Migration

In the case of migration, one needs to investigate how the Tsunami disaster affected people who were displaced and whether it resulted in a temporary or permanent change in the place of residence. In this case, it is quite important to examine the displaced, as well as the host communities, in the resettlement areas. Their characteristics and adjustments to the environment provide a unique opportunity to add a new dimension to internal migration phenomena in Sri Lanka. The demographic implications arising from such a migration pattern will have a substantive impact on policy formulation.

### 1.2.4 Changes in the Demography of the family

It appears that family composition and the type of family have changed in the Tsunami affected areas, due to the deaths taken place during the Tsunami. The available information suggests that many families lost their breadwinners, elderly people, spouses and children. Additionally, many Children have lost their parents. This has caused an increase in the

number of single parent families and also the number of orphan children. In addition, the structure of the family has started to change because of the loss of other family members. It is also visible that there is a possible shift from the state of extended family to a state of nuclear family due to some socio-economic factors, as well as housing policies in the distribution of permanent houses. Therefore, it will be interesting to investigate the magnitude of the demographic changes taking place after Tsunami and analyze the factors causing such changes and to map these changes in order to identify the spatial variation of such changes by way of this research.

### 1.3 Problem Statement

Since Sri Lanka is in the fourth stage of the demographic transition which is characterized by sustained decline of fertility and the stable level of mortality, unexpected natural disasters like the occurred Tsunami can have a significant impact on the demographic situation of the country. Major reason for this is the occurrence of large number of deaths and displacement of thousands of people where fertility is at the lowest levels. Therefore, one might be interested to see the influence of this huge disastrous situation on the demographic situation in the country and also the nature of the effects observed in relation to all demographic components and the changes in the family structures.

### 1.4 Rationale

The number of people affected by natural disasters in the world appears to have increased in considerable amounts over the past few decades. There is also evidence that costs incurred as damages and also in

recovery from natural disasters have accelerated in recent years, mainly due to the magnitude and frequency of incidents. This has inevitably disturbed rapid demographic and economic growth patterns and also the spending capacities of infrastructure development initiatives for maintaining the balance between ecosystems. This has in turn, increased the frequency or severity of some natural disasters, such as floods and droughts due to the absence of adequate measures being in place to curb the impact of such occurrences. Developing countries, especially their most densely populated regions, suffer the brunt of natural disasters. Between 1990 and 1998, 94 percent of the world's 568 major natural disasters and more than 97 percent of all natural disaster-related deaths were in developing countries. In Bangladesh alone, three storms, four floods, one Tsunami, and two cyclones killed more than 400,000 people and affected another 42 million. In southern Africa in 1991-92, Malawi, South Africa, Zambia, and Zimbabwe experienced severe droughts. In Latin America and the Caribbean major natural disasters associated with El Nino, Hurricane Mitch, Hurricane Georges, and the Quindio earthquake in Colombia claimed thousands of lives and caused billions of dollars of damage between 1995 and 1998. In 1998 severe flooding of the Yangtze River caused devastation in China, and a large earthquake occurred in Armenia. Another long series of disasters struck in 1999- a major earthquake in Turkey, a cyclone in Orissa, India, floods in central Vietnam, torrential rains and catastrophic mudslides in parts of Venezuela, floods in Mozambique (Sinha, 2006)

The catastrophic Tsunami disaster that struck the coastal areas of several South Asian and South East Asian countries including Sri Lanka on 26<sup>th</sup> December 2004 left a trail of destruction in terms of human lives, properties, livelihoods and sensitive eco system of the affected countries on

varying scales. Apart from the physical damages the severe impact of the Tsunami on the family system in the affected areas called for concerted efforts at several fronts so as to heal trauma suffered by thousands of people particularly children.

In the case of Sri Lanka, the most affected country after Indonesia, the severe shock and anguish caused by the deadly Tsunami were so immense, that it took a few days for the people to recover their senses. More than 30,000 people perished within a few hours and thousand were reporting missing a large number of buildings, houses, schools and government officers were wiped away, while other buildings suffered severe damages. Apart from destroying coastal tourism infrastructure and the economically valuable coastal eco system, the Tsunami displaced thousands of people and deprived them of their livelihoods. In the fisheries sector alone the loss of employment is estimated to be around 100,000. Thirteen of the fourteen coastal districts of the country; namely Jaffna, Kilinocchci, Mullativue, Trincomalee, Batticaloa, Ampara, Hambantota, Matara, Galle, Kalutara, Colombo and Gampaha, were affected by this disaster. The 2004 Tsunami, the worst ever- natural disaster in living memory of Sri Lanka, exposed the sheer inadequacy of the disaster management mechanism of the country and the need for a streamlined mechanism to be set in place.

Contemporary analyses of major trends and implications of natural man-made and hybrid disasters suggests that all kinds of disasters have grown in terms of loss of life there is a significant shift displaying more loss of life in the 1980's than in the 1990's. In terms of disaster and affected people, about 50% more people were impacted by some kind of disaster in the 1990's than the cases in the 1980's(Singhe, 2006). Disasters

caused by climate/water experienced a growth in the 1990s, while the numbers of geophysical disasters remaining rather steadily during 1980's and 1990's. In the 1990's, disasters such as droughts, windstorms and floods collectively resulted for about 90% of total loss of life from all kinds of disasters which transpired during the decade. Floods emerged as the most widespread natural disaster, contributing to two thirds of the total people affected, but in terms of causing death, they share only 15% of all deaths due to natural disasters (Sinha, 2006)

There were studies carried out on disasters. Most of the studies were about socio-economic implications. However, it must be noted that both natural and man-made disasters have had a great impact on demography.

Although natural disasters influence human population in many ways, still no significant study has been carried out to map the changes that have occurred in relation to demography in disaster affected areas. Therefore, this research should benefit those interested in this area of study. For example, the 1997-1998 El Nino even affected virtually every region. Eastern Africa suffered drought and unusually high rainfall and south East Asia and North America experienced abnormally warm periods. South Asia had drought while Latin America and the Caribbean had unusually high rainfall and droughts( Singhe, 2006). The pacific island experienced unusually high rainfall. The global socio-economic impacts were varied. Following examples show the magnitude of the influence of natural disasters on human population.

- More than 24,000 people died due to high winds, floods or storm tides that occurred during intense storm
- More than 110 million people were affected and more than 6 million people were displaced as community infrastructures including

housing, food storages transport and communications were lost during the storm

- Direct economic losses exceeded US\$ 34 billion.
- Water logging of fields reduced agricultural production in many regions; in others, the absence of storm and rain led to prolonged dry spells, loss of crops and reduction in water supplies.
- Wildfires were more frequent and widespread during extended dry period.
- Increased incidence of disease followed the prolonged disruption to weather and rainfall patterns that resulted in contamination of water supplies or a more favorable environment for disease- carrying insect vectors.

Source: WMO 1999, UNU 2001

According to the above information it is clear how natural disasters have influenced the human population, causing a direct impact on the lost of human lives. Conversely, there are other impacts that can happen as a result, such as creating vulnerable populations; single parent families, more widows, livelihoods losses, property losses, migration etc. The demographic impact of the disaster is very high.

The 1999 Earthquake in ISMIT, Turkey on 17<sup>th</sup> August, had a magnitude of 7.4-7.8 on the Richter scale in the surrounding areas. Damages from the earth quakes were estimated at more than US\$ 13 billion. More than 15,000 people were killed, 25,000 others were injured and 600,000 people were left homeless. The earthquake was blamed for increasing the national account deficit of some US\$ 3 billion in 1999-2000 (equivalent to about 1.5 percent of the GNP). A significant part of the damage could have been avoided had local building codes been effectively

implemented. Many new buildings had not been properly designed, had not been built on foundations strong enough to resist earthquakes, and had not been sited in areas where the effects of earthquakes would have been diminished (ISDR 1999).

**Table 1.2: Impact of natural disasters in Asia and the Pacific 1972-2000**

	Number of killed ( thousands)	Number of affected ( thousands)	Damage ( US\$1000)
South Asia	761	2164034	60881
South east Asia	73	284074	33570
Northwest Pacific and East Asia	606	1447643	317174
Central Asia	3	4895	986
Australia and New Zealand	1	15761	21900
South Pacific	4	4061	3139

Source: IPCC, 1998

Most of the countries in the Northwest Pacific and East Asia sub region and the Pacific Island countries were particularly vulnerable to climate change and associated sea-level rise due to increased human settlements and increased industrial infrastructure located in the coastal or lowland areas. For the small island developing states, climate change and extreme weather events may also have dramatic impacts on terrestrial biodiversity, subsistence cropping and forest food sources ( IPCC 1998). Following table shows the total number of reported disasters, and total number of people reported killed by disasters. However, Asia has reported highest number of disasters and killed people during 1991-2001.



**Table 1.3: Total Number of reported Disasters, by continent and by year (1991 to 2001)**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
<b>Africa</b>	52	54	48	57	57	59	55	84	143	195	804
<b>America</b>	116	88	94	81	97	93	99	112	135	142	1,057
<b>Asia</b>	210	162	220	182	171	173	193	202	238	284	2,035
<b>Europe</b>	62	51	46	69	62	53	60	65	78	118	664
<b>Oceania</b>	14	12	14	17	8	17	15	18	15	13	143
<b>High human development</b>	125	95	106	92	96	84	111	103	111	179	1,072
<b>Medium human development</b>	269	215	259	262	237	245	250	290	381	438	2,846
<b>Low human development</b>	60	57	57	52	62	66	61	88	117	165	785
<b>Total</b>	454	367	422	406	395	395	422	481	609	752	4,703

Source: EM-DAT, CRED, University of Louvain, Belgium

**Table 1.4: Total Number of people reported killed by disasters, by continent and by year (1991 to 2000)**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
<b>Africa</b>	2,660	4981	1637	3104	2932	3484	3903	7092	2675	5610	38078
<b>America</b>	2208	1748	4606	2925	2622	2530	2753	22944	33948	1757	78041
<b>Asia</b>	163758	13414	22769	13362	74975	69679	71113	82274	75890	11056	598290
<b>Europe</b>	1160	2089	1159	2340	3366	921	1166	1429	19448	1417	34495
<b>Oceania</b>	307	6	120	103	24	111	398	2227	116	205	3617
<b>High human development</b>	1734	825	1853	2484	7827	1631	1800	2151	4398	1683	26387
<b>Medium human development</b>	24841	15952	23758	15870	17934	15437	18470	44825	71015	12563	26065
<b>Low human development</b>	43518	5460	4680	3480	58158	59657	59063	68990	56664	5799	465469
<b>Total</b>	170093	22238	30291	21834	83919	76725	79333	115966	132077	20045	752521

Source: EM-DAT, CRED, University of Louvain, Belgium

The massive impact of the Asian Tsunami had on people and the environment has been outlined in the first significant report of the disaster. The United Nations report on the Tsunami disaster states that around

250,000 people died, describing the 26<sup>th</sup> December tragedy as “ among the worst in the history”.

In Sri Lanka, about 36,000 people died from the Tsunami disaster. It happened in 13 districts in the country and it was the worst natural disaster occurred so far in the country. Although natural disasters happened in various ways, ultimately it affects people’s livelihood directly. Therefore, it is very important to study the implication emerging from such natural disasters. Such a study will unearth some important reasons behind demographic implications, which have a great bearing on affected people. It will also be very useful for policy makers to reduce the disaster effects and uplift the lives of the affected population in various ways.

## 1.5 Objectives of the Study

### 1.5.1 Major Objective

The primary objective of the study is to examine the impact of Tsunami disaster on the demography of Sri Lanka.

### 1.5.2 Specific Objectives:

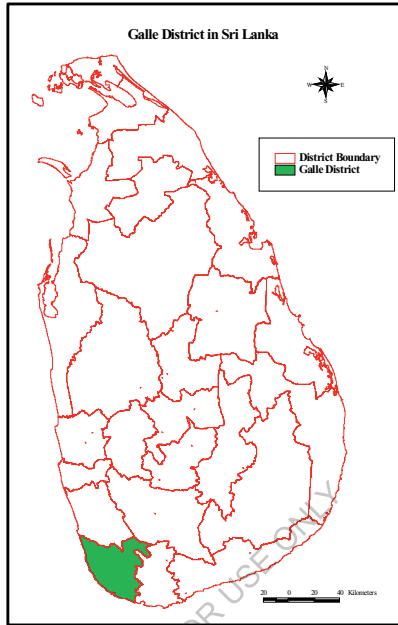
- Examine the changes in relation to mortality among the Tsunami affected population in comparison with pre-Tsunami situation
- Examine the effects of mortality occurred due to Tsunami disaster on the future population growth
- Examine the risk of death occurring due to Tsunami at small-area population level and see whether it is different from the pre-Tsunami situation
- Examine whether the Tsunami situation can lead to increase in fertility during the subsequent Tsunami post Tsunami years

- Explore whether women in the childbearing ages change their fertility behaviour after a time lag during the post-Tsunami disaster years.
- Examine whether Tsunami disaster has influenced the internal migration pattern.
- Examine whether migration to resettlement areas occurred due to Tsunami disaster has had any impact on the socioeconomic mobility of the migrants.
- Examine whether Tsunami disaster has influenced the family size, structure and dependant status of the affected communities.

## 1.6 The Setting

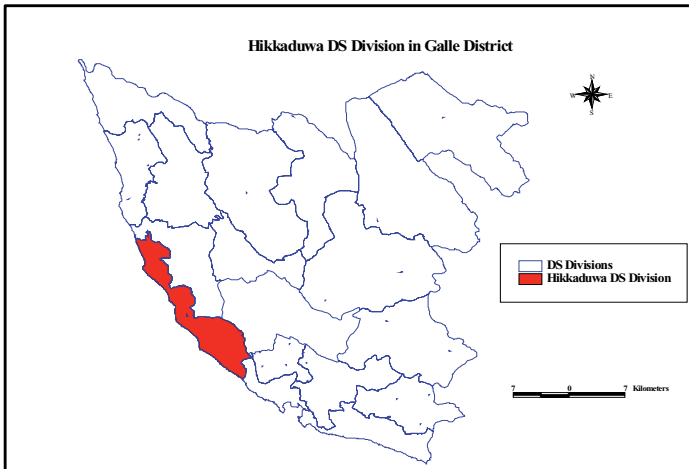
In order to study the impact of the Tsunami disaster on the demographic situation in Sri Lanka, it was decided to choose a district and a divisional secretariat division (DS division) that were severely affected by the Tsunami disaster. It was also determined to perform a semi-anthropological type research in this particular area since it is proven to be an effective research methodology which will enable to obtain greatest possible results in the context of ascertaining the significant impact of the Tsunami disaster on future changes in the demographic components. Consequently, the Galle District and the Hikkaduwa DS division were selected as some worst Tsunami affected areas of Sri Lanka

**Map 1.2**



Source: Data obtained from Department of Census and Statistics

**Map1.3:**



Source: Data obtained from Department of Census and Statistics

### 1.6.1 Galle District

Galle district is positioned in the Southern Province of Sri Lanka. There are three districts in the Southern Province and Galle district is one of them. Galle district consists of 18 DS divisions and 895 Grama Niladhari (GN) divisions. It is located along the coastal tip of Sri Lanka. As indicated earlier that the District of Galle was among the worst affected areas by the Tsunami of 26<sup>th</sup> December 2006.

**Table 1.5: Population in the affected Census Blocks before and after Tsunami, Galle District**

Number of GN Divisions		Number of Census Blocks		Number of Persons in Affected Census Blocks		
Total	No. of Affected	Total	No. of Affected	Before Disaster	Presently within the GN Divisions	Presently outside the GN Divisions
363	132	792	488	114,533	89,657	24,992

Source: Department of Census and Statistics, 2006.

Above table demonstrates the severity of damages to Galle district by the Tsunami disaster. Altogether 132 GN divisions in Galle district were affected by the Tsunami. The census blocks affected by the disaster are also substantial in the Galle district. Table 1.5 shows that 488 census blocks out of the total census blocks of 792 were affected by the disaster. It clearly illustrates that the Galle district was the most severely damaged by the disaster. There were 114,533 persons living before the disaster but it appears that 24,992 were displaced with the disaster outside their former

GN divisions. The people affected by the Tsunami disaster also lost their belongings, livelihoods, houses, properties etc. In addition, schools, shrines, fauna and flora were also adversely affected by the disaster. People were left with sorrow, misery and wretchedness in the wake of the Tsunami disaster.

**Table 1.6: Tsunami-affected DS and GN Divisions in Galle District**

<b>DS Division</b>	<b>Ambalangoda</b>	<b>Balapitiya</b>	<b>Bentota</b>	<b>Galle four Gravetes</b>	<b>Habaraduwa</b>	<b>Hikkaduwa</b>
Affected GN Divisions	04	21	08	22	28	58
Damaged Houses	595	2574	46	2066	1668	5696

Source: Department of Census and Statistics, 2006.

Table 1.6 shows the Tsunami affected DS and GN Divisions in Galle district. It is apparent from the table that most severely affected DS division was Hikkaduwa DS Division. In this division, 58 GN divisions and 5696 houses within those divisions were damaged. In addition, however Habaraduwa, Galle four Gravates, Balapitiya, Bentota and Ambalangoda areas were also adversely affected but fortunately not to the level of Hikkaduwa.

## 1.6.2 Hikkaduwa DS Division

### 1.6.2.1 General information

As shown in table 1.6, Hikkaduwa is regarded as the worst affected DS Division in the Galle District. The Hikkaduwa DS Division spreads from the 15<sup>th</sup> milepost in Galle and extends 1.5 KM to the interior.

Hikkaduwa DS Division borders Ambalangoda from North, Ambalangoda and Baddegama from the East, Galle Four Gravetes from the Southeast and Indian Ocean from the West. The land area of the Division is 63 Sq km, which is 4% of the total land area in the Galle District (*Sampath Pathikada*, 2000). Table 1.7 exhibits general information relating to Hikkaduwa DS division which provides a useful understanding about the situation before the Tsunami disaster. Most importantly this table shows that the unemployment rate for male and females were high so one could imagine how the Tsunami disaster worsened this situation.

**Table 1.7: General information in Hikkaduwa Divisional Secretariat as at 2001**

Category	Information
Area( sq km)	63
Total Mid- Year Population( 2001)	98,012
Population per Sq km	1,566
Population below poverty line (2002)	24.9%
Total no of households( 2000)	21,556
Total male population	50,415
Total female population	50,415
Male unemployment Rate	13.1%
Female unemployment Rate	19.7%

Source: *Sampath Pathikada*, Hikkaduwa DS Division 2000

Table 1.8 indicates that 5,129 families and 21,748 persons within them were affected. The disaster also killed 1,025 people and made 268 persons missing.

**Table 1.8 Impact of Tsunami Disaster: Hikkaduwa DS division**

<b>Category</b>	<b>Information</b>
Total Number of GN Divisions	97
Affected No. of GN Divisions	58
No. of people killed	1,025
Affected families	5,129
Affected persons	21,748
Missing	268

Source: Hikkaduwa Divisional Secretariat

#### 1.6.2.2 Housing

Tsunami disaster destroyed houses both partially and fully. By the time of this research in 2008, it was found that the people whose houses were fully damaged have been already resettled. Table 1.9 provides a clear image about the housing situation of the Hikkaduwa DS Division.

**Table 1.9: Housing Situation Hikkaduwa DS Division**

<b>Category</b>	<b>Information</b>
No of houses fully Damaged within 100 meters	1304
No. of Houses partially Damaged within 100 meters	774
No. of houses fully damaged outside 100 meters	1240
No. of houses partially damaged outside 100 meters	2442
Persons who were living in transitional houses	4488
Number of persons settled in permanent houses	992

Source: Hikkaduwa Divisional Secretariat



The above table shows that 2544 houses were fully damaged and 3215 houses were partially damaged. Within the 100 meter buffer zone demarcated by the government, 1304 houses were damaged and 774 were partially damaged. Outside the buffer zone, 1240 were fully damaged and 2442 houses were partially damaged. It was found at the time of the research in 2008 that there were 4488 people still living in the transitional houses, while 992 had been re-settled in the permanent houses.

### 1.6.2.3 Divisional Specific Information

In addition to the famous Bathgama reservoir, there are two other large inland water resources, namely Madampe Wewa and Rathgama Lagoon. Water streams in the area join the sea at Hikkaduwa, Dodanduwa and Uswatte. Since the western boundary of the Division is the sea, more than 2,000 families are engaged in fishing and altogether the area consists of 19 anchorages. In addition, about 300 families are engaged in inland fisheries too. Industries in the Division are mainly concentrated on small-scale industries. Some employment opportunities are found in the three large garment industries located in the division. It seems that there is a great potential to introduce new industries to the area by linking the agriculture and tourism sector. (*Sampath Pathikada*, Hikkaduwa DS Division, 2000)

Hikkaduwa is regarded as an international tourist destination due to its special attractions such as sandy beaches, coral reef and facilities for water sports such as wind surfing. Hence, a substantial amount of income is generated through tourism. It was noted that Hikkaduwa has become one of the richest DS Divisions of the country due to the rapid development of the industry over last few decades (*Sampath Patikada*, Hikkaduwa DS Division, 2000).

## 1.7 Organization of the Thesis

After introducing the study briefly, Chapter one states the importance of this study, study objectives, problem statement, rationale, and also setting where the field work is carried out. It also presents a justification of why the present study is important in the field of demography. The chapter two will present the conceptualization of disaster and demography in order to place the study on the strong theoretical base. In this chapter a discussion of how the analysis of the present study is undertaken within the context of an appropriate theoretical frame work is presented. Chapter three introduces the data sources and the methodology utilized in the present study. It shows how quantitative and qualitative research is integrated to provide a comprehensive study of the impact of Tsunami disaster on demography of Sri Lanka. Chapter four will present mortality implication after the Tsunami disaster. This chapter will attempt to examine the changes that can be observed in relation to mortality behaviour among the Tsunami affected population, compared to the pre-Tsunami situation, theoretical perspectives, morality from 1968 to 2004, mortality with the absence of the Tsunami disaster, morality with the Tsunami disaster, comparison age specific mortality rates during the pre and post Tsunami periods. It further describes how mortality change has happened due to the population growth. Chapter five will present the influence of Tsunami disaster on the fertility of Sri Lanka. This chapter shows how Tsunami disaster has affected the fertility levels, trends and patterns. It further describes the impact of Tsunami disaster on changes that can occur to fertility. Theoretical perspectives of disaster related fertility changes, positive impact of Tsunami, changes in population growth, and changes in the total number of births, changes in age specific fertility rates and the how the fertility desires has changed after the disaster

are explained within this chapter. Chapter six presents the influence of the Tsunami disaster to change the migration trends and patterns of the affected population to permanently or temporarily change their place of their residencies. Their migration trends, patterns and their views and problems of the resettlement area. Chapter seven presents the impact of the Tsunami disaster on the demography of the family. It describes how family structures have changed after the Tsunami and its impact on human population. The final chapter assesses the extent to the study objectives has been achieved and summarizes the main findings. This chapter also explores the theoretical, methodological and policy implications of the study. Finally it draws attention to future research directions that flow from the present study. The study concludes by assessing the extent to which its findings contribute to our understanding of the process of impact of Tsunami disaster on demography of Sri Lanka has wide applicability for other settings where natural disasters have already occurred or that can occur in the future in order to have a clearer understanding of the impact of such natural disasters on demography in those localities.

## 1.8 Conclusion

This chapter has demonstrated that the Tsunami disaster in Sri Lanka has a great impact on the lives of the people in Sri Lanka. Experiences in the world have shown that the disaster had a major impact on human mortality. This chapter has provided a rationale for the present study by stating the importance of examining the impact of the Tsunami disaster on the demography of Sri Lanka. As a preliminary to the analysis of this study, the next chapter attempts to conceptualize the relationship between natural disasters and demography by reviewing the existing theory and concepts which can be used for this purpose.

## Chapter Two

### Conceptualization of Natural Disaster and Demography

---

#### 2.1 Introduction

The main objective of this chapter is to propose an appropriate conceptual framework in order to place the present study on a strong theoretical base. It is apparent that there is no particular theory to discuss and relate the influence of disasters to demographic situations. Therefore, this chapter attempts to find how available theories, propositions and hypotheses can be used to fill the gap that currently exists in demographic literature in relation to disaster and demography.

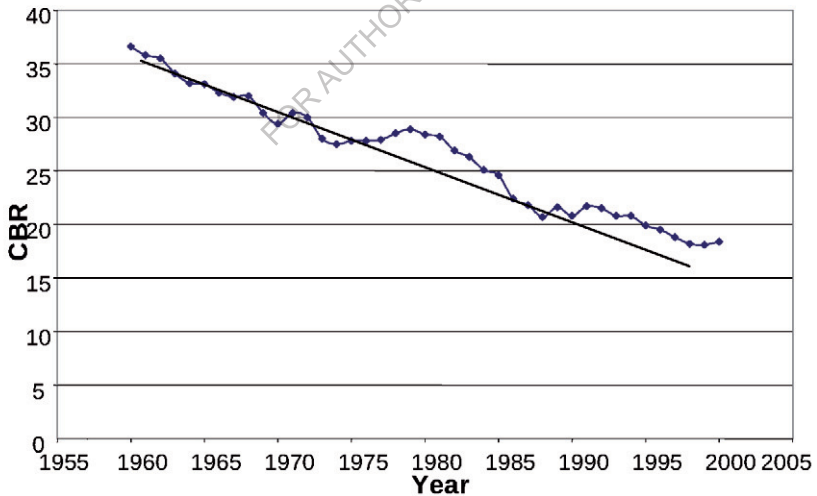
#### 2.2 Influence on Fertility

As indicated earlier, it is quite apparent that no theory on fertility, mortality and migration seriously takes into account fatal discontinuities which can affect future populations and thus behavioural patterns of fertility, mortality and migration. Fertility theories are mainly concentrated on the fertility transition and argue that when sustained fertility occurs then there will not be a return of fertility levels into the pre-transitional fertility plateau (Coale, 1975 ). Although the theories that focused upon demographic transitions are twofold: that is those which concentrate on the onset of the fertility transition and those which discuss the post-transitional fertility differentials (Dissanayake, 1995). These theories have failed to capture the substantial losses of human lives that can be expected from recurrence of natural catastrophes like Tsunamis, which in turn will have a significant impact on fertility behaviour of populations, which are continuously subject to disasters. The main reason why such theories were

not able to capture the effect of such disasters may be mainly because of the absence of such disastrous events during the times these theories were developed.

By looking at the fertility trend in Sri Lanka, one can reasonably assume that there can be a little hump (or increase of fertility) in the immediate post-Tsunami years, like what happened immediate after early 1970s (see Figure 2.1). What is noticeable in the trend prior to the Tsunami is a continuation of fertility trends with the same level after a time lapse. However, we all know that the effect of the economic conditions on mortality was not that severe during that time as in the case of Tsunami disaster.

**Figure 2.1 : Crude birth rate, Sri Lanka, 1960-2000**



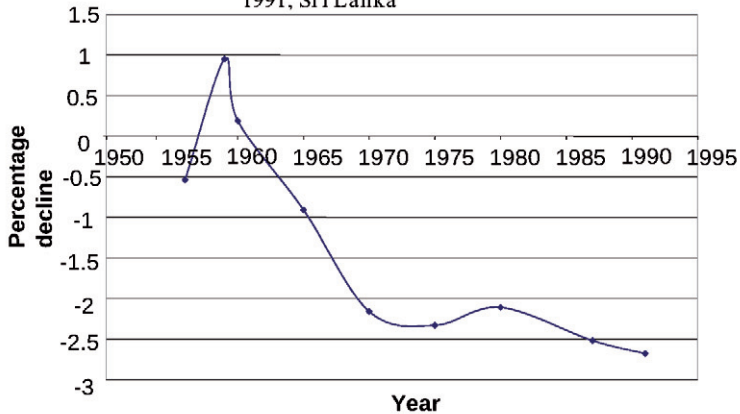
Source: Data obtained from Department of Census and Statistics and Registrar General Department

Therefore, one may reasonably hypothesize that affected people will increase their fertility as a replacement measure for the lost children. It is quite interesting to examine whether the trends in fertility will reach the same continuation of the pre-Tsunami fertility trend. Formation on this can be obtained by gathering data on future fertility desires.

The above figure(2.1) exhibits a very important feature of how people adjust their fertility for a particular time period after a difficult time. It is quite clear that fertility trends which continued until 1975 was disrupted with the increase of fertility observed during the period 1975 and 1988; but the CBR did not come to the expected level even until 2000. This can be seen from the trend line depicted in the above figure. This suggests that there was a great effect on subsequent fertility not becoming a normalcy when there was an adjustment process during a particular time period.

It is assumed by Dissanayake (1995) that the little hump observed in post 1977 period was a fertility response to delayed fertility in the period between 1970 and 1977 due to economic hardship arising due to the government's closed-economic policies and also consequent relatively high infant mortality observed during that period. When the annual percentage change in the Total Fertility Rate was examined, we find similar trend to the CBR which was depicted in Figure 2.2.

Figure 2.2 : Annual percentage decline of the TFR, 1953-1991, Sri Lanka



Source: Dissanayake, 1995

### 2.3 Influence on Mortality

When the mortality transition is considered, it appears that the pre-transitional mortality regime is mainly related to epidemics, famines and other natural disasters, which kept mortality fluctuating at a high level. But the societies that faced those catastrophes were different to the present day societies.

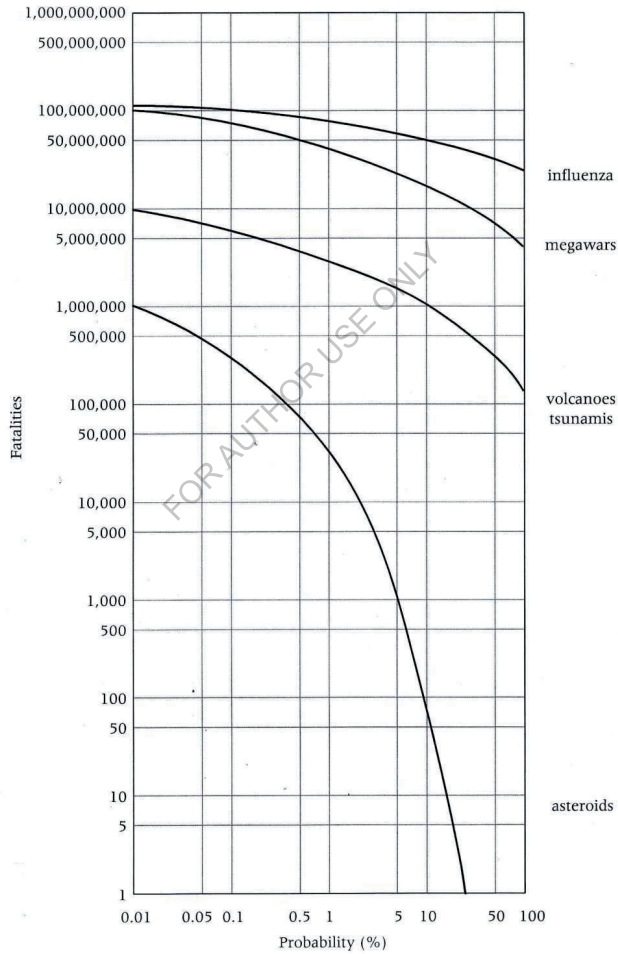
The epidemiologic transition theory suggests that the age of Pestilence and famine (Omran, 1971), characterizes high but fluctuating mortality, thus precluding sustained population growth. The life expectancy at birth in this stage is low, vacillating between 20 and 40 years. Sri Lanka's pattern of mortality before 1945 exemplifies the age of Pestilence and Famine. Many of the peaks and high plateaus of mortality observed during epidemics and famines have recurred periodically throughout the period. However, one can reasonably argue what would have happened to mortality if those natural catastrophes were absent. These events were

observed during the first stage of the demographic transition, which is named as 'high stationary stage'. Similarly we started observing disasters like Tsunamis, tornados etc. during the fourth stage of the demographic transition that is at the 'low stationary stage' where mortality is stable at record low levels. This suggests that we presently observe some marked similarities during the first and the fourth stage of the demographic transition. This also indicates that we cannot assume that we are alright in terms of mortality decline because we can still be vulnerable to natural catastrophes. So the death toll can substantially increase unexpectedly the same way that we observed, resulting in an increase of the number of deaths due to the Tsunami. The risk of death and thus the vulnerability position of the population increase if certain proportion people who live within for example, Tsunami risk zones. We have already experienced many Tsunamis after the year 2004 and some substantial aftershocks as well. We find it is very difficult for someone to predict with accuracy about the magnitude of the earthquakes and resultant Tsunamis which can occur in the next 50 years or so. One such prediction is depicted in Figure 2.3.

Therefore, one needs to adjust the population predictions according to the changes occurring to mortality levels due to natural disasters which we have never been interested in making assumptions when making population projections. In this context, the present study will provide a great opportunity for demographers about making assumptions about mortality with the use of deaths occurring due to natural disasters. These unexpected disasters also can decrease the survival chances of the population so the respective life expectancies may be reduced.



**Figure 2.3: Probabilities of massive fatal discontinuities during the next 50 years, ranging from low chances of asteroid impacts to a high probability of a virulent influenza pandemic. Starting points at the right vertical axis are calculated on the basis of the historical record of the past two centuries; all curves are approximations, aiming primarily to convey correct orders of magnitude**

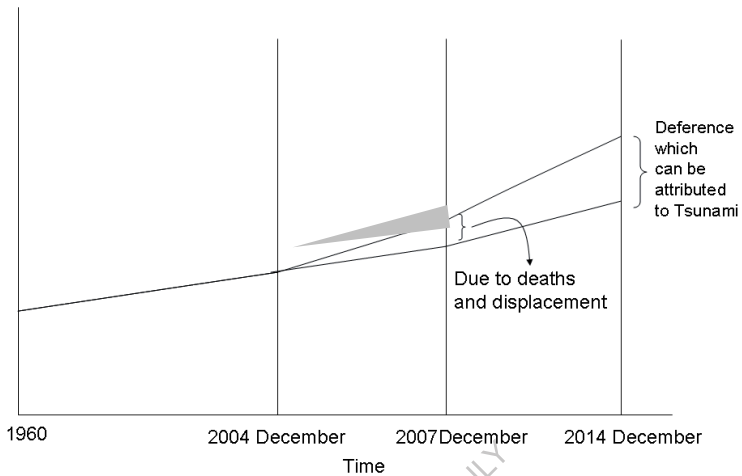


Source: Smil (2005)

Dissanayake (2000) has already shown that Sri Lanka has stepped into the fourth stage of the epidemiologic transition (i.e. man-made and degenerative disease stage) but it appears that some of the events experienced in the first stage of the epidemiologic transition can be repeated, may be in reasonable intervals with some regularity, even in the fourth stage of the epidemiologic transition.

With all these experiences, it is time for us to think whether natural disasters function as preventive checks on population growth as predicted by Robert Malthus in his famous Essay on the 'Principle of Population' in 1798 (Malthus, 1798). Presently, we have the opportunity to examine whether these disasters have, at least, short-term effects on the population growth in disaster affected areas. The proposition made by Malthus can be examined with the Sri Lankan data to see whether it is applicable to places which are vulnerable to disasters. Of course, we have started experiencing such massive fatal discontinuities due to influenza, mega wars, volcanoes/ Tsunamis and asteroids (Smil, 2005). Therefore, conceptualization and testing of Malthus's proposition to Tsunami situation in Sri Lankan context will provide a unique opportunity for us to generalize the relationship between population growth and disasters. For this we can examine whether the Tsunami disaster has any impact on the population growth during the pre-Tsunami and post-Tsunami time periods.

**Figure 2.4: Impact of Tsunami on future population growth**



The above figure(2.4) shows that how we can investigate the impact of Tsunami on future population growth. In this particular phenomenon one can make few hypotheses as follows:

1. Population growth will be reduced and thus there will be less number of people compared to the expected population in the absence of Tsunami disaster;
2. There will be no reduction in population growth;
3. There will be a reduction in population growth in the short run, but the resumption of the same growth can be observed; so there will be no any reduction of population in the long run.

We are in a more advantageous position because at least we can capture population growth for the three-year post Tsunami period. We can use the above assumptions to make few simulations to predict future populations

which will be very useful in making population projections, especially for socio-economic planning. It is quite important to note that people in affected areas will be exposed to health hazards due to various factors such as environmental pollution, damaged occurring to health institutions etc.

**Table 2.1 Available Educational and public Health Services**

Category	Number
Schools	92
Hospitals and Clinics	
Hospitals	02
Clinics	22
Proposed for construction	02
Other Clinics	12

Source: Hikkaduwa Divisional Secretariat

There are 2 hospitals, 22 clinics and 12 other clinics in the Hikkaduwa Ds Division. 02 hospitals were affected by the Tsunami. 12 clinics situated in the Tsunami affected area were damaged. Therefore, the people affected by the Tsunami suffered health problems as the health institutions were also damaged. People who were admitted to the hospital for various serious health problems suffered a lot.

Due to the magnitude of the disaster, the risk of health problems among the victims and even of epidemics has rapidly increased in the aftermath of the Tsunami. As a result of the violent force of the Tsunami and the great extent of destruction, large quantities debris and waste accumulated at affected sites (Domroes 2006). Therefore, several changes of the affected people may not be the same when compared with the pre-Tsunami time period. This allows us to focus to compare survival

probabilities in the affected areas for pre Tsunami and post Tsunami period and see whether they show a significant difference.

## 2.4 Influences on Migration

It is quite interesting to examine whether massive displacement that took place due to Tsunami would make any significant impact on the level and pattern of migration. We already know that certain policies such as demarcation of 'buffer-zone' along the coastal line can have a significant impact on internal migration because the people on the buffer-zone were evacuated. Therefore, one can hypothesize that the government policies will force people who are living in disaster prone areas to migrate to disaster free places. This acts as a push factor which operates at the place of origin as suggested by Lee (1966) and Ravenstein 1889) In addition, the unavailability of lands in the vicinity of the affected areas and of course outside the buffer zone area also force the government to establish re-settlement schemes in other localities. Therefore, the land availability in these areas becomes a pull factor at the place of destination. However, as the majority of the affected belong to the fishing community, a substantial daily mobility pattern from the present destinations to the coastal areas with employment opportunities can be observed. This type of commuting is possible because of the available transport facilities. In other words this type of commuting or daily mobility is impossible if they are in a traditional society which existed in the pre-demographic transition time period as illustrated in the hypothesis on mobility transition by Zelinsky (1971).

It is also quite reasonable to hypothesize that the recurrence of Tsunami in the region at reality short intervals and its aftershocks can make people fear, especially those who are living in the Tsunami disaster prone

areas and thus they might decide to migrate to safer places. In this particular context, this study will demarcate the areas into two zones, Tsunami prone areas and Tsunami free areas, to examine the volume and pattern of migration from Tsunami prone areas. At the same time one can hypothesize that the resettlement of affected people away from the coastal region may force them to look for other employment opportunities in the resettlement areas. Therefore, it is quite interesting to examine not only the physical mobility of the people, but also associated social and economic mobility of migrants suggested by the mobility transition hypothesis (Zelinsky 1971: 219)

*“Social scientists are guided in their groupings towards pattern regularity in human activities by their small hoard of paradigms. In the fields of geography and demography, such broad intellectual designs have been especially scarce.<sup>1</sup> In deed, there are probably no more than three major geographical paradigms in active use to day. The first, which might be called the geographic axiom, so basic and instinctive as to be seldom articulated, is the conviction that there is genuine significance in the spatial patterning of the physical and social events on and near the surface of the earth. Next is the notion of the spatial diffusion of innovations, sired jointly by anthropologists and geographers and recently explored with highly interesting results. Finally, geographers have borrowed the principal of least effort, or economic optimization, from economists and have grafted it on to the geographic axiom. This hybridization has spawned a number of hypotheses concerning the territorial arrangements of economic and related activities.” (Zelinsky, 1971: 219)*

Generally, migration was not that substantial during the fourth stage of the demographic transition where mortality and fertility levels are stable at low levels. Commuting becomes more prevalent due to the improvement in the modes of transportation. Since the South west coastal areas in Sri Lanka were the first to experience the onset of the fertility transition in Sri Lanka (Dissanayake, 1995; 1997), one can reasonably argue that mortality has been at low stationary situation at the time of the Tsunami disaster. Since this particular area comparatively has better transportation systems connected to the Colombo- Galle highway and railway, we can assume that migration is low and less frequent. However, we know that massive displacement occurred when Tsunami struck these areas. If we can assess the magnitude of the displacement, we may reasonably hypothesize; the subsequent level of migration will increase higher than that of the pre-Tsunami period (Figure 2.4) In order to predict future migratory patterns, we can interview affected people and obtain their perceptions on migration behaviour.

## 2.5 Influence on the Family

### 2.5.1 Extended Family System

It has been shown that the extended family system was still prevalent in Sri Lanka although it was dealing at a considerable rate (Dissanayake, 1995). It was also observed that extended families were prevalent in the Tsunami-affected South-west coast (CUCEC/UNDP/DRMU of the HRC, 2005). Since the government policy was to provide a house to house for the head of the household, it appears that most of the extended families were unhappy about such a decision. The present study has the unique opportunity to find out whether this “house to house” policy and

resettlement scheme established by the government and non-governmental sector has had any significant impact on the extended family structures in the affected areas.

### 2.5.2 Single parent families and female headed households

It appears that a substantial number of children lost at least one parent. This suggests that they are left with one parent. This has led to increased numbers of female headed households. This suggests that Tsunami-disaster has put a substantial number of mothers into more vulnerable situations. Then number and the behavioral patterns can have a great impact on the family and the society to change their attitudes towards women. Example: There are about 65 women have lost their bread winners in Hikkaduwa DS division. (Hikkaduwa Divisional Secretariat) This study will have the opportunity to identify structural changes that have occurred in the family in terms of type, age, and gender and changing situations of the economics of the family.

### 2.5.3 Elderly population and their dependent status

As we are already aware, the Sri Lankan population age structure is gradually aging. In addition, the feminization of elderly population can also be observed. “Population aging” a demographic transitional phenomenon identified as an increase in the proportion of the “older People” in the population age structure has become a prominent topic for studies on the implication of demographic change. Like in the industrialized societies, Sri Lanka, (though a developing country), in the wake of a declining in fertility, along with increased life expectancy of the population, is experiencing a shift in the age structure towards the older segment of the population. Aging process in the developed societies is



already well advanced and will continue, with serious consequences, particularly on the economy of pension schemes. It is however, gaining importance in developing regions, because of the ongoing or incipient fertility decline. A number of countries including Sri Lanka, in the category of developing societies, are being alerted about the medium or long-term social and economic implications of population aging (Dissanayake, 2004).

Population ageing will affect economic growth, savings, investment and consumption, labour markets, pensions, taxation and the transfer of wealth, property and care from one generation to another. It is also has a great impact on health and health care, family composition and living arrangements, housing and migration. The ageing phenomena of the population can also influence voting patterns and representation, because older voters usually read, watch the news, educate themselves about the issues, and hence they vote in much higher percentage than any other group (UN, 2002).

**Table 2.2 Vulnerable groups in Hikkaduwa**

<b>Vulnerable Group</b>	<b>Number</b>
Disabled	25
Children who lost their mothers	145
Children who lost their fathers	99
Women who lost their bread winners	65
Elderly people who lost their wage earners	40

Source: Hikkaduwa Divisional Secretariat

The number of affected elderly people in the Tsunami disaster is large. Some have died and some are facing many problems after the disaster. They are health, economic, security, psychological etc. Now most

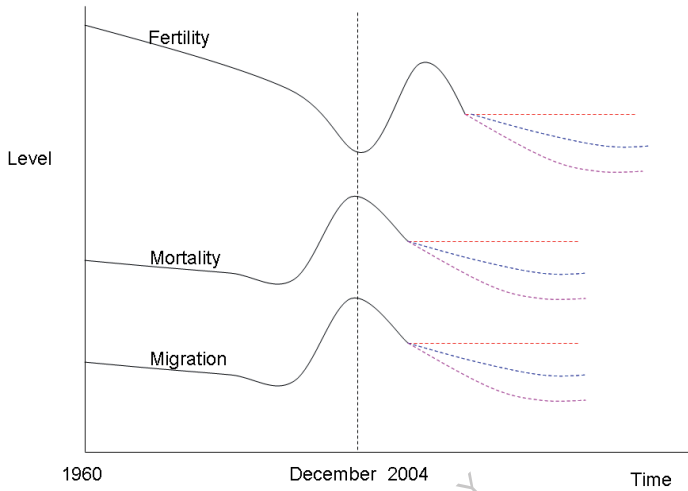
of them are in vulnerable situations since some have lost children, care takers and also livelihoods. Therefore they are in a vulnerable situation without proper security. In the absence of a proper social security scheme, it is quite clear that the elderly population becomes more and more vulnerable. What has happened with the Tsunami disaster is that a substantial proportion of elderly have become more vulnerable.

Therefore, it is one of the intentions of this study to investigate how many elderly people were affected and the magnitude of their vulnerability.

## 2.6 Evolutionary forms of fertility, mortality and migration with the Tsunami disaster

The above conceptualization of the relationship between “disaster and demography” can be summarized and presented in the following diagram by looking at the changes occurring through time for the three demographic components. The figure highlights possible scenario which can expect after then Tsunami disaster in 2004. This suggests in fact these evolutionary forms: high, medium and low and they are depicted in the figure 2.4 after the Tsunami disaster and evolution through the time axis.

**Figure 2.5: Conceptualization of disaster and demography**



## 2.7 Conclusion

In the absence of an appropriate theory to explain the mechanism underlying the relationship of “natural disaster and demography”, this chapter has attempted to conceptualize the relationship by taking some appropriate sections of the theories and concepts in relation mortality, fertility and migration that are available at present. We feel confident that the conceptualizations proposed in the chapter will be able to examine the “impact of Tsunami disaster on demography of Sri Lanka with the support of empirical data available for this purpose.

## **Chapter Three**

### **Sources of Data and Methods**

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#### **3.1 Introduction**

This chapter discusses the sources of data and the methods utilized to demonstrate how a mixed-method paradigm (integrating both quantitative and qualitative research) is adopted to comprehensively assess the impact of the Tsunami disaster on the human population in Sri Lanka. This survey is based on the quantitative analysis of data collected from the 'Department of Census and Statistics' and vital statistics obtained from the 'Registrar General Department', 'District Secretariat' and the 'Divisional Secretariat'. The primary data was collected through a structured questionnaire survey. A qualitative analysis will be used to meet the expected objectives of the study. Caldwell and his associates (Caldwell et al., 1984a, 1984b; Caldwell, 1985; Caldwell et al., 1987; Caldwell et al., 1988; Caldwell et al., 1989 a, 1989b, Caldwell, 2006) have attempted to widen the nature of demographic inquiry by adopting demographically informed qualitative research on population inquiry by adopting demographically informed qualitative research on population issues. This has been labeled the 'micro approach' in demographic investigation and is quasi-anthropological; combining ethnographic field research with surveys and censuses of small communities in a broad historical and sociological context (Caldwell, 1985:51-27). The aim in the present study, as indicated earlier, is to combine both the quantitative and qualitative approaches to provide a more comprehensive picture than could be obtained from relying solely upon either type of research. In this regard, data from the 'Department of Census and Statistics' and vital data obtained from the 'Registration Department

provides quantitative information and micro-level information gathered at Divisional Secretariat level and GN level.

### 3.2 Nature of the study

The Tsunami disaster has impacted in various ways the human population in Sri Lanka. About 36,000 people died and 79,500 people were displaced (Department of Census and Statistics, 2005) Their normal patterns of life have changed due to the impact of the Tsunami disaster. This chapter describes the sources of data used for the study and the methodology used to analyze the impact of Tsunami disaster on the demography in Sri Lanka. The analysis will be performed initially at macro-level to find the level of the disaster in terms of deaths and displacement by each Tsunami affected district. However, data will be more specific to Galle district and in particular the Hikkaduwa Divisional Secretariat Division in order to understand the impact of the disaster on each demographic component. This will provide a unique opportunity to understand not only the level and pattern of the impact, but also the mechanism underlying such impact. It is quite clear that quantitative analysis alone will not be sufficient to find factors which would have a significant impact on future fertility, mortality and migration as they are more connected to the behavioral patterns of people.

### 3.3 Significance of the Study Area

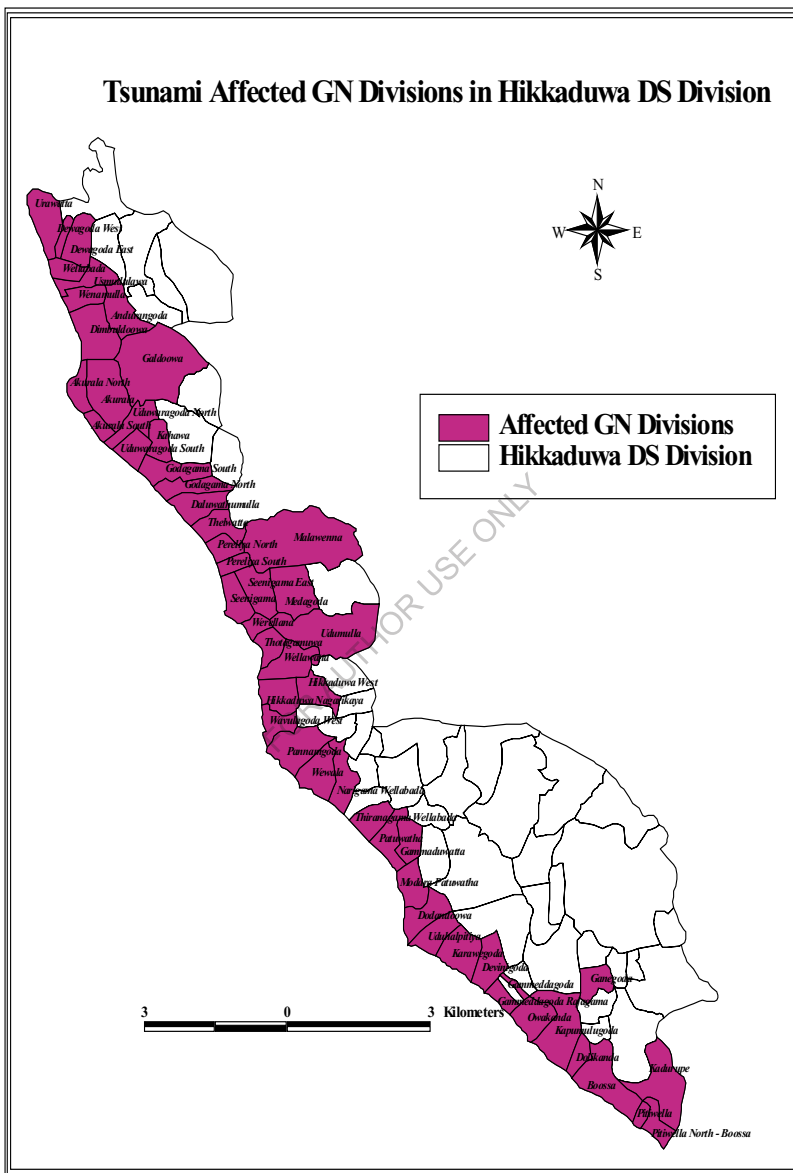
This analysis attempts to describe the significance of the study area in order to study the impact of the Tsunami disaster on the demography in Sri Lanka. Firstly, it is important to note that studying the Sri Lanka situation is important because the impact of the Tsunami was great on the Sri Lanka population as described in Chapter 1. Therefore, the research

findings from a study in Sri Lanka can make a significant contribution to existing literature to provide an in-depth understanding of natural disasters on demography in any country. The following Districts in five provinces were affected by the Tsunami disaster, as depicted in Map 1.1.

- Southern province: Galle, Matara, Hambantota
- Western province : Kalutara, Gampaha, Colombo
- Eastern province : Ampara, Batticaloa, Trincomalee
- Northern province: Jaffna, Mullativu, Killinochchi
- North Western Province : Puttalam

Altogether 13 Districts out of the 14 Districts in the coastal belt of Sri Lanka were affected by the Tsunami waves. For administrative convenience, Sri Lanka is divided to 9 Provinces. These Provinces are again sub divided in to 25 Districts. Each District is divided in to Divisional Secretariat (DS) Divisions depending on the population size of the area. Each DS Division consists of several Grama Niladari (GN) Divisions, which is the lowest level of administrative area. Currently there are 324 DS divisions and 14,008 GN Divisions. (Department of Census and Statistics, 2005)

Map 3.1 Tsunami Affected GN Divisions in Hikkaduwa DS Division



Source: Data obtained from the Department of Census and Statistics

The area of the study was selected after the consideration of all affected Districts in Sri Lanka. Two districts were severely affected by the disaster; they are Ampara and Galle districts. The Galle District was selected for the present study and there are three major reasons to select Galle district for this study:

1. It is one of the severely Tsunami affected districts in Sri Lanka
2. According to the war situation in the country Ampara was too difficult to be accommodated in this research
3. It is one of the first districts to experience the onset of the fertility transition in Sri Lanka

The selection of the Galle district therefore appears to be appropriate, since the present study investigates the impact of Tsunami disaster on demographic changes. As indicated in Chapter1, Hikkaduwa can be regarded as the worst affected DS Division in Galle District. According to official records, in Hikkaduwa DS Division 58 out of 97 Grama Niladari Divisions were affected and that alone shows the severity of impact. Table 1.8 in Chapter 1 shows that 5,129 families with 21,748 persons were affected by the Tsunami disaster and more than 1,000 people were killed 268 persons were missing. A detailed discussion on the study area was carried out in chapter 1.

### 3.4 Data Collection procedure

#### 3.4.1 Observations on Mortality

Available records on deaths in the Galle district, as well as in the Hikkaduwa DS division, were examined and analyzed in order to understand the level of the disaster on mortality and the changes which have occurred to the age-sex pattern of mortality. In addition, an analysis



was performed to ascertain whether the attrition due to deaths in certain population subgroups had a significant impact on future population growth and its numbers.

In the analysis, population data derived from the ‘Department of Census and Statistics’ and mortality data obtained from the ‘Registrar General Department’ are used to examine the Tsunami impact on mortality by considering pre-Tsunami and post-Tsunami periods. Age-specific mortality rates were compared and the appropriate abridged life tables were developed. It is important to note that this was done for the Galle District. Although usual calculation procedure for life-table construction is to concentrate on census years, here in the study the Tsunami occurred in a non-census year, therefore, estimated population was used and was adjusted by Tsunami mortality. Therefore, this study attempted to minimize the errors which can occur due to unexpected sudden mortality with the Tsunami disaster. Since the level of fertility and mortality patterns have not been changing very fast, it can reasonably be assumed, that the impact of fertility and migration on the population is not severe.

#### 3.4.2 Observations on Fertility

Changes observed in fertility in the Galle district and Hikkaduwa DS division were investigated by using district level fertility data obtained from the ‘Registrar General Department’, population data gathered by the ‘Department of Census & Statistics’ and a survey carried out by the present study in Hikkaduwa D.S. Division, since DS level fertility data demanded by the objectives of the study are not available from other data sources. In the case of the latter, 80 women who lost children due to the Tsunami were identified with the help of the Grama Niladari in the DS Division.

Information was collected from these women with the use of a structured questionnaire and also by using in-depth studies.

Fertility desires among the young women who lost their young children were investigated to find whether their fertility expectations have increased due to lost children because of the Tsunami disaster. These women were identified in all the areas in Hikkaduwa DS division by consulting the Grama Niladharis in respective GN Divisions. In-depth case studies were performed to ascertain whether there has been any effect of infant and child mortality on the fertility of the women in this locality.

#### 3.4.3 Observations on Migration

Since migration can take several forms with the disaster such as resettlement in other localities or migrating outside the district or DS division, both streams were analyzed with the use of primary as well as secondary data. In the latter case, surely one has to limit the study for secondary data because of the difficulty to keep track of people who have migrated from the district to other districts in the country. However, the level of such a migration can be depicted with the use of secondary data. In addition, neighbors were consulted to find out the reasons for migration rather than residing in resettlement schemes. For the former, a special investigation was carried out with the use of structured questionnaires and meetings and discussions with the re-settlers by selecting a resettlement scheme. In this way we compiled data to analyze the impact of resettlement on the local distribution of population and also changes that have occurred in social mobility patterns.

The Galagodawaththa resettlement scheme, which is the largest scheme, was selected for the present study. This scheme consists of about 450 households coming from various Grama Niladhari Division in Hikkaduwa as indicated in the following table.

**Table 3.1 Place of Origin of the resettlers in Galagodawaththa Resettlement Scheme**

Place of birth/previous residence		GalagodaWaththa Resettlement Scheme- Galagodawaththa 78 A
Akurala	76	1
Akurala North	76B	65
Akurala South	76A	78
Daluwathumulla	67C	1
Dimbuldoowa	77B	28
Galagoda	E	11
Godagama North	70A	2
Godagama South	70	9
Hikkaduwa Urban	59a	1
Kahawa	69	1
Pereliya North	67A	15
Peraliya South	67B	11
Pitiwella North	42	18
Seenigama west	64A	2
Thelwaththa	67	2
Totagamuwa	61	16
Uduwaragoda North	71A	22
Uduwaragoda South	71	28
Urawaththa	80	61
Usmudulawa	79A	35
Wellaboda	79	12
Wenamulla	77	34

Source: Survey data

88 households were selected by using every 5<sup>th</sup> household in the sample after employing systematic simple random sample procedure in order to make this sample, a probability sample. In this particular sample, we adopted both qualitative as well as quantitative data collection procedures. Through the qualitative survey we were able to gather information to map the aggregate migration related patterns in the DS divisions, but qualitative case studies done by interviewing various generational groups provided us with more understanding of the migratory behavior of the resettled community.

#### 3.4.4 Observations on the Changes in Family Composition

With regard to the examination of changes that have occurred to the family composition, a special investigation was carried out with a selected sample in the Hikkaduwa DS division in order to understand whether family composition and structures have been disrupted by the loss of life and migration which took place with the disaster

In this case, secondary data available for age-sex composition for small area population (that is GN level) was collected and analyzed. This was coupled with the available fertility and mortality data to examine if the changes in mortality and fertility have had any impact on the age-sex distribution of those small area populations.

A detailed analysis is carried out on the observation of the changes in the family composition by interviewing people from the 88 household selected in the Galagodawaththa housing scheme, as indicated in the previous section. In addition, elderly person who still live in affected coastal area but not moved with the resettlement scheme, were also interviewed.

### 3.5 Nature of Secondary Data Used for the Study

With respect to the availability of quantitative time series data sources, Sri Lanka is in a strong position in comparison to most other developing countries (Taeuber, 1949:304). This is a result of the regular record keeping system carried out by the British Colonial Governments. The small size of the country must have enabled the Colonial Government to maintain such documentation. These time series data sources in the fields of population and education, provides the opportunity to establish with some certainty the timing of the onset of the fertility transition and the onset of mass education, which are crucial events in the present study.

The data sources currently available to study trends and levels of fertility and mortality cover a considerable time period in Sri Lanka. These include population censuses, vital statistics available through the vital registration system and a series of national sample surveys. In addition to surveys, censuses and vital registration data, the present analysis is occasionally supplemented with statistical material obtained from governmental and non-governmental agencies. Population censuses have been taken since 1871 in Sri Lanka, while the vital registration systems have been in existence since 1867. A number of nation-wide sample surveys designed, especially to study fertility and closely related behavior (i.e. Sri Lanka Fertility Survey of 1975; Sri Lanka Contraceptive Prevalence Survey of 1982; Sri Lanka Contraceptive Survey of 1985; Sri Lanka Demographic and Health Survey of 1987) have been conducted since 1957.

### 3.5.1 Census and Vital Registration Data

This study utilizes data from the published reports of the censuses of 1901 to 2001, Census report prepared specifically for the Tsunami disaster and the published annual reports of the Registrar General of Sri Lanka for the period 1981 to 2002 data gathered were used in the present study. In addition, unpublished data on fertility, mortality were also obtained for the years 2001 to 2006 from the Registrar General department. The data are collected not only for the Sri Lanka as whole but also for the district of Galle and Hikkaduwa DS Division.

A survey on the completeness of birth registration in 1953 revealed that the under-registration of births was in the order of 11.9 percent, while that of deaths was 1.3 for births and 7.7 for deaths (ESCAP, 1976:378-379). A sample survey in 1980 estimated that birth registration was only 1.2 percent incomplete (ESCAP, 1986:14). It is important note that the census data has been high quality from the census year 1953. Sarkar, 1957, Fernando, 1957 and Guneseekare 1987). Therefore, it appears that quality of vital registration data has been very good.

### 3.5.2 A Survey conducted by the Department of Census and Statistics in the Tsunami Affected Areas

The Department of Census and Statistics conducted a census covering all census blocks affected by the disaster in order to provide information on the impact of the Tsunami in Sri Lanka. Many institutions have adopted various methods to measure the damage caused by this calamity soon after the disaster. As there was no uniformity in the methodologies adopted the figures were found to be different from each. As such, the 'Department of Census and Statistics' (DCS), as the main government institution

responsible for collecting, compiling, analyzing and dissemination unbiased and reliable information in Sri Lanka, decided to conduct this special Census to collect information on people, housing units and other affected buildings. For proper planning to rebuild the areas devastated by Tsunami and assist the people affected, it is essential to have reliable information down to the lowest possible administrative units and even at individual level. There was a survey done by the 'Department of Census and Statistics'. The data gathered after the Tsunami was also used. This census has been designed to provide much needed information for planning of rebuilding Tsunami affected areas and it is being conducted in two stages. During the stage 1, all the buildings in the affected census blocks were listed. Data on a few key indicators on the affected buildings and persons are also collected at this stage. Detailed information was collected during the second stage. Following information was captured by this census.

- Buildings ( housing and other buildings)
- Persons who died and who were residing in damaged houses
- Persons whose houses are damaged and lost employment
- Household assets of those whose houses are damaged
- Assets of their economic activity (eg. boats, fishing nets etc. if fisherman) of those whose houses are damaged
- Children who were residing in damaged houses at the time of Tsunami and lost their parents( mother, father or both)
- Attempts will also be made to fill the gaps using administrative records available in other institution

Source: Department of Census and Statistics (2006)

### 3.6 Limitations

The major limitation of the study is the inability to perform the analysis in all affected district due to time constraint and lack of funding. Since the main focus of the study is to understand the behavioral pattern underlying the macro-level picture, it is expected this study has attempted well; even with the selection of small samples drawn from Hikkaduwa DS Division (one of the worst Tsunami affected DS Division in the country). In addition, Tsunami deaths have been registered by the 'Registrar General Department' only in the year 2005 and not in the year 2004 as this disaster occurred on the 26<sup>th</sup> December 2004. Therefore, some information collected by the 'Department of Census and Statistics' refer to year 2004, but vital registration data mainly refers to the year 2005. This can be regarded as a limitation of the study since the reader may get confuses about the fluctuations of vital registration data in 2004 and 2005. However, this study has always indicated at necessary place which data sources being used for that particular section.

### 3.7 Conclusion

This chapter described how available data from the secondary sources, surveys and vital registration were used together with information collected through a structured questionnaire and in-depth studies in Hikkaduwa DS Division. An attempt was made to mix both qualitative and quantitative information together in order to perform a better analysis by eliminating possible shortcoming which can arise when these sources are analyzed separately. In addition, this type of analysis can not only provide understanding about the level and patterns of fertility, mortality and migration at the district level. But also better understanding about the behavioral patterns of the three components at small area population level.



## Chapter Four

### Influence of Tsunami Disaster on Mortality

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#### 4.1 Introduction

The main objective of this chapter is to examine the mortality implications after the Tsunami disaster in the Galle District. The study will attempt to observe and examine changes in relation to mortality among Tsunami affected population in the district, when compared to the pre-Tsunami situation. Although Sri Lanka has been experiencing gradual changes in mortality and fertility as predicted by the demographic transition theory, this natural disaster may have produced some imbalances with regard to both levels and patterns of fertility and mortality in the affected areas.

Although Sri Lanka was devastated only recently by the Tsunami disaster during the past 20 years, earthquakes have caused more than 1 million deaths worldwide. The Asian and Pacific Region alone has recorded 70 percent of the world's earthquakes measuring 07 or over on the Richter scale, at an average rate of 15 percent per year. The most devastating earthquake in the world in recent history, the Tangshan earthquake, occurred in People's Republic of China on 28 July 1976, and is reported to have claimed over 240,000 lives. Other countries of the region which are badly affected by earthquakes include Japan, the Phillipines, India, Nepal, Afganistan, Islamic republic of Iran, Countries of the Central Asian republics and the pacific Islands (Sinha, 2006). Although the present study concentrates mainly on one out 13 districts, (Galle district) affected

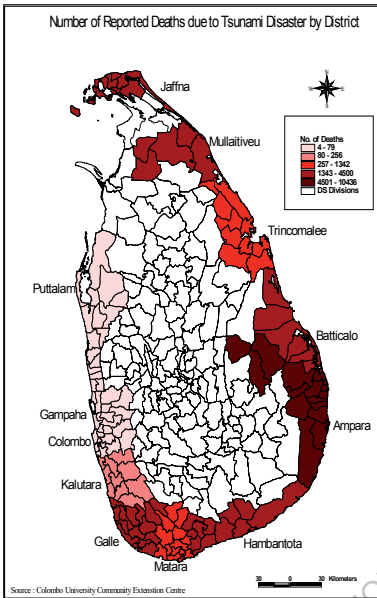
by the Tsunami disaster, this district can be regarded as one of the worst Tsunami affected districts indicated earlier. Table 4.1 shows the number of deaths, number of injured people and number of missing persons in Galle in a comparative perspective with other districts.

**Table 4.1: Impact of Tsunami Disaster 26th December 2004**

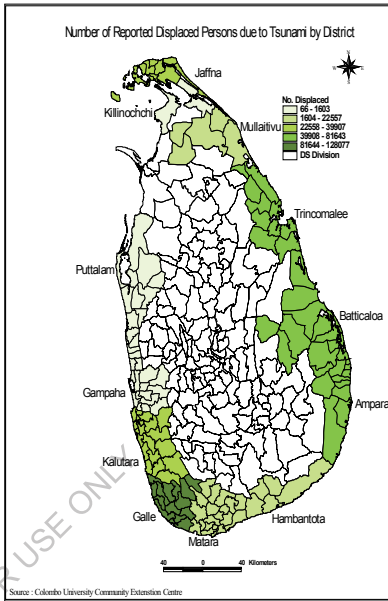
District	No. of deaths	Number of Injured	Number of Missing
Jaffna	2,640	1,647	540
Mullaitivu	560	670	1
Kilinochchi	3,000	2,590	552
Trincomalee	1,078	n.a	337
Batticaloa	2,840	2,375	1,033
Ampara	10,436	120	876
Hambantota	4,500	361	963
Matara	1,342	6,652	613
Galle	4,216	313	554
Kalutara	256	400	155
Colombo	79	64	12
Gampaha	6	3	5
Puttalam	4	1	3
	<b>30,959</b>	<b>15,196</b>	<b>5,644</b>

Source: <http://www.cenwor.lk/Tsunamistat.html>

**Map 4.1:**



**Map 4.2**



## 4.2 Theoretical Perspective

An increase of death rates in unpredictable situation can be seen all over the world at any moment of time, either due to natural or man-made disasters. According to Cox (1993) the mortality rate differs according to the environmental factors such as climate, weather and political conditions which can lead to a war situation. Environment factors influence individual mortality which influences the normal death rate in a country. In developed countries mortality is low, maintaining a low stationery level. Although death rates stationing at a low level, natural disasters can still have a great influence in increasing the death rate.

Malthus (1798) described two categories of checks on population

1. Positive checks: related to cause of death and an increased death rate. These include poverty, disease, epidemics, famine and war
2. Preventive checks: on the birth rate. These include ‘improper arts’ such as abortion

Although the Malthusian theory was dropped from favour during the 19<sup>th</sup> century, interest has revived in recent years due to the relationship between population growth in developing countries, the wastage of natural resources, and concern over food supply. In fact, sudden death occurring due to disasters like Tsunami disaster leads us to revisit Malthusian theory, since he had made an emphasis on how natural disasters can act as a check on population growth in a country.

Sri Lanka’s pattern of mortality before 1945 exemplifies the Age of Pestilence and Famine. Many of the peaks and high plateaus of mortality observed were due to the epidemics, which recurred periodically, throughout this period (Dissanayake, 2003). He has explained this situation with the use of Omran’s theory of epidemiological transition. This provides a unique opportunity to understand the mortality and epidemiological situation during a disaster period by peaks occurred in mortality levels.

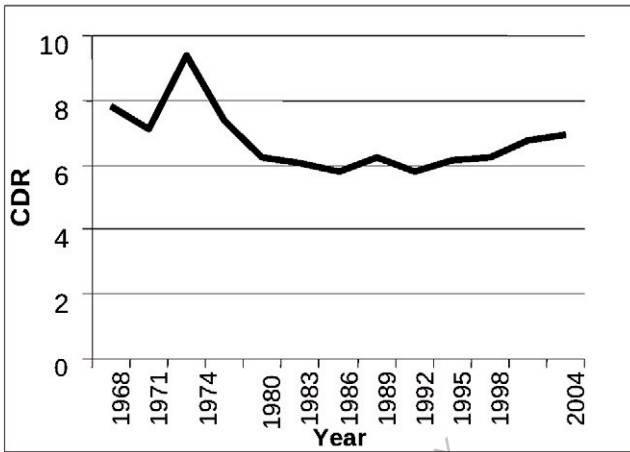
This study uses information available on mortality and fertility from the ‘Department of Census and Statistics’ and Registrar Generals Office. It is important to mention that the ‘Department of Census and Statistics’ collected demographic and housing data immediately after the Tsunami disaster and such information was extensively used in the analysis as they provide better insight into the demographic changes occurred after the

disaster. Although there are many sources which provide information on demographic patterns, it was decided to use data available from the above sources such as the 'Department of Census and Statistics' and Registrar Generals Department; so far these have proved reliable information on population characteristics.

### 4.3 Mortality from 1968-2004

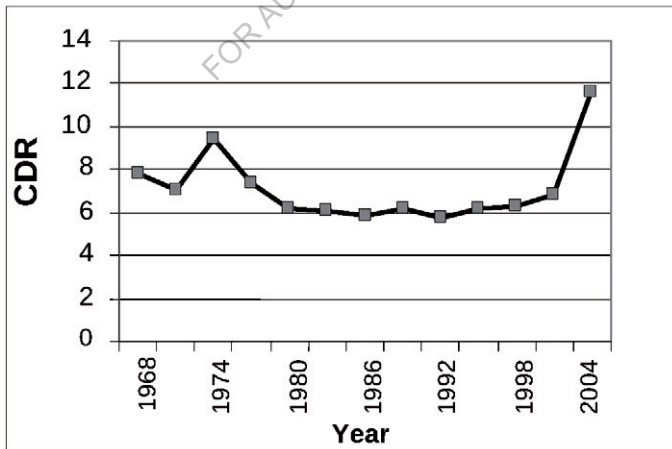
Figures 1 and 2 attempt to show how Tsunami disaster affected the mortality situation in the Galle district. This will provide a unique opportunity to understand the severity of the disaster and also its implications on the mortality level. The figure 4.1 shows the number of deaths occurred in Galle District from 1968 to 2004, without considering the deaths that occurred due to Tsunami disaster. The crude death rate in the Galle district was oscillating around six per 1000 deaths from the year 1980 onwards, a trend very similar to the national level of mortality. Therefore, the mortality depicted in Figure 1 was the normal situation in the District. Figure 4.2 includes the normal deaths in the district as well as Tsunami deaths in order to show how the Tsunami disaster affected the mortality level in the district. It is clearly visible that the crude death rate increased in an unpredictable manner with the Tsunami disaster. In fact mortality has increased more than any level observed during the past 25 years.

Figure 4.1: Mortality in the absence of the Tsunami disaster in Galle District



Source: Data obtained from Department of Census and Statistics and Registrar General Department

Figure 4.2: Mortality with the Tsunami disaster in Galle District

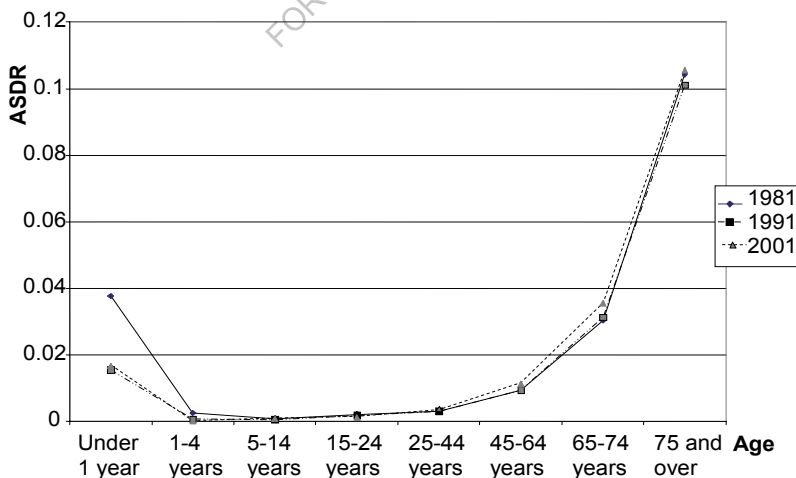


Source: Data obtained from Department of Census and Statistics and Registrar General Department

#### 4.4 Age specific mortality in the district before the Tsunami disaster

It is quite interesting to observe the age specific mortality rates before the Tsunami disaster since it will provide a unique opportunity to compare that with the post-Tsunami mortality to ascertain the impact of the natural disaster on the mortality pattern in the Galle district. It is quite clear that the age-specific mortality among the infants and older people is comparatively high as usual. However, there is a clear differentiation by gender, especially at young ages. In general, it appears mortality of males is higher than that of the females in all age groups. Following figure shows the male and female age specific mortality rates in the absence of Tsunami disaster, depicting that it follows a usual pattern in any low mortality community in the world.

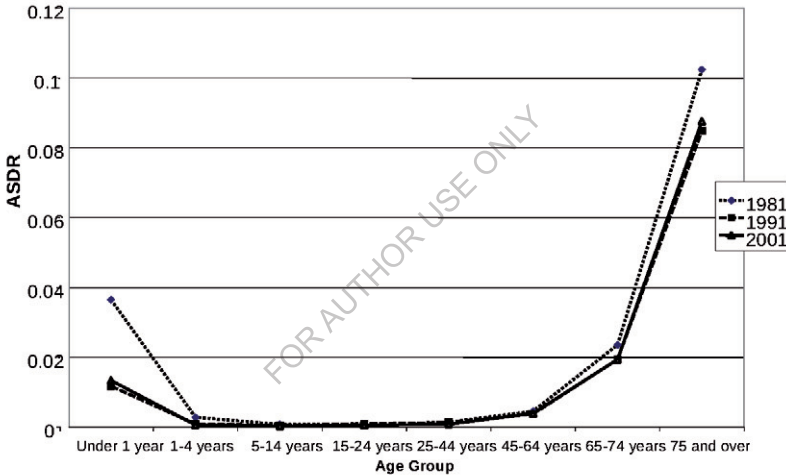
**Figure 4.3: Age specific mortality rates for males, Galle District, 1981, 1991 & 2001**



Source: Data obtained from Department of Census and Statistics and Registrar General Department

Figure 4.3 shows the age-specific mortality rates for males from 1981-2001, a trend during a 20 year time period. It clearly shows that age specific mortality rate is high for infants who are under 1 year but gradually it has decreased during the young ages. However, with the ageing effects observed in the Sri Lankan population, it appears a slight increase in adult mortality in the year 2012.

Figure 4.4: Age-specific mortality rates for females, Galle District, 1981, 1991 & 2001



Source: Data obtained from Department of Census and Statistics and Registrar General Department

Figure 4.4 shows the age specific mortality rates for females in the absence of Tsunami disaster. This also shows that the infant mortality in 1981 higher and it has gradually decreased. Mortality rates for females after 65 years has decreased in subsequent years compared to the values in 1981. When we compare both men and women it can be seen that life expectancy of females has increased more than that of males. According to some demographers nature has also made women in such a way that they



can live a comparatively longer life when compared to men. Bouge has said that “under current conditions the typical female in industrialized countries may look forward to several year of widowhood even, if she marries a husband of her own age”. Some demographers have pointed out that American girl marrying at the age of 18 would be forced to marry a boy only 12 year old in order to assure that she would not spend time as a widow (Ray, 2006) Although females have longer life expectancy than males, a natural disaster can influence the normal situation of female mortality.

#### 4.5 Comparison of the Age Specific Mortality Before and After the Tsunami

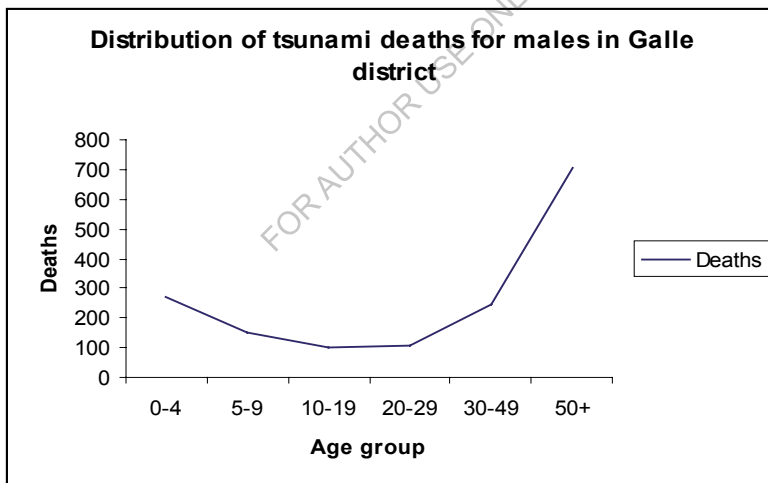
When we analyze the age specific mortality after the Tsunami disaster, it is very interesting to observe new issues. This section attempts to analyze how mortality after Tsunami has deviated from the pre-Tsunami pattern. The following figure shows the pre-Tsunami situation with regard to mortality and it is quite clear that the pattern is a normal pattern where infant mortality is at low level in the case of both males and females. Female mortality has become less when compared to male mortality at all ages, but the gap widens at the adult ages. This is the usual pattern one observes in a low mortality community. Therefore, Galle district does not deviate from that normal pattern, and also it clearly shows a low stationary mortality situation

The following figure 4.5 exhibits the post-Tsunami mortality pattern in Galle district. It is clearly visible from the figure that Tsunami disaster has made a great impact in increasing mortality levels in all the age groups. The increase however, has become very much noticeable after the age of

30, but has started to increase steadily. Therefore, the mortality effects of Tsunami were much greater in the adult ages.

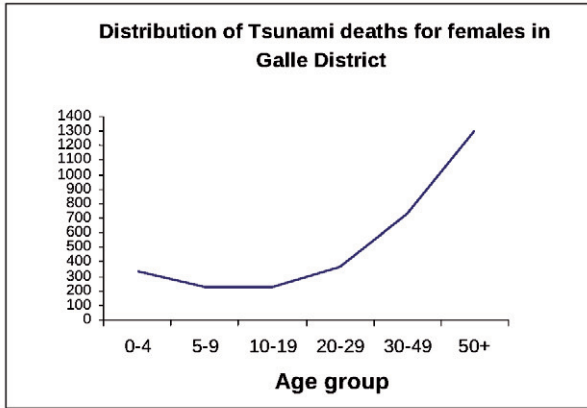
One of the most interesting features observed in the mortality pattern after Tsunami is the gender-wise differences in deaths. The following two figures 4.5 & 4.6 indicate that males were less vulnerable to deaths at the time of the disaster when compared to the females in Galle district. In addition, female adult mortality was greater and it clearly shows their vulnerability. This has resulted in more single-parent families and more male widows.

**Figure 4.5**



Source: Data obtained from Department of Census and Statistics and Registrar General Department

Figure 4.6

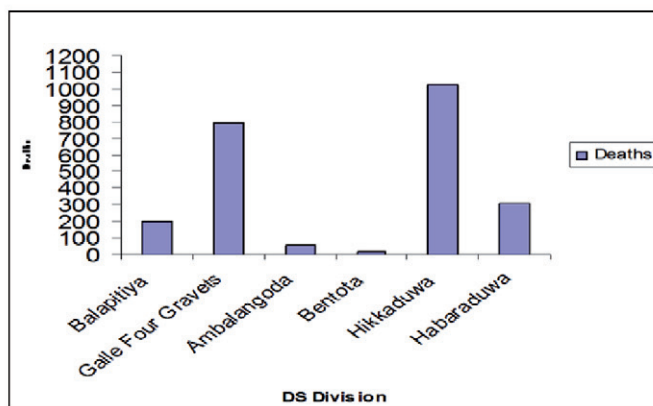


Source: Data obtained from Department of Census and Statistics and Registrar General Department

In order to show the spatial distribution of Tsunami mortality the following figure 4.7 was drawn. It shows the distribution of deaths by affected DS Divisions. Hikkakuwa DS division is the worst affected area in the district and thus the highest number of deaths reported in the district. The least number of deaths were reported by Ambalangoda and Bentota DS divisions and their impact on the mortality in the district was minimal.

A clear division of the mortality impact was clear by gender according to their employment states. It appears that those engaged in trade and fishery sectors were mainly males who died due to the disaster, while those engaged in the coir industry, especially females were at the high mortality risk.

Figure 4.7: Distribution of deaths by affected DS Divisions in Galle District



Source: Data obtained from Department of Census and Statistics

Table 4.2: Distribution of Dead/Disappeared persons by their employment which they have engaged before the Tsunami disaster

	Dead			Disappeared			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Agriculture / Farming	5	1	6	0	2	2	5	3	8
Fishing (for sale)	22	3	25	4	0	4	26	3	29
Other fishery related	11	0	11	0	0	0	11	0	11
Coir Industry	0	42	42	1	5	6	1	47	48

Lime stone industries	5	0	5	0	1	1	5	1	6
Other manufacturing industries	4	22	26	1	2	3	5	24	29
Trade	41	34	75	11	4	15	52	38	90
Tourism related industry	6	2	8	1	0	1	7	2	9
Other related industry	35	16	51	9	1	10	44	17	61
Other	34	26	60	2	6	8	36	32	68
Government sector	18	28	46	0	7	7	18	35	53
Total	181	174	355	29	28	57	210	202	412

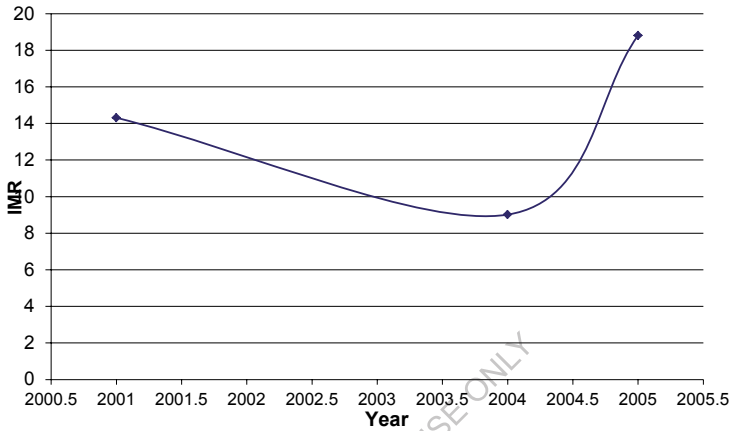
Source: Department of Census and Statistics

#### 4.6 Changes in Infant Mortality Rate

When we examine the infant mortality data we can observe a decline in IMR dramatically over the years, but it has increased to relative significant level in 2005. Although one can expect the mortality to rise during the year 2004 due to the Tsunami disaster, what is observed with data obtained from the registrar Generals' Department is, rather than a rise in mortality statistics, an unchanged situation mainly due to the registration of the deaths on the day of the Tsunami, only in the year 2005. Therefore, the following figure, which shows the changes in IMR exhibits, that IMR

has increased to a record level in the recent history to 18 deaths per 1000 births in 2005.

**Figure 4.8 : Infant Mortality Rate, Galle District, 2001,2004 and 2005**



Source: Data obtained from Department of Census and Statistics and Registrar General Department

#### 4.7 Cause-specific death ratio

Cause-specific death ratio is usually calculated to show the relative risk due to any particular cause of death. In the present study, deaths due to the Tsunami disaster can be regarded as a cause of death and therefore a Tsunami disaster-specific death ratio is calculated for the district of Galle as follows:

**Tsunami disaster-specific death ratio for Galle District in 2005 =** (Number of deaths due to the Tsunami disaster/ Total number of deaths in Galle district in 2005)\*100,000. The ratio calculated is 46.22 per 100 people in the Galle district. This shows a high relative risk due to Tsunami disaster in Galle district.

## 4.8 Risk of death due to Tsunami

Natural disaster is intimately connected to the processes of human development. Disasters triggered by natural hazards put development gains at risk. At the same time, the development choices made by individuals, communities and nations can pave the way for unequal distributions at risk. Meeting the Millennium Development Goals is extremely challenged in many communities by losses from disasters triggered by natural hazards. The destruction of infrastructure, the erosion of livelihoods, damage to the integrity of ecosystems and architectural heritage, injury, illness and death are direct outcomes of disaster. However, disaster losses interact with and can also aggravate other stresses and shocks such as financial crisis, a political and social conflict, disease and environmental degradation. Such disaster losses may set back social investments which aim to eliminate poverty and hunger, provide access to education, health services, safe housing, drinking water and sanitation or to protect the environment as well as economic investments that provide employment and income. In the present study, an attempt has been made to address “How the Tsunami disaster risk distributed locally between small area population levels?” This will provide us a great opportunity to map out how the disaster risk is distributed among small area population level so the government policies can be directed to eradicate their vulnerable position. In order to do this, a map can be developed for Galle district by computing the risk of death for all the DS divisions in Galle district and similarly for the Hikkaduwa DS division, another map can be developed by calculating the risk of deaths for all Grama Niladhari Divisions. This can be a methodological contribution to the field of disaster mitigation since these maps will provide a sound basis to understand the different exposure of the risk due to any disaster situation.

**Table 4.3: Risk of death, 2001, Prior to Tsunami disaster and with the Tsunami disaster**

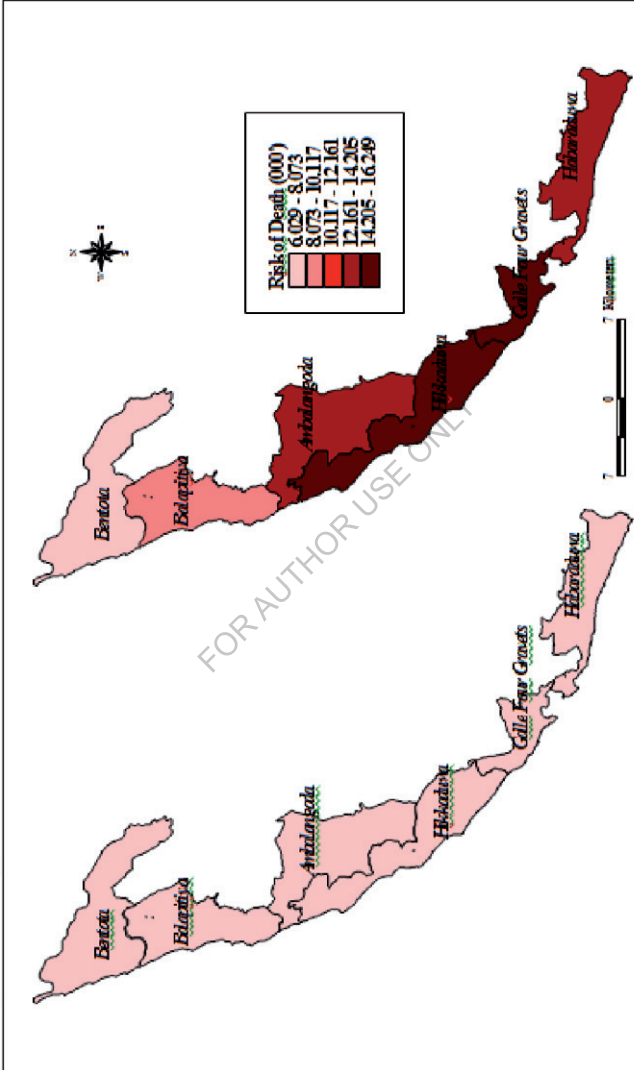
DS division	Risk of death, pre-Tsunami situation	Risk of death, post-Tsunami situation
Balapitiya	0.007009	0.008539
Galle Four Gravets	0.007981	0.01479
Ambalangoda	0.007656	0.012311
Bentota	0.007687	0.006029
Hikkaduwa	0.007171	0.016249
Habaraduwa	0.007571	0.012517

Source: Computed risk of death by using data from Department of Census & Statistics

Table 4.3 shows that Hikkaduwa has the highest risk to a Tsunami disaster and the lowest risk is observed for Bentota DS division. Prioritization of the risk of death by DS division will be very important for those who make disaster interventions as they can prioritize the areas needing more attention. The following figure (figure 4.9) further highlights the risk of death pattern in Galle district and it clearly shows four high-risk areas in the district. Relative risk of death in a particular locality can be more clearly investigated by developing a map too.

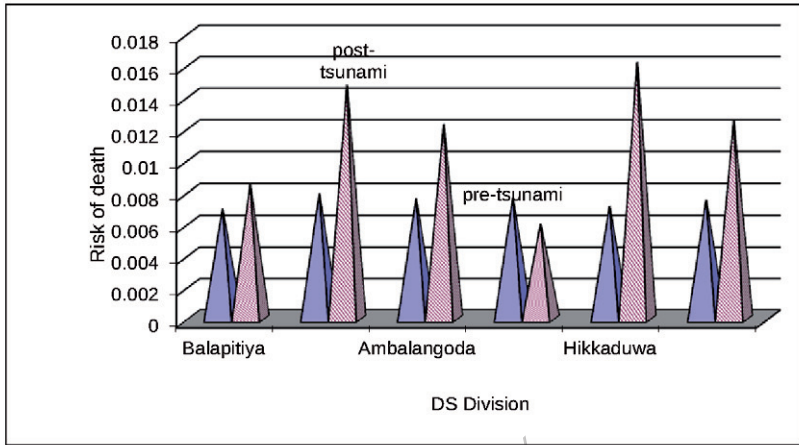


Map 4.3: Changes in risk of death before and with the Tsunami disaster



Source: Data obtained from Department of Census and Statistics and Registrar General Department

Figure 4.9: Risk of Death, Galle district by DS division, Pre and Post Tsunami situation



Source: Data Obtained from Department of Census and Statistics

It is also quite important to mention that the risk of death prior to Tsunami was almost equal and relatively low in each division (Figure 4.9), as mortality has been stable in the country during the last 30 years (Dissanayake, 1987).

#### 4.9 Changes Observed In Life Years

It will be quite interesting to examine whether Tsunami disaster has had any impact in changing the life expectancies at birth. For this, we have computed life tables for males and females for the years 2001 and 2005. It is quite amazing to observe the effect the Tsunami disaster had on the life expectancy values and this is quite visible in Tables 4.4 & 4.5. For females the change has been when compared to males as women have lost 6.53 years compared to men who had lost 5.04 years during just four year period from 2001 to 2005. When annual change in life expectancy is calculated,

we observe more than 1 life year lost for both sexes during this 4 year time period.

**Table 4.4: Changes in life years, males, 2001 - 2005**

Initial life expectancy	68.78
Final life expectancy	63.74
Change in life expectancy	-5.04
Annual change	-1.26

Source: Calculated life years for males by using data from  
Department of Census & Statistics

**Table 4.5: Changes in life years, females, 2001 - 2005**

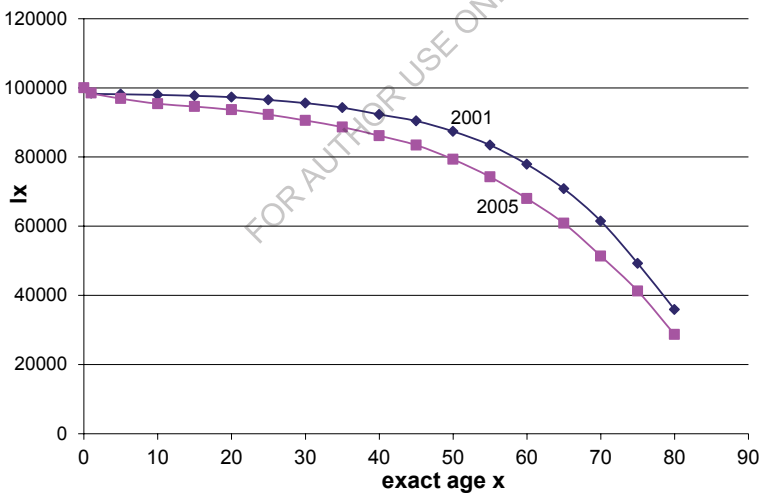
Initial life expectancy	75.31
Final life expectancy	68.78
Change in life expectancy	-6.53
Annual change	-1.63

Source: Calculated life years for females by using data  
from Department of Census & Statistics

The required life tables for 2005 were computed by adjusting the estimated population for Tsunami mortality. Although there is a limitation of not considering fertility and migration changes, it is expected that the present analysis will not be affected severely because the focus here is to examine the changes that have occurred to mortality and its relationship with the population structures and growth. It is also quite visible from the  $l_x$  columns of the said life tables since they are smoothed and compatible with the  $l_x$  columns of the 2001 life tables. The following figures (4.10 & 4.11) show the  $l_x$  columns of the life table survivors at exact age  $x$  for males and females for the years 2001 and 2005. Figure (4.10) for the males

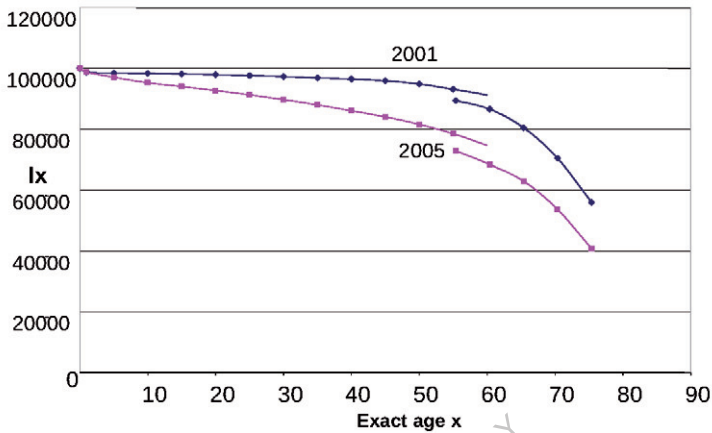
indicates that the number of survivors at each age in 2005 is less than that of the 2001 and the greater differences can be observed in the middle ages. This is mainly due to the impact of infant and child mortality that appears to show signs of their impact mainly during the middle ages where mortality is usually low. It is also important to note that the pattern observed for female survivors is similar to male survivors but a significant difference is observed between the two years considered in this study, which is 2001 and 2005. This can be attributed to more female mortality occurring with the Tsunami disaster.

**Figure 4.10: Life table survivors at exact age x, Males, Galle district, 2001 & 2005**



Source: Based on table 4.4

Figure 4.11: Life table survivors at exact age x, Females, Galle district, 2001 & 2005

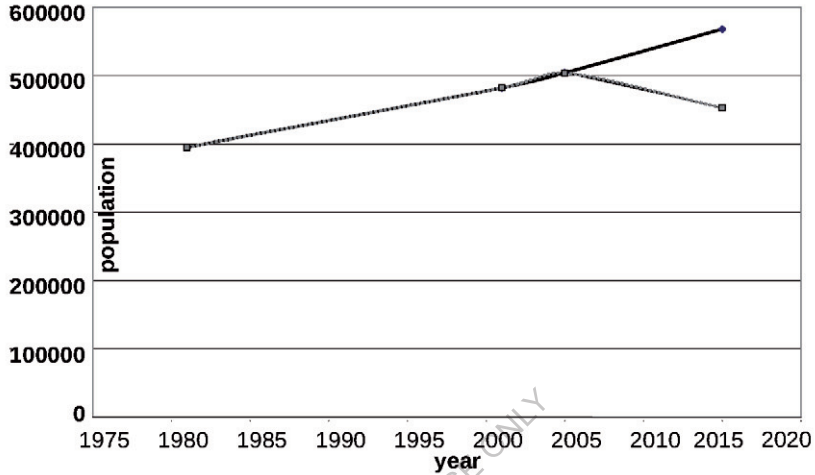


Source: Based on table 4.5

#### 4.10 Impact On Population Growth

Sudden events like Tsunami disasters may usually not be taken into consideration when population predictions are made since we often base our information concentrating on census years. If someone does not know the magnitude of the impact of a disaster on mortality level of a particular locality, the predictions made on population for future years can be severely affected. Therefore, this study has made an attempt to show the severity of the Tsunami disaster and its impact on future population predictions by considering the Galle district mortality and its population. The following figure (4.12) shows the estimates of the population for males in Galle district. As hypothesized in the Chapter 3, we clearly observe a significant effect of Tsunami mortality on the population growth. Tsunami mortality has reduced the population number and also thus the population growth at least in the short and medium run.

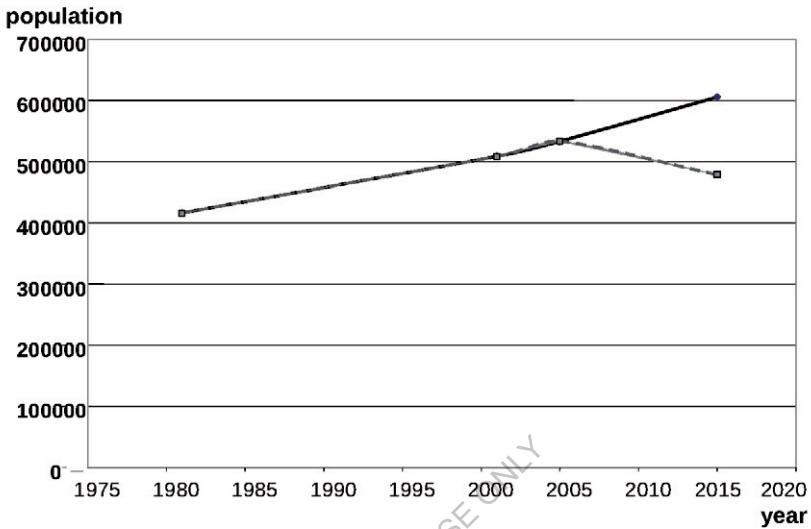
Figure 4.12: Estimates of population by incorporating Tsunami male deaths, Galle district



Source: Data obtained from Department of Census and Statistics and Registrar General Department

When we calculate the rate of growth of the population after Tsunami until 2015, we find that the population is expected to decline by 1.07 during that 10 year period. It is important to mention here this is mainly in the absence of migration and fertility but only in the presence of mortality. However, the decline of female population during this 10 year period from 2005 to 2015 is higher as the average annual growth calculated is -2.50 percent. This is mainly due to higher Tsunami mortality experienced by more females in Galle district.

Figure 4.13: Estimates of population by incorporating Tsunami female deaths, Galle district



Source: Data obtained from Department of Census and Statistics and Registrar General Department

#### 4.11 Conclusion

This chapter attempted to show how a natural disaster can affect mortality in country by taking one of the worst Tsunami hit districts in Sri Lanka. Galle was one of the districts in the southwest of Sri Lanka, which underwent both fertility as well as mortality transition, and therefore, it was quite interesting to see how a disaster can upset post-transitional mortality pattern. The present analysis clearly showed that normal mortality pattern even in such a society can greatly change and this will have a great impact on the population structures as well as social status at the family level by producing a significant number of single parent families and large number of male-widows. A relatively high female mortality at adult ages call for some social protection measures for the elderly males since they are

already in a vulnerable position with fewer number of children who can look after them at their adult age due to early fertility transition in this district. Therefore, it is expected that this study provides a unique opportunity for the population planners as well as policy makers to look at what adjustment procedures need to be implemented in order to recover from such a population loss, at least in the medium term.

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## Chapter Five

### Influence of Tsunami Disaster on Fertility

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#### 5.1 Introduction

The main objective of this chapter is to examine how the Tsunami disaster has affected the fertility levels, trends and pattern in the country by making special reference to the Galle District. The Hikkaduwa Divisional Secretariat Division, which is one of the worst Tsunami affected areas, is selected as a case study to carry out a detailed analysis. This will provide a unique opportunity to understand the underlying mechanism of the impact of the Tsunami disaster on changes that can occur to fertility. This chapter begins with a brief review of examples in which birth patterns respond to well-known events of the time.

It is quite clear that the environmental shocks and other forms of short-run instability affect fertility. Tsunami mortality can affect the increase of the fertility rates since the number of children were affected by the Tsunami disaster. In other ways, fertility rates can decrease for some times due to reasons like the loss of breadwinners of the family, economic instability and mental stresses etc. There may be some women who may need to have children to replace their lost ones, but they delay their pregnancies due to the above reasons mentioned. There are few examples that we can draw from areas that have faced difficulties of disastrous situations in various ways. Their experiences can provide a good opportunity to direct the present study and see whether some of the hypotheses that we propose in this study are true.

Many people believe that human reproduction is highly sensitive to influences from the surrounding socio cultural milieu. After the terrorist attacks in New York city and Washington, DC, on September 11, 2001 (hereafter 9/11), newspaper articles, speeches ( e.g., by First lady Laura Bush), and general speculation posited that U.S. birth patterns would change after 9/11 ( e.g.,“ Baby Miniboom” 2002). Other reports were more cautious ( e.g.,” No Sign” 2002”). However, even this latter relatively cautious and careful report included the following quote: “Dr. Michael Silverstein...at New York University’s School of Medicine said many of his patients told him the events of September 11 motivated them to have a child.” Two years after the terrorist attacks, on September 15, 2003, The New Yorker published an evocative poem written by Deborah Garrison that explicitly stated the link between the terrorism in New York and a desire for childbearing, “When I learned of the uncountable, the hell bent obscenity, / I felt, with shame, a seed in me,/ Powerful and inarticulate:/ I wanted to be pregnant” ( p. 68). This proposes us to hypothesize that any Tsunami disaster situation can lead to increase in fertility during subsequent post-Tsunami years.

Do disasters-either natural or man-made generally influences birth patterns? Popular belief is not always correct. Newspapers confidently reported a “mini baby boom” in New York City hospitals exactly nine months after the famous power blackout in November 1965, but the blackout effect did not actually show up in a careful analysis (Udry 1970). However, negative results like Udry’s did not preclude speculation about the “blackout baby-boom effect” following the most recent major U.S. power blackout in August 2003 in the northeastern United States; any number of newspaper articles and columns predicted a “recurrence” of the discounted 1965 effect. Other even more subtle birth effects have been

proposed, accepted, but were relegated to the category of “urban legend” (Brunvand 1993).CY . Cynthia Linthia Lin (2004) has shown the experiences of two countries: one European country- Italy- and one Asian country- Japan. According to the results, natural disasters have a significant negative effect on fertility in both countries, while short run economic volatility had a significant negative effect in Italy, but no effect in Japan. Thus, short- run instability, particularly those arising from the natural environment, appears to cause a decrease in fertility. Just as economic volatility has been found in previous literature to lower investment in physical and human capital, environment instability lowers investment in the population size of future generations. This evidence suggests a hypothesis that the Tsunami disaster will have a significant negative effect on fertility.

The above literature shows how disasters have affected the people. It has resulted in more deaths and as a result some fertility desires has been increased. This experience will help to rethink the Tsunami disaster in Sri Lanka and how it has influenced human fertility behavior. A similar experience can be seen in the city bombing in Oklahoma City. The particular man-made disaster- the Oklahoma City bombing in April 1995- had an effect on human fertility behavior (Rodhers, John,Coleman, 2005)

The rest of the chapter describes the events surrounding the Tsunami-affected areas. We then define some theoretical orientations that have helped us to understand and organize our thinking about fertility responses to Tsunami-affected areas. Next, we report the results of the studies done in the Hikkaduwa DS Division for birth patterns.

## 5.2 Theoretical Perspectives

As indicated earlier, the main objective of this study is to examine whether the Tsunami disaster has had an effect on human fertility. There are examples from various countries and also there are conceptualizations, which have been developed to show how disaster effects can influence human fertility.

### 5.2.1 Few examples of disaster related fertility changes

Are there previous and documented examples in which birth patterns shifted in response to cultural/political events, terrorism, and natural disasters? A number of such examples exist in the demographic and other social science literature. First, there was a measurable reduction in births in the southern United States following the 1954 *Brown V. Board of Education* court ruling that ended legal segregation of schools (Rindfuss, reed, and St. John 1978). Researchers interpreted that reduction- which began around 12 months following the court decision- as a behavioral reaction of giving birth to children in a sociopolitical environment that was at odds with the prevailing southern culture during that period. More recently, birth rates declined dramatically (by about 60% between 1989 and 1994) in East Germany following the German reunification in 1989. This response was called “the most substantial fall in birth rates that has ever occurred in peacetime” (Conrad, Lechner, and Werner 1996: 331) and was interpreted as a “demographic shock” caused by the difficulty of assimilation during the transitional period after reunification. An example of fluctuations in birth patterns following a natural disaster was reported in relation to Hurricane Hugo (Cohan and Cole 2002). Following the hurricane in 1989, births (as well as marriages and divorces) increased in the 22 affected counties in South Carolina, compared with those that were

not affected. Other recent work also suggested a reduction in divorce immediately following the Oklahoma City bombing (Nakonezny, Rodgers, and Reddick 2004). This suggests that one can observe significant changes in fertility following a natural disaster. Therefore, it will be quite interesting to see how the Tsunami disaster has had an impact on the subsequent fertility in Sri Lanka.

### 5.2.2 Theoretical perspectives on fertility change

The demographic literature contains a broad treatment of how and why fertility changes. The “long” perspective of fertility change is typically cast in the context of demographic transition theory ( e.g. Notestein 1945), which accounts for and attempts to explain the timing of and relationship among declining mortality, declining fertility, and economic/ technological development. Theoretical developments that followed included ‘Beckers’ (1960) household economic perspective, which applied theory from microeconomics to fertility decision making; Easterlin’s (1978) supply-and-demand perspective linking economic and sociological theory; and Davis’s (1963) “multiphasic theory” of demographic change, which combined contraceptive decision making and stresses within the household in explaining fertility change. More recent reformulations and challenges have been offered by Knodel and van de Walle (1979), who suggested that culture is more important than economics in accounting for fertility change, and by Lesthaeghe’s (1983) ideational theory, which further developed the importance of accounting for culture in explaining fertility change.

Do these broad theoretical perspectives have relevance for understanding the possible effect of the Tsunami disaster on fertility in Sri

Lanka in relation to the changes of birth patterns and birth desires of those who lost their children? The answer is partly yes, but in a general sense. *In this chapter we present three focused and specific theoretical formulations that helped us understand fertility responses in Sri Lanka, each of which draws in some key elements from these broader perspectives.* The concept of the demand for children that emerged from earlier economic theories of fertility change is especially relevant. As we consider what happened within households in the Tsunami affected areas in Sri Lanka after the Tsunami disaster 2004 onwards, the disaster could have influenced couples in a number of different ways, through their planning, thinking, and even unconscious expectations and desire for children. Although our theoretical development emerged from these earlier broader theories, our empirical analyses do not in any sense test these broad perspectives. Rather, we defined theories that make specific and sharp distinctions between what might have happened in Tsunami affected areas in Sri Lanka. In other words, theories were designed to help us understand and organize our thinking about the ways in which the Tsunami disaster in Sri Lanka might have influenced birth planning and birth patterns.

*Our specific prediction is that births would increase in response to the Tsunami disaster.* But there are more-subtle and-nuance statements that emerge from various theories than those births should simply increase. The demographic literature distinguishes between the *quantum and tempo of fertility*. Bongaarts and Feeney (1998:290) stated that “quantum refers to the average number of children born to women in a cohort, and tempo to the timing of births by age of mother within the cohort. “Our analysis was of a specific period effect on fertility- the effect of a single historical event. Within this context, we considered tempo effects, which may (or may not) also be ultimately realized as quantum effects (depending on whether

women within this cohort eventually had more children than they would have had otherwise or whether any additional babies born after the Tsunami disaster reflected earlier childbearing, but not an overall increase in childbearing).

The three specific theoretical perspectives were used to help motivate our prediction of increased births following the Tsunami disaster are not in broad perspectives like those stated earlier; rather, they were specifically chosen because they apply to disaster situations like the one in Oklahoma City in April 1995. Two theories were particularly borrowed from other sources and then further developed explicitly in relation to the Tsunami disaster in Sri Lanka. The third is a psychological theory that was explicitly defined to model response to terrorism. *The three perspectives agree in predicting an increase in births following Tsunami disaster.* Natural disasters or manmade disasters ultimately result in the losses of thousands of people that affect to change the population of a country. These theories were developed by looking at the huge loss of lives. Therefore, these three theories can be used to place the changes of birth patterns after the Tsunami disaster. More specifically, they predict an increase in births in certain areas compared to the disaster with the counterfactual consideration of the number of births if the Tsunami had not occurred. Obviously, critical design innovations are required to evaluate this type of counterfactual causal reasoning- specifically, the inclusion of a time series (to observe the *momentum and patterns preceding the disaster*) has been widely applied for this type of purpose.

### 5.2.3 Community influence theory, replacement/insurance theory, and terror management theory

The three focused and specific theoretical perspectives that we used included community influence theory, replacement/insurance theory, and terror management theory. The community influence theory suggests that parents want to raise children in a positive and supportive community. *In Hikkaduwa DS Division, we will be examining whether the parents have presumed to have discovered that Hikkaduwa DS Division was such a community through the response to the Tsunami disaster.* Replacement/insurance theory suggests that parents observed the loss of life, especially the loss of life of children during the Tsunami disaster and thus felt that life was more fragile than before. They therefore, respond by having more children. We posit this response as a psychological one in which parents ensure against the potential loss of their own children (or, in a sense, *parents proactively replace that potential loss*). The Terror management theory (Solomon, Greenberg, and Pyszczynski 2000) suggests that *when mortality becomes salient, people behave increasingly according to traditional values*. Having children and raising families would be such a traditional response.

Although these three theories each predict increasing birth rates, they have different short- and- long- term implications and geographic predictions. Community influence theory suggests a long-term effect, building over time as the positivity of the community becomes more and more salient (and lasting as long as the community response continues to be positive and supportive). Within this perspective, the effect should be the strongest in the actual locations in which the disaster occurred (Hikkaduwa DS Division). In relation to the broader theories of fertility



change, community influence theory is strongly tied to the cultural features of ideational theory; in fact, it suggest a shift in the “birth culture” caused by a disaster, including a new recognition of positive features of the community culture that were already present, but that may not have been recognized.

Replacement/ insurance theory would suggests a more immediate response, possibly dampening over time (in much the same way that someone might take out extra life insurance immediately following an unexpected death in the family and let it drop later). This type of effect may be observed broadly in the Hikkaduwa DS Division and other communities in which individuals feel personally tied to Hikkaduwa DS Division, including the Hikkaduwa DS Division suburbs and the other Tsunami affected areas. The dampening period may be fairly long term in relation to a disaster of the size. There is a strong link in this theory to demand/socioeconomic theories, in that *couples are assumed to be responding to their (possibly unconscious) desire for children or, more specifically, for a certain number of children.*

Terror management theory suggests effects on those who were the most immediately influenced at a deep psychological level by the disaster, those for whom the Tsunami disaster made their own mortality vivid and realistic. Those effects may dampen fairly quickly as the feeling of immediate threat to life decline and those who are affected return to the routines of everyday life. Or if media attention results in the “threat life” remaining salient, the effect could persist for some time. Because the terror-management effect depends on the strength of the feeling of threat, the effect should be observed strongly in Hikkaduwa DS Division and, to a relatively small extent, in other Tsunami affected areas surrounding

Hikkaduwa. This theory would predict a potentiality broad geographic effect of the disaster.

Any or all of the processes that are implied by these three theoretical perspectives can occur simultaneously. Empirical patterns can distinguish between the predictions of the theories, but they are not mutually exclusive. Thus, if there are measurable fertility responses to the Tsunami - within the context of our design structures, the patterns across time and geography will provide insights into which of the processes described in these theories are relevant in explaining fertility responses to disaster settings like the Tsunami disaster in Sri Lanka. Therefore, this chapter attempts to test the hypotheses that have proposed in those three theories.

### 5.3 Demographic-economic relationships

What factors determine fertility? The classical Malthusian theory posits that fertility is affected by income and mortality; the hypothesis is that the Tsunami disaster in Sri Lanka has had an impact of human fertility. There are several theories for how fertility may respond to disasters, income, social change etc. Malthusian theory predicts that wages should have a positive effect on fertility through its effect on increasing the marriage rate (J. Lee Wang, 1999), perhaps because in Europe couples could not marry before they acquired an economic means of support (R. Lee, 1979). Another possible reason for a positive relationship between wages and fertility is that higher incomes lead to better nutrition, which in turn enhances fecundity (R. Lee, 1985)

On the other hand, it is also possible for higher wages to have a negative effect on fertility. One reason why fertility may decrease with

income is that higher wages diminish the need for children as a form of insurance. A second reason is that higher income levels may be associated with a stringer social custom against marriage or a stronger social custom favoring quality of children rather than quantity. Third, when one's earning in the labor market are high, then the opportunity cost of marriage and of raising children are high as well. Thus, because economic theory does not make a definitive prediction on the sign of the effect of income on fertility, the net effect is an empirical question best resolved with data.

In addition to the wage, a second determinant of fertility is included in the Malthusian model of the crude death rate. The classical economic theory of population growth predicts that fertility should increase with mortality. For example, if couples desire to have a certain number of surviving children, then higher rates of infant and child mortality would induce higher levels of marital fertility, for parents would endeavor to replace the children they have lost. Likewise, in some pre-industrial populations, age at death of one's father would affect the timing of inheritance and therefore of one's marriage (R. Lee, 1973), so that a higher death rate would lead to earlier marriage and therefore a higher birth rate as well.

On the other hand, as with other forms of risk, mortality risk may affect individual behavior and, in particular, reduce long-term investing. To the extent that the crude death rate is a measure of mortality risk, therefore, it is possible that fertility decreases with mortality. For instance, if child death rates are high, then children become a more risky investment, and parents may choose to invest less in having them. Likewise, if adult death rates are high, then parents may be more cautious about having a child if they do not believe they will live long enough to care for the child,

or long enough to reap any potential old age insurance benefits from investing in children. Thus, once again, the sign of the effect on fertility is ambiguous: while a positive coefficient on the crude death rate would support the classical Malthusian theory, a negative coefficient would provide evidence that individuals may be affected by risk.

While the classical economic theory has focused primarily on income and mortality, this study focuses instead on an additional determinant of fertility: environment shocks, as measured by the number and magnitude of natural disasters. According to Jones (1981), who hypothesized that families living in a more natural disaster prone environment would accumulate a population surplus as a form of demographic insurance against catastrophe, one would expect natural disasters to have a positive effect on fertility. However it is also possible that short term environment shocks may decrease fertility, perhaps because the shock makes individuals less willing to make the long term investment required to raise a family. Thus, there are theories to support either sign of the effect of natural disasters on fertility, and which effect becomes an empirical matter.

Dynamic demographic-economic relationships have been of interest to economists ever since Malthus proposed an economic theory of population growth in the late eighteenth century (see e.g. NBER, 1960; Schofield & Wrigley, 1985; Lindahl-Kiessling & Landberg, 1994; Galor, 2004). However, while it may describe long-run relationships between population and income in pre-industrial Western societies, the classical Malthusian theory fares less well in more general contexts. One possible reason is that, in focusing primarily on the extent to which wages and vital rates exert influence on each other in steady state, the classical theory has

overlooked the possible effects of environmental shocks and other forms of short-run instability on the demographic-economic system.

Individuals behave differently under conditions of instability, risk and uncertainly than they do under conditions of perfect certitude. For example, ample empirical evidence suggests that household level income volatility leads to lower investment in both physical and human capital at the micro level, and that country-level economic volatility leads to lower government spending and lower mean growth at the macro level (Blattman, Hwang & Williamson, 2007, & references therein.). In a similar fashion, sources of instability are likely to affect fertility decisions as well. According to Cain (1983): “If people are motivated by a principal of safety first (their fertility behavior) may be influenced less by average mortality experience than by variance in that experience, and particularly the tail of the distribution that contains the worst records” (p.698). Just as individuals in unstable economic environments may be less willing to invest in capital, individuals in volatile natural environments may be less willing to invest in bearing children. An analysis of the effects of environmental shocks on population growth is important for several reasons. First, because there are considerable differences in the stability of the natural environment relationships may enable economists to better understand the sources of cross- country differences in population growth and income.

There is an extensive literature that theoretically and conceptually discusses the consequences of population growth on a country’s economy (see. E.g. Coale & Hoover, 1969; Spengler, 1969; Stavig, 1979 & references therein.) In his empirical study 94 countries over the period 1955-1971, Stavig (1979) finds that rapid population increase had a negative impact on changes in many crucial economic indicators- including

change in per capita gross capital formation, government consumption, manufacturing and exports- many of which are highly correlated to change in per capita GNP.

#### 5.4 Positive Impact on Fertility

This section attempts to analyze whether, as predicted by the theory, the Tsunami disaster had any positive impact on fertility. In this regard, Hikkaduwa DS division is used as a case study, as indicated earlier, in order to collect information from mothers who are still in the childbearing ages and lost at least one child due to Tsunami disaster. In addition, we also hypothesize, that potential couples who are just married may have changed their attitudes towards the number of children (different to the fertility norm which currently exists in the society) and have decided to increase the number of children by thinking of possible similar disasters in the future and also possible loss of children.

In this context, we hypothesize, that those who are in the childbearing ages and have lost their children have planned to have at least another child. As indicated in the literature by many writers have discussed, this behavior can be seen as an adjustment to the lost children by replacing them by an additional birth. This was further studied by collecting information from women who lost children and replaced them by an additional birth. In addition, those who have not yet replaced children have been asked about the decision.

It is also interesting to see *how women who were in the childbearing ages but became widowed respond to their fertility desires in the subsequent marriage*. In this regard, some few case studies were carried

out in Hikkaduwa Divisional secretariat Division in order to understand this phenomenon in great detail. One can expect the timing of birth in the Galle district is happening at a regular sequence since Galle district is already in the fourth stage of the demographic transition. However, with the Tsunami disaster we hypothesize that this regularity in the timing of births is disrupted. This phenomenon was examined in more details by comparing the timing of marriage, timing of first birth and the interval between births occurred during post Tsunami period with the pre-Tsunami birth intervals.

## 5.5 Changes In Population Growth

It is quite interesting to see whether the Tsunami mortality had any impact on the future population and its growth. This will indirectly force us to examine whether this decrease in population growth will be compensated by an increase in fertility. The following table 5.1 shows the population growth predicted in the absence and presence of Tsunami deaths in the Galle district. It seems that the average annual growth rate of the Galle district population has decreased from .0074 per year between 2001 and 2011 in the absence of Tsunami disaster to .0045 for the same period after applying the Tsunami deaths occurred to Galle district population observed in 2004. The decrease in the population in 2011 due to Tsunami disaster appears to be about 2.9 percent decline in the population or about 30,500 in absolute number, which can be regarded as a substantial decline. However, it is important to note here that this decline may not be observed if those who have experienced child losses have intended to have additional birth in order to replace the loss ones.

**Table 5.1: Population in 2011, in the absence and presence of Tsunami deaths presence of the Tsunami deaths, Galle District**

<b>Average annual growth rate</b>	<b>In the absence of Tsunami deaths</b>	<b>In the presence of Tsunami deaths</b>
2001-2011	.0074	.0045
Estimated population in 2011	1,067,115	1,036,613

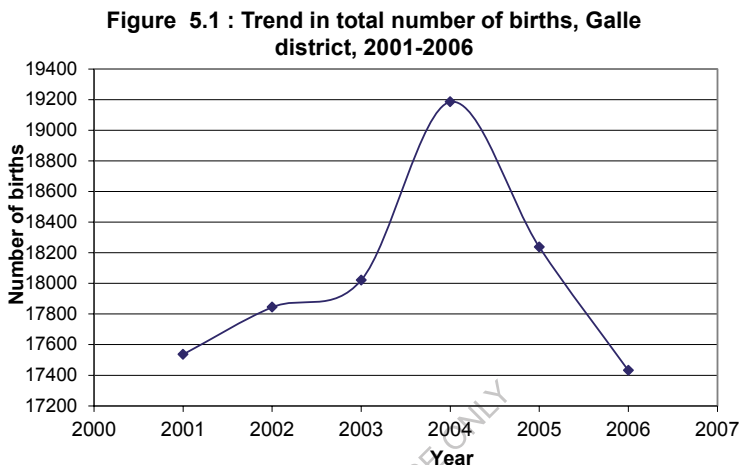
Source: Calculated Population in 2011 by using data from Department of Census & Statistics

## 5.6 Changes In The Total Number Of Births

It will be quite interesting to examine whether there has been any change in the trend line of the total births observed in the Galle district from the beginning of this century and for couple of years after the Tsunami disaster. This will surely provide a great opportunity to find out whether the intensity of fertility has changed significantly during this period. As we can see from the Figure 5.1, we find that the total number of births have increasing from the year 2001 up to 2004, which is the Tsunami year. Then a declining trend is observed in 2006, even below the level of the births observed in 2001. It is quite reasonable to argue here that the fertility decline is not necessarily reflected in the total number of births as the decline in fertility in the third stage or initial stage at the fourth stage can have an increasing number of mother concentrating still in the childbearing ages due to the decline in the fertility observed during the recent past. This phenomenon is still happening in the Galle district, and therefore, on can assume the increase in the total number of births observed during the period between 2001 and 2004 was result of the increasing



number of women in the childbearing ages. This can be observed when age structure of the childbearing ages of the Galle district is examined.



Source: Data obtained from Department of Census and Statistics and Registrar General Department

As indicated earlier, Figure 5.2 clearly shows what has happened to the age-structure of the female population in the childbearing ages during the period, 2001 to 2004. It clearly exhibits that there has been a constant increase in the number of women in all ages during the period under study. This explains why the total number of births has increased from 2001 to 2004. As Coale (1975) has pointed out, birth momentum has continued for some time even the fertility decline has observed in the Galle district. Therefore, one needs to examine further whether this trend has continued even after the Tsunami disaster, because we need to find why there has been a steady declining trend in the total number of births in the post-Tsunami years.

The following case is a good example for how family structure was changed due to the Tsunami disaster. In this case a couple who had five children lost wife and four children due to the disaster and remarried with wife's sister and are having one child already in their marriage and intends to have another very soon.

#### **Case study 5.1**

31 years old Ruwani is a married woman, presently residing at Galagodawatta housing scheme after losing her dwellings in the Tsunami. She lost all she possessed, as well as a child due to Tsunami tragedy. Nilmini is a Sinhala Buddhist who was educated up to year 10. She, who got married willingly at the very tender age of 13 and has given birth to five children so far. Four children were born prior to the Tsunami and one in the post Tsunami period. She was only 14 years old in the year 1991, when she delivered the first child. The second child was born in 1993 when she was 16 years old. She gave birth to the third child in 1995 when she was 18, fourth in 1998 when her age was 21 and at the age of 30 the fifth in 2007.

Due to the Tsunami tragedy they lost their house, household goods and their 6 years old son. Since she gave birth to their fourth child in 1998, they decided that they were content with their four children, two boys and two girls. Subsequently, when Tsunami killed one of their sons, they decided that this should be compensated with another child in lieu of the lost. They did not implement this until their economy became stable and they got a house to live. Since then they proceeded to get a child. Their objective was fulfilled in the month of April in 2007. They have got a child and they are content with the family.

It is also clear some actually want more children, especially older women as a social security measure as well as an insurance measure as depicted in the following case study.

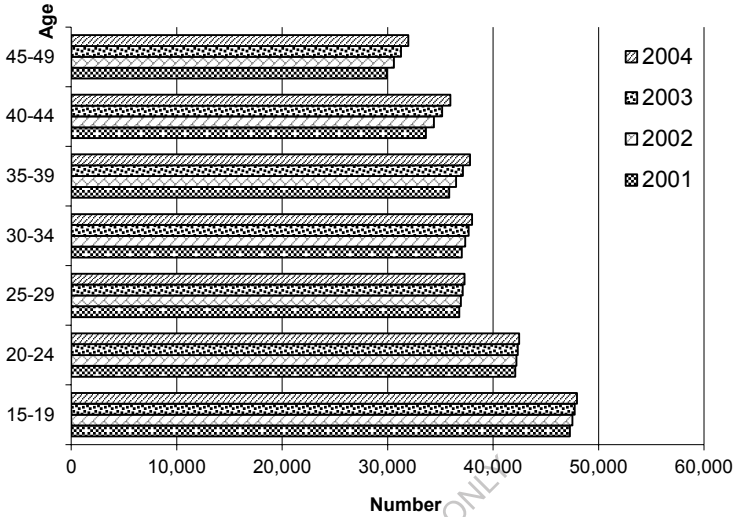
### Case study 5.2

Kanthi who is 29 years, is a Sinhala Buddhist woman educated upto year ten. As a result of a love affair she got married at the age of 16, and has given birth to two children during her life span. Her first child, a male was born in the year 1997 when she was 18 years old. The second child was born in 2002. Then she was 23 years old and the baby was a female. Considering their economic situation they decided that two children are sufficient. Second child who was two years old, demised due to Tsunami.

Though they want to have another child in lieu of the demised child, they are unable to take a correct decision. The fact is that due to their matrimonial husbands parents and relatives are angry with them. They were assisted by her mother and sister. She lost both of them due to Tsunami. Therefore the family ties are limited to the three of them. Ties with the other relatives are apart. Therefore when the husband is engaged in fishing, she is alone with her child. Her husband rarely spends the night at home. Therefore there is no one to assist them during a calamity. They are not yet accustomed to the present living environment. Their economic status is also not very sound though her husband is engaged in his livelihood. Considering the above facts they need another child they have decided that the present condition is sufficient. But the possibility of another child depends on the improvement of the economic standard and good relationship with her husband's relatives. She is 29 years of age and still fertile, another birth of another child birth will be decided with changes in due time.

Figure 5.3 clearly shows that the number of females in the childbearing ages in 2006 has increased in all ages compared to that of the 2001. However, the relative increase in different ages shows that the intensity has been greater in the ages 35 and above in 2006. This suggests that most women who have produced children before in their early years of childbearing ages have now been moving into higher ages where women usually commence stopping behaviour of fertility.

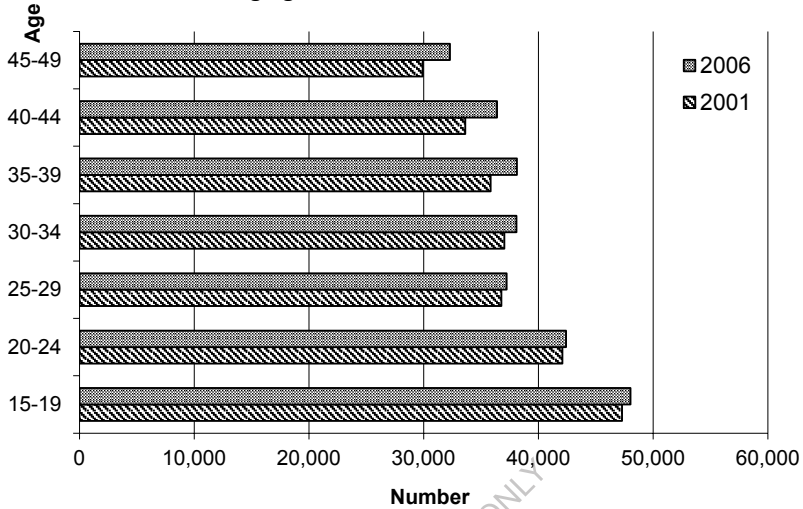
**Figure 5.2 Age-sepcific female population in the childbearing ages, 2001-2006:**



Source: Data obtained from Department of Census and Statistics and Registrar General Department

Therefore, one can reasonably claim that the relative decline in the early years of childbearing may have had some impact on the decline in the total number of births. However, this alone may not be enough to explain the substantial decline observed in the total number of births in the post-Tsunami years. Perhaps, women in the reproductive ages who have lost children may have decided to postpone their subsequent births during the immediate post-Tsunami years. However, that does not indicate whether they have decided to completely stop childbearing, but they may be expecting to have many more children than they expected after they have settled themselves during the post-Tsunami years, with a two or three years lapse.

**Figure 5.3 : Age-specific female population in the childbearing ages, Galle District, 2001 & 2006**



Source: Data obtained from Department of Census and Statistics and Registrar General Department

Micro-level analysis at Hikkaduwa DS divisional level provides a clear insight into what really has caused to observe a decline in absolute number of births during the immediate post-Tsunami years.

Following is good example again to show how the kin influence on the family's decision with regard to number of children changed due to Tsunami, which existed prior to Tsunami and disturbed with the death of the family with the Tsunami disaster. In addition, this case study also shows the importance of economic recovery and the time needed for such recovery, which affect the size of the family.

### **Case study 5.3**

Niranjala who got widowed due to the loss of her husband from Tsunami is 23 years old. She is a Sinhala Buddhist and was educated up to G.C.E ordinary level. She was just 18 years when she got married on a proposal in the year 2003. She was 19 when she delivered her first baby on 16<sup>th</sup> August 2004. The baby was a male. Since the death of her husband from the Tsunami, she is living with her child and mother in law. Their family income depended on the salary her husband drew from the hotel institute where he was employed. This source ceased with the demise of the breadwinner. Therefore, not only the responsibility of the child but she has to bear the burden of feeding and caring for her mother in law. She is not willing for a remarriage or to send the mother in law to her dwelling, as the rightful owner of the house which her late husband claimed from his parents she is responsible for their upkeep. Therefore, with the economic problems aroused with the Tsunami her attention was focused on sewing. The donation of a sewing machine by an organization has become a great asset for her. She is sewing night dresses on the basis of settling the credit for the material after marketing them. She has developed the enterprise to a certain extent. She is still 23 years old. Her parents and relatives are proposing marriages for her. Her intention is to develop the enterprise, and if a person could be found who would understand her situation and undertake the responsibility of maintaining the family, with her mother in laws consent to consider to such a marriage. In such a context she expects to bear children. Considering the situation that arisen with the Tsunami tragedy, she said having more children is a satisfaction. She said she was able to develop her life because of her child.

It is very much clear from the case study 5.4 that the widowhood due to Tsunami has affected the desire for more children. In this particular case a man who is 49 years old expect two more children in his second marriage because he lost all two children and wife with the Tsunami disaster.

#### **Case study 5.4**

We could identify with Danasiri, (an employee of the ‘Department of Health’) as a person who is depressed due to his losses from the Tsunami. He is 49 years old and is educated up to G.C.E ordinary level. They were contented with the two children they had prior to the Tsunami and lived a happy family life with his wife and children.

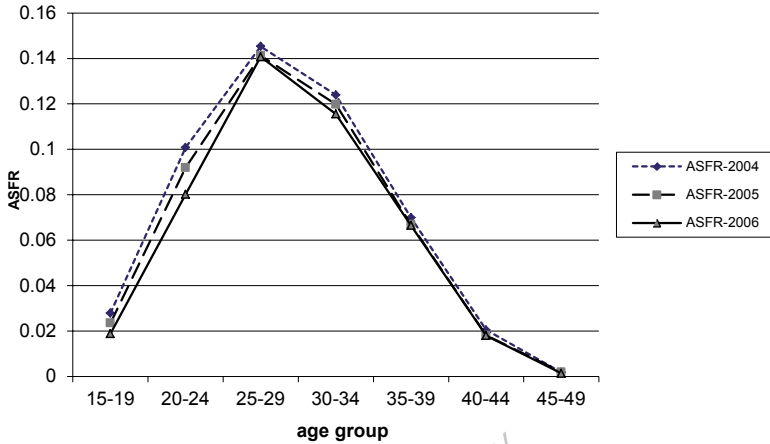
The Tsunami tragedy snatched everything he possessed leaving him alone. He lost his wife, children and all the property. He was severely depressed due to this and the Department of Health services extended an excellent counseling service for him. He lived as a spinster and subsequent to the counseling he developed hopes of rearranging his life.

The first move was getting married to an attendant serving in the Department of Health. He was 23 years old when he first married. In the year 1990 when his first child was born his age was 31 years. He was 34 years old when his second child was born in 1993. When he lost all his belongings and got widowed, he was 45 years old. He was 47 years old when he remarried. Her age was 37 years. The first child for this new family was born in the year 2008. At present he is 49 years and she is 39 years old respectively. But they are expecting to have two more children at one year intervals. Their intention is to give birth to two more children before they get old. At the inception in the first marriage they wanted only two children. But the ideas about fertility have changed since the Tsunami tragedy. They are expecting two more children though they have passed the appropriate age at present.

### **5.7 Changes in the age-specific fertility rates**

Examining the age-specific fertility rates between the periods from 2001 to 2005 provides a unique opportunity to understand whether there has been a significant change in the fertility behaviour in Galle district with the Tsunami disaster. This macro-level picture is further investigated by carrying out in-depth studies in Hikkaduwa DS division that are described later in this section.

**Figure 5.4 : Age-specific fertility rates, Galle district, in the absence of tsunami disaster, 2004,2005,2006**



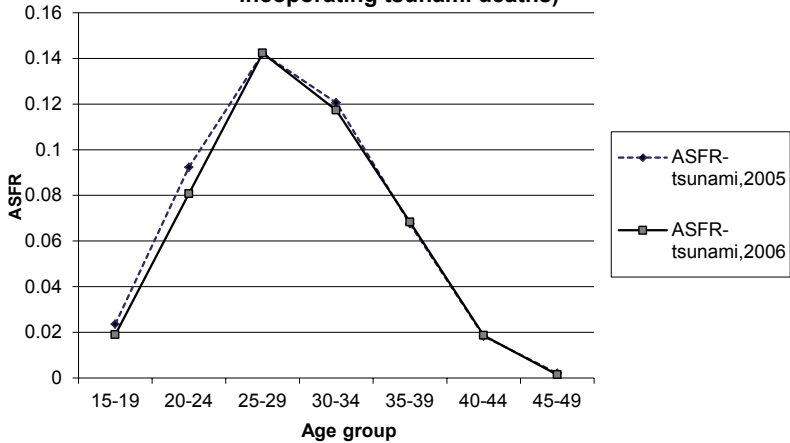
Source: Data obtained from Department of Census and Statistics and Registrar General Department

Figure 5.4 exhibits the age-specific fertility rates in the absence of the Tsunami disaster for the years 2004, 2005 and 2006. It shows that fertility decline has been substantial during the two-year period from 2004 to 2006, especially in the first half the childbearing period in all ages. This coincides with the rapidity of the fertility decline, which can be observed in the initial period of the fourth stage of the fertility transition, where fertility begins to stabilize at relatively low level.

Figure 5.5 shows the changes in age-specific fertility rates of the Galle district incorporating the Tsunami deaths to the population being studied. It indicates that the decline in the age-specific fertility rates have been in the first half of the childbearing. This is very similar to the pattern what we have observed even in the absence of the Tsunami disaster as depicted in Figure 5.4.



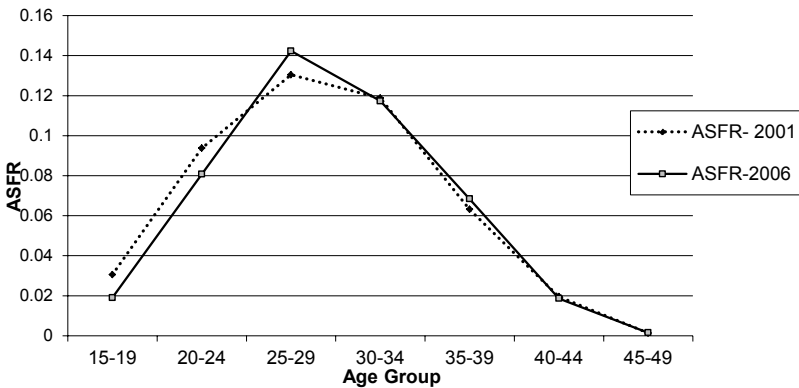
**Figure 5.5 : Age-specific fertility rates, Galle District (after incorporating tsunami deaths)**



Source: Data obtained from Department of Census and Statistics and Registrar General Department

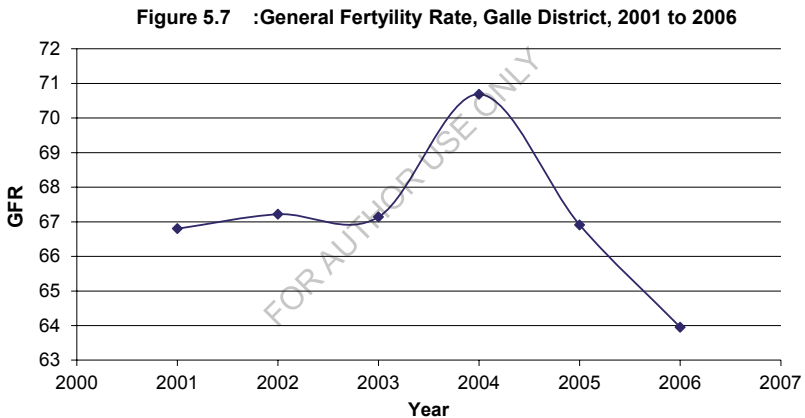
Although Figures 5.4 and 5.5 does not show much of a variation in terms of level and pattern of age-specific fertility rates, Figure 5.6 clearly exhibits a considerable difference between level of fertility between 2001 and 2006, which is a post-Tsunami year.

**Figure 5.6: Age-specific fertility rates, Galle District, 2001 & 2006(after incorporating tsunami deaths)**



Source: Data obtained from Department of Census and Statistics and Registrar General Department

Therefore, one can claim that the most fecund women and also those who have just married may have decided to have more births during the post-Tsunami years. Since the number of women who were severely affected by losing children is not substantial, their impact may not be reflected in the occurrence of absolute number of births in 2006. However, when rates are calculated the relative intensity is clearly seen as depicted in Figure 5.6. In this regard, we also can examine whether there has been any change in relation to intensity of fertility by using another useful rate, the General Fertility Rate (GFR) of the Galle District from 2001 to 2006.



Source: Data obtained from Department of census and Statistics and Registrar General Department

Figure 5.7 is not very different to Figure 5.1, which exhibited the time trend of the absolute number of births that occurred in the Galle district. It appears that there is a clear decline in fertility during the immediate post-Tsunami period. However, the present analysis is in a greater position to highlight that a significant and unusual pattern of change

in the fertility behaviour of women has been observed, especially in the ages 25-29 years. As indicated in the beginning of this chapter, short run economic volatility can have a significant negative effect on fertility as the rehabilitation process took more than two years. As a result, families became more vulnerable mainly with regard to shelter and livelihood. Thus, short- run instability, particularly that arising from the natural environment appears to cause a decrease in fertility. On one hand, the evidence suggests the hypothesis's that the Tsunami disaster will have a significant negative effect on fertility. On the other hand, women in the age 25 to 29 years have changed their fertility behaviour significantly in a positive manner with the Tsunami disaster.

## 5.8 Changing Fertility Behavior

### 5.8.1 Age Of Mother And Child Mortality

On average, the number of children ever born for the affected population was 2.1. Among them 59 percent of women have lost 1 child and 41 percent have lost at least more than two children. Majority of children who died due to Tsunami were younger children and whose mother was still in the first half of their childbearing age span. According to our survey results 68.1 percent of the children who died belonged to women who were below 35 years of age at the time of Tsunami disaster. It is quite interesting to note that the level of mortality of the children among the affected community before the Tsunami disaster was zero as no children were reported dead.

**Table 5.2: Number of children lost due to Tsunami by age of mother**

Age group	Number
20-24	8
25-29	12
30-34	40
35-39	13
40-44	10
45-49	5

Source: Survey data

### 5.8.2 Fertility Desires

When we examined the fertility desires at present, we found quite interestingly that all wanted to have at least one child. The majority indicated that the desire to have at least 2 children.

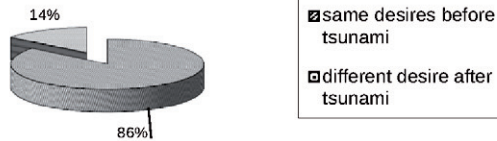
**Table 5.3 : Number of children desired by age of mother**

Age group	Number of children desired		
	1	2	3
20-24		4	4
25-29		8	4
30-34	20	12	
35-39	8	4	4
40-44	4	4	
45-49	4	4	4

Source: Survey data

The fertility desires were quite different to what they had before the Tsunami disaster and it coincided with the fertility norm of the society; 2 children per family, on average. About 73 percent indicated their fertility desires were not the same before the Tsunami disaster as depicted in the following figure.

**Figure 5.8 : Fertility desire before and after tsunami disaster**



Source: Survey data

It is quite interesting also to observe how the fertility desires have changed dramatically with the Tsunami disaster for those who are still at the fecund ages. Following case study is good example for this as this couple has decided to have three more children in place of their two dead young children due to the disaster.

#### Case study 5.5

In the pre Tsunami era Dilanthi and her family lived in Peraliya North GN division with wealth and happiness. At present she is 34 years of age and has studied up to G.C.E advance levels. They got married subsequent to a love affair, with the blessings of their parents and were gifted with a son and a daughter. Even prior to their marriage they had planned to have only a son and a daughter. When this was fulfilled they decided to limit their family. She lost many belongings due to Tsunami, most importantly even her beloved children. Their life was shattered. Subsequent to the tragedy they got accustomed gradually for the life style. Though they wanted only two children in the pre Tsunami era, they wished they could have three children in lieu of their lost children. They have arrived at this decision due to the loss of their children from the Tsunami tragedy. At present they are once again parents of a son and a daughter. She was 18 years old when she married, her first child was born in 1993 when she was 19 years old and the second child was born when she was 25 years old in 1999. In the post Tsunami period the first child was born in 2006 when she was 32 years and the second child

was born in April 2008 at her 34<sup>th</sup> year. The baby is three months old at present. She has given birth to four children during her life span. As she is 34 years old she is expecting to deliver her next baby within two years.

When the respondents were asked if they had decided to have a child in place of their lost children, about 95.5 percent indicated that they would like to have a replacement. This suggests that they have decided to adjust their fertility behavior because of the disastrous situation. It is also quite interesting to show that the age at widowed due to Tsunami was 36.00 years. About 43 percent have remarried and the average age at re-marriage was 36.57 years. This suggests that there was still in the fecund age and their desire is to have children in the new marriage as well.

It seems as indicated earlier that the women who are still in their fecund ages would like to replace their dead one from the same number after Tsunami and this is very much evident from the case study 5.6.

#### **Case study 5.6**

30 year old Susila resides at the “Tubaco” housing scheme at Galagodawatta after the Tsunami. She is a mother of two children. She is a Sinhala Buddhist educated up to G.C.E ordinary level. When she was 18 years old she got married according to her wishes and has given birth to four children.

She was a mother of three when Tsunami struck. Her first child was born in 1997 when she was 19 years, the second in 2002 when she was 24 years and the third on 17<sup>th</sup> December 2004 when she was 26 years. She sacrifices her property as well as two of her children for the Tsunami. Till then they were satisfied with their family consisting of two daughters and a son. But they lost their only son who was 7 years old then and seven days old infant daughter due to Tsunami. They decided to have two more children due to this fact, resulting in the birth

of another daughter in the year 2007. She was 29 years old then. She is still in a fine fertile age and also because they feel the lack of a son they intend giving birth to a child as early as possible. There was no such intention in the pre Tsunami period. She said they decided on this due to the loss of children by Tsunami.

The following case is a very interesting one because this woman is in her second marriage not because her husband died due to Tsunami but it was a divorce and then re-married. What is more important here is that they expect only one child in the second marriage but because of the Tsunami disaster, now they feel one child is not enough and intend to have another child at their earliest. This woman is at the age of 44 years but it appears that the Tsunami disaster has severely changed their attitudes towards number of children.

#### **Case study 5.7**

Warusa is a 44 year old married woman. She is a Sinhala, Buddhist and is educated only up to primary level. In the year 1985, when she was 21 years old, she got married and the first child was born in 1986. The second child was born in 1996 when she was completing 32 years of age. At the time of marriage their intention was to have two children. Though this objective was fulfilled the disagreements which prevailed between them for a long period developed and they divorced. The custody of the children was assigned to the farther.

Now the elder daughter is married and the son is living with the farther. Subsequent to the divorce, she lived a single life for some time and remarried, when she was 34 years old in the year 1998. As she had no children under her custody and due to remarrying she intended having only one child. When the Tsunami struck on 26<sup>th</sup> of December 2004 she was pregnant for two months. But due to the unexpected shock she aborted and lost hopes of a child.

Currently they have gradually developed their way of life which was affected by the losses due to Tsunami. After the tragedy, the first child of the marriage was born in the year 2007. Till the economical difficulties gradually lessened, they have postponed having another child. Initially they expected only one child from the second marriage but due to the losses from the tragedy they decided that a solitary child is not sufficient. As she is already 44 years old, the intention is to have another child at their earliest.

It was found that the majority of the children who died due to Tsunami were younger children and whose mothers were still in the early years of childbearing age span. It was also revealed that the level of infant and child mortality during the pre-Tsunami period in the affected community was zero as no child has been reported dead. Our analysis showed that the fertility desires of the affected who are still in the childbearing age span are quite different to their fertility desires before the Tsunami and now they want more children, that is more than the fertility norm in that community for not only to replace the dead children but also as an insurance measure to face a future disaster situation. This clearly shows those affected women have decided to adjust their fertility behaviour of the disastrous situation. A relatively high incidence of re-marriage was also noticed among the women who lost their husbands due to Tsunami and thus an increase in number of children in their new marriage also is desirable.

Although some people did not have any intention to remarry and have more children, like in the following case, unexpected things happened to their lives with the Tsunami disaster. Although the man who is now 49 years old got married at the age of 22 years and had three children, but lost wife due to the disaster and got married wife's sister in 2007, who was 29 years then and now expect to have two more children in their marriage. In



fact his daughter from the first marriage is now married but it is quite parent that the Tsunami disaster has changed fertility behaviour of the people to a great extent.

#### **Case study 5.8**

We could identify Gunathilake too among the people who got affected by the Tsunami. He is now 49 years old and employed as a teacher. He was 22 years old when he first married in 1980. He had three children from that marriage; two daughters and a son. He was 28 years old in 1986 when the first child was born. He was 30 years in 1988 when the second child was born and when he was 33 years in 1991 when the third child was born respectively.

Initially they had planned the family for three children. But this decision had to be changed since he lost his wife due to the Tsunami tragedy. Due to Tsunami he lost his wife, his property as well as parents in law. Only a 35 years old unmarried sister of his wife was left from that family. Therefore she too settled down with them. Subsequent to the Tsunami, when things started settling, gradually both of them decided to marry. He who was widowed when he was 47 years in 2004 remarried his wife's sister in the year 2005 when he was 47 years old. At present the elder daughter is married and living in another area. The rest of the family is living together. As a result of remarrying a child was born to them in the year 2006. At present they have four children. They were satisfied with the children they had and there was no intention of remarrying or having more children. But due to remarrying after the Tsunami and having experienced the way people lost children from the tragedy, they expect to have two more children. As they are passing the suitable age they intend to fulfill this wish at their earliest.

The following case is a good example for how the family structure was changed due to the Tsunami disaster. In this case a couple who had five children lost wife and four children due to the disaster and remarried with wife's sister and are having one child already in their marriage and intends to have another very soon.

### **Case study 5.9**

Priyantha could be identified as a person who faced a tragedy due to loss of beloved family and property in the Tsunami. At the time of Tsunami he was a father of five children. He lived a happy life with his wife and children. As a livelihood they were engaged in the fishing industry. Out of the five daughters, there were twins too. At the time of Tsunami the eldest daughter was 10 years old, twins were 8 years, a 5 years old daughter and the youngest was 2 years of age. This nest filled with pleasure was destroyed by the Tsunami. Mr. Kumudu Priyantha lost his wife, four children and property. Only one of the twins were left for him. He was highly depressed by this unexpected tragedy and to forget about the loss of his beloved wife and children he sought the assistance of liquor. Due to this fact, the older sister of his deceased wife took the responsibility of adopting the child whose life was spared from the tragedy. Out of the people who cared for him Priyani had a specialty. The final result was a marriage between them and today they are parents of a son aged 1 ½ years. They intend to have another child with the gradual development of their family. In the pre Tsunami period he had 5 children, but today he is father of only two children. But due to the prevailing economic situation and considering his age he is expecting to have only another child. He is 40 years old at present and his wife is 32 years. He has commenced fishing and is in the process of developing his family gradually. The daughter who was saved from Tsunami is living with her aunt. He is attending to her needs too.

It is also clear some actually want more children, especially older women as a social security measure as well as an insurance measure as depicted in the following case study.

### **Case study 5.10**

Let's name her as Sarojni. At present she is 42 years old. She had two children at the time of Tsunami. Those are a 11 years old son and a 9 years old daughter. She was 38 years of age then. She lost her 9 years old daughter due to Tsunami. She and her husband could not bear this up. In the post Tsunami period she lived in a temporary shelter with her husband and son. She was craving for another child due to the loss of her child. But they could not achieve this as they were both mentally depressed. Later they sought advice of the mid wife regarding having another child. They advised her not to bear another child due to her age. She got scared due to this factor, but she cannot bear up the loss of her child. She was 40 years old when she sought advice from the mid wife. She said that she and her husband are both depressed, and solution would be another child. They felt it was better if they referred them for medical advice. Mid wife has advised that if another child is born, the gap of the age difference would affect the children socially. She got more dejected on this advice. Both of them are disheartened due to the fact that they are not able to achieve their need. She further said her husband is not yet mentally stable. The only solution is another child, but they are helpless as they fear any repercussion. She said they should have had at least four children without limiting to two.

These case studies clearly support the hypothesis that “fertility desires of the disaster affected community can be quite different to the fertility desire prior to the disaster and now they will want more children and in fact more than the fertility norm of that community for not only to replace the dead ones due to the disaster but also as an insurance measure to face future fatal disasters.

## 5.9 Conclusion

In this chapter, we attempted achieve two specific objectives: to examine whether the Tsunami situation can lead to increase in fertility during the subsequent Tsunami post-Tsunami years and ; to explore whether women in the childbearing ages change their fertility behaviour after a time lag during the post-Tsunami disaster years. Our investigation suggested that there has been a clear decline in fertility during the immediate post-Tsunami years and the present study investigated this behavior thoroughly and concluded that this arose due to short run economic volatility which had significant negative impact on fertility as rehabilitation process took place nearly more than two years so families have become more vulnerable with regard to shelter and livelihood. This short-run stability has caused a decline in fertility. It was also found out that that the fertility desires of the affected community are quite different after couple of years after the disaster, to their desires before the Tsunami disaster and now they want more children and that is more than the fertility norm in that community for not only to replace the dead children but also as an insurance measure to face future disaster situations.

## Chapter Six

### Influence of Tsunami Disaster on Migration

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#### 6.1 Introduction

The main objective of this chapter is to examine how the Tsunami disaster has affected the migration patterns in the country by making special reference to the Galle district. However, the Hikkaduwa Divisional Secretariat Division, one of the worst affected areas in the country is selected as a case study for a detailed analysis. There are 08 resettlement areas that belong to the displaced people of the Hikkaduwa D.S. division. Out of the 8 resettlement areas, the Galagodawathththa resettlement area was selected for detailed analysis. In this chapter, basically, It was examine that the changes in migration during the post Tsunami period and investigate how Tsunami affected people were displaced and whether it was a temporary or permanent change of their place of residence.

Migration is a movement that involves a permanent or semi-permanent change of residence from one administrative unit to another (Mangalam 1968, Lee 1969, Zelinsky 1971). Internal migration plays a major role in population re-distribution by administrative units of a country. Resettlement areas in the country have impacted to change the internal migration patterns in the country. It will be quite interesting to investigate whether the Tsunami disaster in Sri Lanka also had an impact on the internal migration patterns in Sri Lanka. There were number of resettlement areas which emerged as a result of the Tsunami disaster. Most of the people who lost their houses have resettled in another place by migrating from their usual place of residence. This provides us a unique

opportunity to observe the changing migration patterns in Sri Lanka and how it will affect the normal life style of the human population. In this context, attitudes about the host community of the resettlement areas also studied in order to identify their views about the resettled population.

## 6.2 Literature Review

### 6.2.1 Migration And Displacement After Disaster

According to the United Nations Refugee agency (UNCHR), internally displaced persons ( IDPs) “ are individuals or groups of people who have been forced to flee their home to escape armed conflict, generalized violence, human rights abuses or natural or man-made disasters”. The IDPs comprise the world’s largest group of vulnerable people, with an estimated 25 million living in the midst of war, persecution and natural disaster in about 50 countries of the world (UNHCR 2004)

In Sri Lanka one can observe the IDP’s of war and disasters. The Tsunami disaster had great impact on the people to be displaced. Their places of residences were destroyed and they faced a very difficult situation. But the people who were displaced by the Tsunami disaster recovered with assistance from government and non-governmental organizations within few years after the disaster. They were given alternative houses in disaster free places. These people are vulnerable in many ways. Gradually the number of displaced in the world is increasing.

Like refugees, IDPs are unfortunate civilians who are often caught up in endless civil conflict or persecution. The difference between an IDP and a refugee is mainly in terms of whether or not the person has crossed an international border. When a fleeing civilian crosses an international

frontier, he or she becomes a refugee and as such receives international protection and help. If a person in similar circumstances is displaced within his or her home country and becomes internally displaced person then assistance and protection is much more problematic (UNHCR 2006)

Many IDPs of the world are located in conflict zones; for example, 6 million in Sudan and 200,000 in Afghanistan. However, not all IDPs are in the zones because of conflict. For example, 450,000 of the 800,000 IDPs currently in Sri Lanka were forced to move in the aftermath of the December 2004 Tsunami, while the other 350,000 were displaced by the civil war raging in that country (Yin 2006). Internally displaced persons do not receive the same assistance as refugees. International law requires that refugees receive food, shelter, and safety in their host communities as well as international support, whereas internally displaced have few legal or physical protections. In other words, the fate of IDPs is less certain than that of refugees.

The natural Tsunami disaster of December 2004 in the affected 13 districts in Sri Lanka created many internally displaced persons (IDPs) in the country. Women IDPs face greater difficulties than their male counterparts. Their disadvantages stem from a number of problems, such as the lack of hygiene and water sanitation facilities. They are poorer than most others and have faced limited access to distributed food and materials after having fled areas of conflicts and natural disasters. These difficulties are exacerbated because data on heads of households are mostly available on male-headed households. However, it has been observed in IDP camps throughout Indonesia that women IDPs are able to organize themselves in temporary camp settings. Women IDPs continue to carry out their multiple chores even in emergency situations and take care of both domestic and

public tasks such as child-rearing, taking care of the elderly, adjusting to life as sole breadwinners, regardless of the fact of whether they were heads of households or had husbands who could not function as breadwinners for various reasons (The World Bank 2004). After the Tsunami disaster women IDPs faced lots of problems. They faced difficulties when living in camps and also in temporary shelters.

## 6.2.2 Migration and Environmental Hazards

Several classic theoretical perspectives on migration, operating at micro and macro scales, provide basics for inspection of the link between moderation and environment hazards. Significantly, nonetheless, while contextual influences are frequently distinguished in this framework, they are seldom highlighted. Additionally, to the degree that empirical work has been embarked on with relation to the association between migration and environmental dangers, little of such work is grounded in this classic framework. The purpose of this review is to summarize classic migration theories of potential use in the exploration of environmental context within migration research, while providing a synthesis of existing efforts, examining more specifically, migration as related with both natural and technological hazards.

In Population and Development Review's supplement to volume 28, broad arrays of methods were presented for examination of the association between demographic and environmental change (Lutz, Prskawetz and Sanderson 2002). The review presented here highlights work examining, as put forth by the supplement's Editors, the ways in which changes in the natural environment affect human population ( $E \rightarrow P$ ). Although existing research on migration and environmental hazards does not incorporate



dynamic modeling of environmental processes, such efforts do offer examples of the ways in which demographers might incorporate environmental context into the exploration of demographic processes.

An environmental hazard has been well-defined by hazard scientists as, in the widest sense, a threat to people and their valuables. (Cutter 2001 a). Relations between social, natural, and technological structures can harvest environmental hazards (Cutter 2001 a), and both natural vulnerabilities (e.g. earthquakes, hurricanes) and technological environmental vulnerabilities (e.g. nuclear waste facilities, chemical spills) are on the increase.

In relation to natural hazards, it is conventionally probable that environmental hazards caused over \$300 billion in property and crop damage and nearly 9000 deaths during 1975-1989 (Mitchell and Thomas 2001). In developing countries, decrease rates are considerably greater than in the more developed perspective, while in developed nations, economic damage overshadow human losses (van der Wink et al. 1998). Furthermore, it is probable that the impacts will heighten, since research heralds that a warming climate shall increase dangerous weather happenings (e.g. McGuire, Mason and Kilburn 2002). In respect to technological hazards, over 6,000 deaths are accredited to the 1984 gas leak in Bhopal, India, while over 135,000 inhabitants were evacuated as a consequence of the 1986 accident at the nuclear power plant in Chernobyl, Ukraine. In the U.S., the ongoing dispute over the nuclear waste storage at Yucca Mountain, Nevada, attests to the continuing existence of these matters in present-day society (Pollution Engineering 2002; Riddle and Shaw 2003). Today's public is, indeed, accustomed to environmental hazards; as stated by risk researchers Cvetkovich and Earle (1992:3),

“complacency may have been an appropriate description of public responses to environmental hazards 25 years ago, but it is no longer apt”. How this consideration plays-out demographically, principally with respect to migration, is the attention of this examination.

Migration as a demographic process that can be associated with environmental hazards in several ways. On the one hand, proximate environmental hazards might influence residential decision-making by shaping the desirability of particular locales. In this case, we might consider environmental hazards as factors shaping migration. On the other hand, migration can represent an exacerbating force with regard to environmental hazards as result of increasing population density on vulnerable locales. Consider, for instance, the dramatic population increases in earthquake and hurricane-prone regions of the U.S. (Mileti 1999) and the movement of poverty-stricken households to floodplains in Bangladesh (e.g. lein 2000; Zaman 1991). In this case, we might consider migration a factor shaping the scale of environmental hazards, and the scope of the resulting disaster should one occur. Regardless of these important associations, scholarly explorations of environmental hazards as either cause or consequences are few. As stated recently by the National Research Council’s Committee on the Human Dimensions of Global Change (1999:57) “there is very little empirical documentation of the relationships between migration and environment.”

### 6.2.3 Theoretical Foundations: migration and environmental Hazards

As cited, many classic migration frameworks integrate environmental considerations (e.g. Dejong and Fawcett 1981; Lee 1966; Apere 1974; Wolpert 1966), albeit often in quite subtle ways. The most

relevant of these frameworks integrate non-economic aspects of residential fulfillment within the procedure of relocation decision-making. Wolpert is often accredited with the original progress of a migration ideal combining non-economic aspects of residential fulfillment (Fredrickson et al. 1980). Wolpert's theoretical "stress-Threshold" model (1966) posited that migration is a response to stress experienced from the current residential location, with residential "stressors" including environmental disseminates such as pollution, congestion and crime. The model suggests that these "stressors" bring about "strain" which may lead to consideration of residential alternatives. Further, potential migrants determine the "place utility" of alternative residential locations based upon the anticipated satisfaction derived from relocation to a particular locale.

Thoughts along these lines were further advanced by Speare (1974). More unambiguously, Speare delineated individualities of the individual, household, housing unit location and social ties as they affect residential movement, in disagreement that individual's experience a "threshold of dissatisfaction" after which they may consider residential relocation. He personalized "utility" in to varying levels of satisfaction in order to examine the effects of social and contextual factors on individual stress thresholds. Speare argued that residential dissatisfaction may occur from a transformation in the criteria used to assess these dynamics. Within Spears framework, physical amenities (or their opposite, physical disseminates) as "location characteristics," are of most relevance for consideration of environmental hazards.

Additional applicable frameworks functioning at the individual or household measure contain the value – expectancy (V-E) model in which migration motivation is defined as a function of the value placed on certain

goals, combined with the perceived likelihood that a chosen behavior will lead to those goals; the V-E models' basic components are, therefore, goals (value, objectives) and expectancies (subjective probabilities). Several general values/goals of "comfort" likely encompassing environmental context included within the "goal" "comfort" is a "more pleasant residential environmental ...(and)...a healthier or less stressful setting" (Dejong and Fawcett 1981:50). Still, it is argued that decisions with regard to moving or staying are shaped by the ways in which these values/goals interact with individual and household characteristics, societal and cultural norms, personal traits and variation in opportunity structures between areas.

Critical consideration of temporal shifts in individual and household – level migration decision can be found in Zelinsky's (1971) explication of the "mobility transition hypothesis." With a focus on the association between modernization and migration, Zelinsky argues that social and economic change inherent within modernization and migration, Zelinsky argues that social and economic change inherent in breaking ties with residential origins. These changes, it is argued, enhance the role of personal preferences in migration decision-making processes (Zelinsky 1971). Given research suggesting that individuals often express preferences for residential environments free of environmental hazards (e.g. Blackwood and Carpenter 1978; Hsieh and Liu 1983; McAuley and Nutty 1982); it might be suggested that modernization increases households' ability to act freely upon these preferences for less risky residential environments.

Environmental contexts finds substantially less emphasis within the neoclassical economic perspectives that tend to focus more on the human capital and economic dimensions of migration decision-making (Davanzo

1981; Harris and Todaro 1970; Todaro 1976). Here, migration is viewed as shaped by cost-benefit calculation with personal investment in migration behavior only being justified by sufficient returns to the behavioral investment. Environmental considerations are, in a sense, implicit here since environmental pollution or other risks may represent negative location characteristics, while positive environmental attributes are likely to increase destination attractiveness. Econometric migration models have revealed association with locational amenities (e.g. Knapp and Graves 1989) and some suggest that an indication of the societal value placed upon such amenities, or dis-amenities, is reflected in wage differentials across locations (Knapp and Graves 1989). Certainly in the conventional economic model, population movement acts as an equilibrating mechanism reducing geographic wage differentials (Da Vanzo 1981), yet these wage differentials are, themselves, often due to variation in location-specific amenities (e.g. Graves 1983; Mueser and Graves 1995; Knapp and Graves 1989; Mathur, Stein, and Kumar 1988; von Reichert and Rudzitis 1994). The existence of location-specific amenities (or dis-amenities) is important, because migration is the only way to consume (or avoid) them. To be more specific, within the neoclassical framework individuals might accept somewhat lower pay to reside in a location with environmental amenities; conversely, individuals might have to receive higher compensation to continue to live in an environmentally unattractive or hazardous locale.

Shifting to outlines with more prominence on macro-level elements, human ecological models have more centrally measured contextual factors, even though astoundingly little expansion has taken place with regard to structures specifically related to the natural environmental. The POET model, for instance, theoretically deliberates the interrelationship concerning Population, Organization, Environment, and Technology (e.g.

Duncan 1960; Duncan and Schnore 1961), with migration subsumed with “population” and environmental hazards potentially represented by both “environment” and “technology”.

Linking macro and micro chrematistics, Peterson’s early typology (1958, 1975) describe innovative or conservative migration behaviour with specific incorporation of ecological “pushes” as a type of migratory force. He argues, however, that ecological forces tend to shape migration in primitive times and that a conservative response would yield nomadic tendencies within the risky area in an effort to recreate status quo without long-distance relocation. Innovative response would, instead, entail a flight from the risky area more generally to find a less risky ecological context.

As a final theoretical reflection, Gardner’s (1981) exertion on the migration decision-making practice intended to recognize particular phases within the decision-making process at which the effect of macro level factors ought to unequivocally be considered. He identified five such points: 1) Formation of values; 2) Real, place-related macro-level factors; 3) Factors that affect accurate perception of place-related factors and thus one’s expectations; 4) Objective constraints and facilitators to migration, and; 5) Factors that affect accurate perception of the constraints and facilitators (1981: 63-64). Of specific importance within Gardner’s efforts is his attention of the individual’s formation of values, as it is the standards that will shape perception of the local environment. He claims, ‘studies of migration behaviour rarely deal with the formation of values, although such work has been undertaken with regard to other demographic processes, namely fertility’ (Gardner 1981; 65). In a logic, Gardner’s hard work tie macro and micro-through arguing that ‘*what people value*’ contours perceived contentment at present location, with feelings of stress and

dissatisfaction as related to macro context and value orientation creating preferred residential satisfaction, and therefore represent an extension to work by Speare (1974) and DeJing and Fawcett (1981). Gardner (1981: 88) concludes:

*The study of migration decisions, while necessarily proceeding on the micro-level, must nevertheless take into account at all steps the influence of macro factors, the social and institutional, the economic and the geographic context within which the individual exists (emphasis added).*

As per Gardner (1981), Spear (1974) and others, residential preferences represent the proverbial glue holding together the connection between migration and environmental context. Social science research has revealed significant effects of perceived neighborhood quality on metropolitan net migration (Schacter and Althaus 1982) and that climate (summer humidity and winter severity) is a significant determinant of migration patterns (Schacter and Althaus 1982; Waletrs 1994) within the context of the U.S. In addition, levels of air pollution and healthy environments are often noted as desirable residential attributes (e.g. Blackwood and Carpenter 1978; McAuley and Nutty 1982). Further, Hsieh and Liu (1983) argue that in the short-run, “pursuance of better environmental quality is the dominant factor in explaining interregional migration” (emphasis in original, p. 431). The rural turnaround of the 1970s’ in the U.S. suggested that environmental amenities such as mountains, lakes and “other areas of natural beauty” represent contextual characteristics of importance within rural destinations as well (e.g. DeJong and Sell 1977:177).

As Slovic (1987) argues, people respond to the hazards they perceive; as such, while amenities may act as migratory “pulls”, is the converse necessarily then true that dis-amenities act as migratory “push”? Specially, relocation in response to nearby environmental hazards cannot simply be assumed since individuals may not be aware of, or concerned with, the danger posed. Risk assessment reflects human judgments, with these judgments influenced by various psychological and social factors (Cvetkovich and Earle 1992). Several reasons can be outlined as to why residents might not migrate from hazard-prone areas. Residents may”

- not be aware of hazard
- be aware, but do not expect a disaster
- expect a disaster , but do not anticipate loss
- expect loss, but not serious loss
- expect serious loss and have undertaken, or planning to undertake, loss reduction actions
- expect loss, but accepted as costs of gaining location benefits
- have no choice in location( Kates 1962; expanded by Fordham 1992)

If aware of hazards, four mechanisms of adjustment are possible: 1) engineering mechanisms (technological adjustments); 2) symbolic mechanisms including culture (norms & values), 3) regulatory mechanisms (policy), and 4) distributional mechanisms (movement of people, activities, resources) ( Mcklin 1973; Mileti 1980). The focus within this review is on population distribution through migration. A useful heuristic is presented by Hugo (1996) in his book on environmental concerns as related specifically to international migration. Hugo (1996:107) presented a continuum whereby population mobility is viewed as ranging from totally voluntary, in which migration is entirely resultant of the choice and will of



the migrants, to forced, where migrants face death in their present location. Migrants forced out of places of origin due to environmental disruption have been termed, in some contexts, as “environmental refugees” (Jacobsen 1988), although this terminology has proven problematic, since such refugees do not fit within conventional political definitions.

In the end, many classic migration frameworks offer potential for the specific inclusion of environmental hazards as contextual characteristics. Nonetheless, there has been a limited amount of scholarly work undertaken with regard to the migration hazard association, with virtually none integrating classic migration conceptualization.

#### 6.2.4 Migration as a Response to natural Hazards

Natural hazards are defined as those “extreme events that originate in the biosphere, lithosphere, hydrosphere or atmosphere” (Alexander 2000:9) “that pose a threat to people, their property and their possessions” (McGuire, Mason and Kilburn 2001:1). Countless natural hazards are recurring in time and moderately foreseeable in terms of location, even though this is arguable as not always being the case.

The effects of natural hazards on humanity are substantial and are clearly on the rise (Abramovitz 2001). Despite the fact severe storms, floods, and earthquakes result in inferior planes of mortality than socio-political phenomenon for instance civil strife, these natural hazards are more common incidences and more commonly affect relatively larger quantities of individuals (Smith 2001). Indeed, approximations advocate that between 1/5 and 1/4 of the Earths’ human population was affected by natural hazards throughout the 1970s and 1980s (Abramovitz 2001). Even

so, impacts are expected to increase; during the period 1972-1995, actual calamities increased by 5-7% per year, while the damage resultant of these disasters increased by 5010% per year (Kondratyev, Krapivin, and Phillips 2002). Predictions to 2030 suggest a continuation of these trends in addition to their “enhancement” (Kondratyev, Krapivin, and Phillips 2002). Estimated future growths in human impact of these extreme events are due to two factors: population growth and subsequent rises in the constructed environment in the constituency most vulnerable to great impact natural disasters, explicitly coastal and urban parts (Mileti 1999).

Similarly significant with regard to the social perspective of natural hazards is social variation in vulnerability (Blaikie et al. 1994; Girard and Peacock 1997). At utmost threat are revealed that SES is related with Hurricane mitigation in Southern Florida, with low-income households more likely to live in highly vulnerable mobile homes and less likely to have invested in disaster mitigation such as hurricane-resistant windows and roofing (Peacock and Girard 1997). They are also more likely to have insufficient insurance and, therefore, inadequate settlements for rebuilding (Peacock and Girard 1997). In developing regions, the poorest inhabitants are often forced to live on marginal land outside urban areas or coastal zones, potentially prone to flood risk (e.g. Chan 1995). In an aggregate sense, a direct relationship exists between the level of development and type of natural disaster losses. In developing nations, death tolls are much higher than in more developed contexts, while in developed countries, economic losses outweigh human losses (Van der Wink et al 1998).

As noted above, a wide ranging continuum characterizes the ways in which environmental hazards might act as a “push” factor in migration decision-making. With regard to natural hazards, forced migration is

characterized by evacuation (e.g. Ziegler and Johnson 1984), even though this movement is characteristically only momentary and does not involve a eternal alteration of residential location. Some disaster-impacted populaces do ultimately choose to relocate, nonetheless, by this means engaging in voluntary migration. The extensive relocation of populations embodies an additional possible migratory conclusion of natural hazards, also demonstrating a more permanent residential location. Such relocation is often mandated (therefore forced) migration, and will for that reason be look over first below. As offered, the reviewed writings move from forced migration to gradually more voluntary migration as a response to natural hazards.

Community relocation is one of three forms of reconstruction typically undertaken by disaster impacted communities (Mileti and Passerini 1996). Rebuilding most frequently trails the route of rebuilding, whereby communities are reassembled to restore their pre catastrophe charisma. Such exertions to reconstruct the pre-disaster status quo are motivated by human desire to recreate pre-disaster ethos and relations. Second, a community may be incompletely recognized to take distinction of threat within its borders into consideration. Alterations in pre-disaster land use may, for example, limit suburban redevelopment in flood zones, as an alternative marking these zones for more malleable uses (e.g. recreational space). Finally, communities may be relocated to a less hazardous site, thereby requiring migration but reducing future damage (Mileti and Passerini 1996). An good example of relocation encouraged by hazard relocation is offered by way of looking at the story of Valmeyer, which flooded regularly, but following devastation by the 1993 Mississippi River floods, the community took swift action to initiate a comprehensive community relocation assignment. Flood water had stretch to depths of 10-

15 feet in the village center, devastated the town's infrastructure, and harshly impaired 98% of the village's configuration. In October 1993, a new town location was established outside of the flood plain, on top of an adjacent hill, and in April 1995, the first occupant relocated into his home in the new settlement. The community, which includes many of the town's residents moved into his home in the new town. The community, which includes many of the town's residents prior to the flood, has reconstructed itself with a new sense of permanence (Rozdilsky 1996).

Community repositioning is, nevertheless, a comparatively infrequent incidence, especially within the framework of developing countries. Environmentally-induced permanent relocation of a less prearranged kind characterizes these dealings in less advanced environments. Hugo (1996) presents an analysis of reports on Asian environmental migrants as presented in the *United Nations Disaster Research Organization News* for the period 1976-1994. The results demonstrate that over the last 2 decades there has been a trend toward increasing numbers of people displaced by environmental disasters. As for specific contributions to these "environmental refugee" flows, in 1994, mass migration to urban areas within China took place as a result of floods and droughts in upland areas (Kaye 1994). Natural calamities also often "push" migrants from rural to urban areas in Bangladesh, such that "an unusual increase of beggars and people looking for work in cities and towns is part of the aftermath of drought and floods." (Population: UNFPA Newsletter 1984). It has been argued that millions are displaced annually as a result of environmental factors in Africa as well.

Local displacement also takes place, such as in portions of Bangladesh, where floods and cyclones frequently befall, often with intense

consequences (Lein 2000; Zaman 1991). Agriculture in Bangladesh is very much reliant on yearly flooding and the floods, hence, take on unique cultural significance. Even though compulsory, the persistent floods also effect in variations in river paths, with many Bangladeshis losing homes and lands to erosion each year (Zaman 1991). In a investigation undertaken in a Bangladesh floodplain in the mid 1980's 64% of sample households stated having been displaced by erosion at least once, with the mean number of displacement being seven. (Zaman 1991). Characteristically, migrant households relocate only a short distance away; in the above-mentioned survey, nearly 88% of households had remained within 2 miles of their earlier abode (Zaman 1991). Short distance migration is a creation of lack of resources, presence of kin, and belief that land will re-emerge to be reclaimed (Zaman 1991). Migration at this point is a household coping mechanism, with household members typically having little faith in finding permanent residence; displaces often continue to live in fear of eviction, either by governmental authorities or natural forces (Haque and Zaman 1989; Mutton and Haque 2004; Zaman 1991).

Sometimes, however, migration in answer to hazards is not practicable. In Peninsular Malaysia, academics dispute those structural factors, such as poverty, low educational accomplishment and social movement, insecure land tenure, a absence of government aid, disaster preparedness and/or relief programmes limit the residential choices of countless inhabitants of risk-prone regions (Chan 1995). Based on 1992-93 interviews with members of 618 flood-prone households, Chan (1995) argues that migration is a choice available merely to wealthier households. Underprivileged floodplain residents' migratory options are rigorously restricted, and, if provided the opportunity to relocate, do so only to every

so often find themselves on different floodplains since these are the least costly places to reside.

In cases, some household members shall migrate whereas others remain. These decisions similarly signify household migratory approaches as associated to natural hazards. Here we can see to research by Ezra and Kiros (2001) commenced in ecologically tarnished and drought-prone populations in Ethiopia. Multilevel simulations approximating young adult migration inside this framework provide confirmation for the “new economics of migration”, whereby migration of some household members turn out to be a family strategy for those living in indeterminate natural surroundings. Results advocate that a community’s vulnerability to food scarcity as a consequence of drought contributes considerably to out-migration as a strategy to assist kinsfolks (Ezra and Kiros 2001).

Household migration approaches as connected to natural hazards are likewise perceived in South America. On May, 31, 1970, a major earthquake struck Peru, killing as many as 70,000 residents and injuring 150,000 others. Osterling (1979) undertook a study of the ways in which this catastrophe contributed to out-migration of peasant workers from the highland region of Ancash, the area most destroyed by the quake, to Huayopampa a rural community four hours’ drive north of Lima. Results suggest that most migrants were compelled to seek employment through migration because the natural disaster had intensified traditional poverty in their origin villages. Only a handful of migrants indicated that the earthquake was their primary migration motivation. Indeed, the natural disaster is seen to have stimulated an ongoing process of modernization and acculturation, primarily with regard to Ancash young men, by “forcing some of the victims to seek their fortunes within a labour economy”

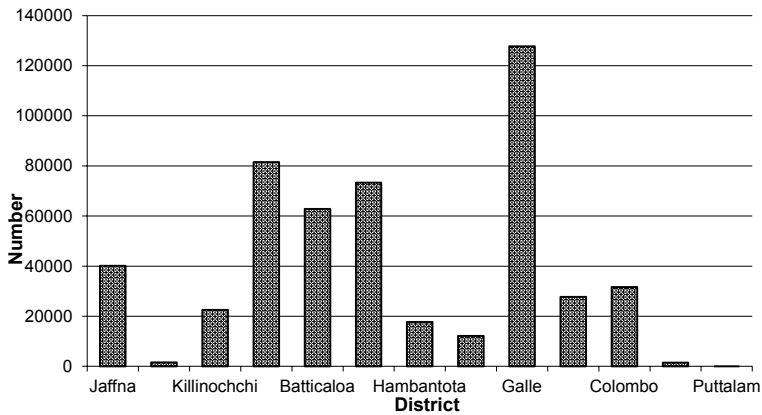
(Asterling 1979:120). Migrants were innovative in responding to the earthquake by capitalizing on social networks that facilitated migration to Huayopampa which is seen as a training ground for preparation for an eventual permanent move to Lima (Osterling 1979).

It is quite apparent that from the vast literature available on environmental hazards and migration or natural disasters and migration, many have attempted to link the two components in aiming at proposing several hypotheses about mechanism underlying that relationship. The present study will be attempting to make certain hypotheses in order to capture major issues involved in natural disaster and migration by placing the study in more social science perspective in looking at migration phenomenon as both a physical and social mobility.

### 6.3 Magnitude of displacement

It is quite important to understand the magnitude of the displacement occurred due to Tsunami disaster, particularly its regional distribution. We find, 500,666 were displaced in this regard and majority of the displaced people has been reported from Galle district. Therefore, it is quite appropriate that this study investigates the Galle district as a case study in order to show the influence of Tsunami disaster on migration. Following figure (6.1) shows that about 25 percent of the displacement in all thirteen districts is accounted for only in the Galle district.

**Figure 6.1 : Displaced population due to Tsunami disaster by district**

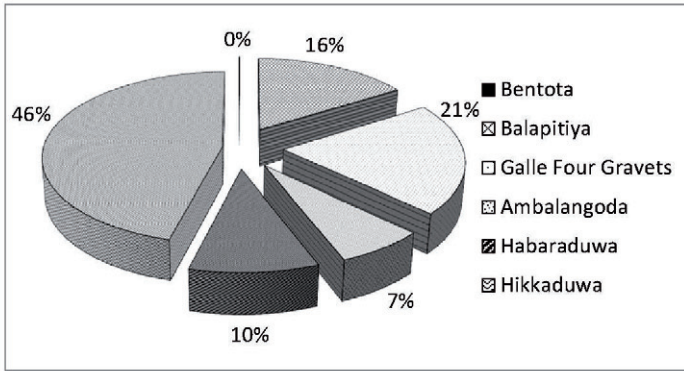


Source: Data obtained from Department of Census and Statistics

Since Galle district shows a significant displaced population due to Tsunami disaster, it may be quite important to examine how they are distributed within the district by each DS division. The following figure (6.2) shows Hikkaduwa has the major share of the displaced population and therefore, the present study carried out a detailed analysis by taking Hikkaduwa DS division as a case, in order to understand the factors influencing Tsunami disaster on migration and also the underlying mechanism of the relationship between Tsunami disaster and migration. In fact, Cutter( 2001) has argued that substantial variation can exist regard to the level of risk posed by particular geographical localities. Substantial variation also can exist in relation to vulnerability, usually defined as characteristics of a person or group in terms of their capacity to anticipate, cope with resist and recover from the impact of a natural disaster.



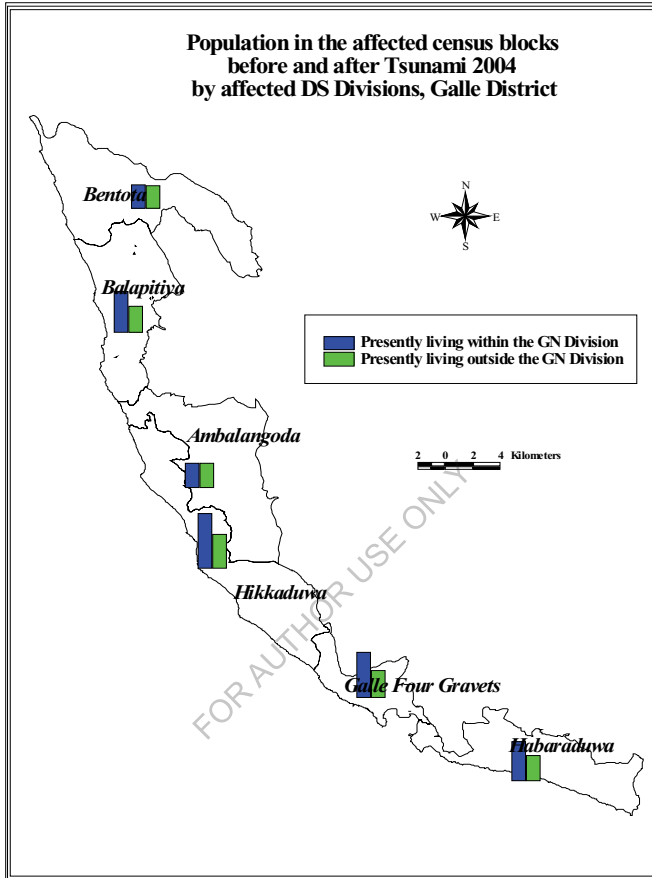
Figure 6.2: Displacement due to Tsunami disaster by DS division, Galle district



Source: Data obtained from Department of Census and Statistics

Linking risk factor to migration has been cited by various writers (Keilcolt and Nigg,1982;Kirschenbaum, 1996;Dynes and Quarentelli,1976) indicating that the “risk image” can be powerful factor in determining disaster-afflicted negative image of the area affecting relocation decisions. By analyzing the above figure( figure 6.2) also one can claim that Hikkaduwa, Galle Four Gravets and Balapitiya are high-risk Tsunami prone areas, while the least risk area is Bentota. The magnitude of displacement can, in fact, indicate the Tsunami prone and Tsunami free areas. This is also seen in the following map.

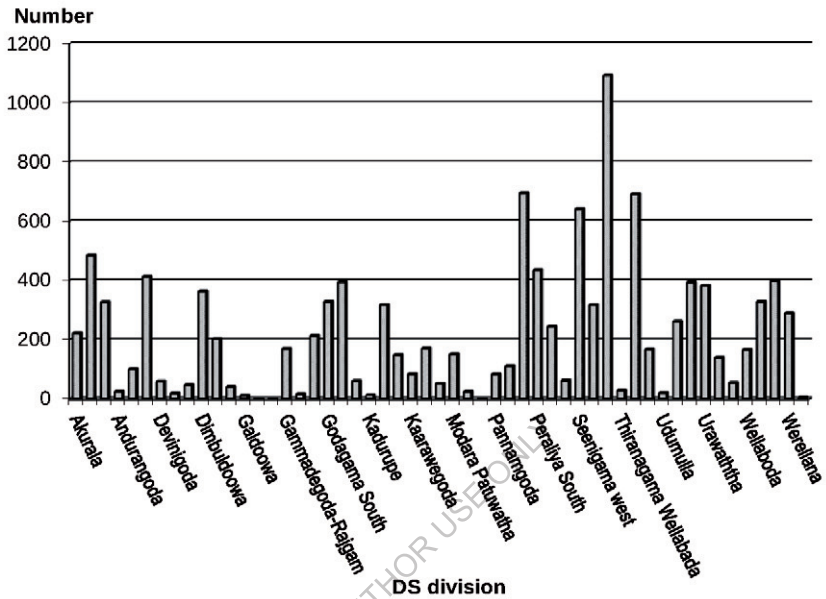
**Map 6.1**



Source: Data obtained from Department of Census and Statistics

The following figure (6.3) shows the displacement pattern of the population in the Hikkaduwa DS division by each GN division. It appears that the GN divisions such as Akurala North and South, Daluwatumulla, Godagama South, Peraliya North and South, Seenigama Wets and Telwatte were the most significant GN divisions observed in terms of the magnitude of the displacement pattern in the area under study.

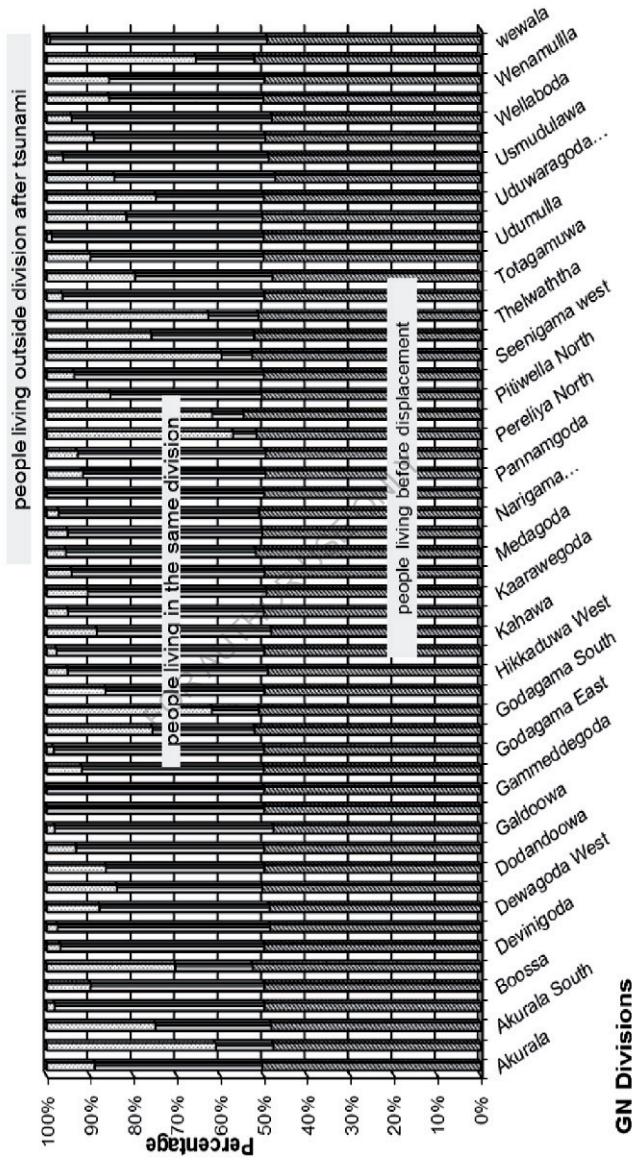
Figure 6.3: Displacement pattern of the population in Hikkaduwa DS Division by each GN Division



Source: Data obtained from Department of Census and Statistics

In addition to the level of displacement by GN division, the following figure (6.4) shows the relative distribution of displacement within and outside the respective GN division. In this regard, Peraliya North and Peraliya South shows the highest displacement of the affected population out of those GN divisions.

Figure 6.4: Pre-Tsunami population and displaced population within and outside GN division

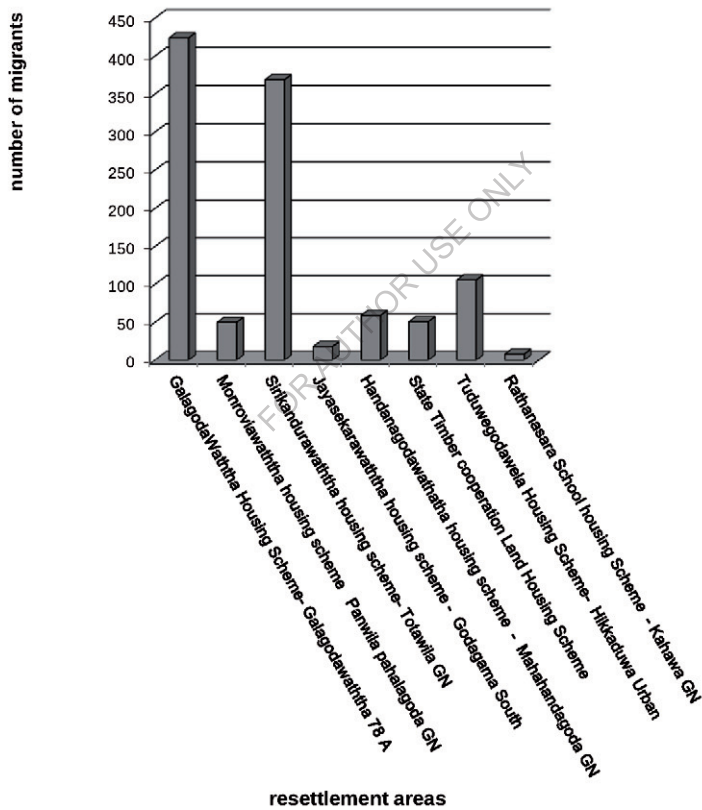


Source: Data obtained from Department of Census and Statistics

## 6.4 In-Migration To Resettlement Areas

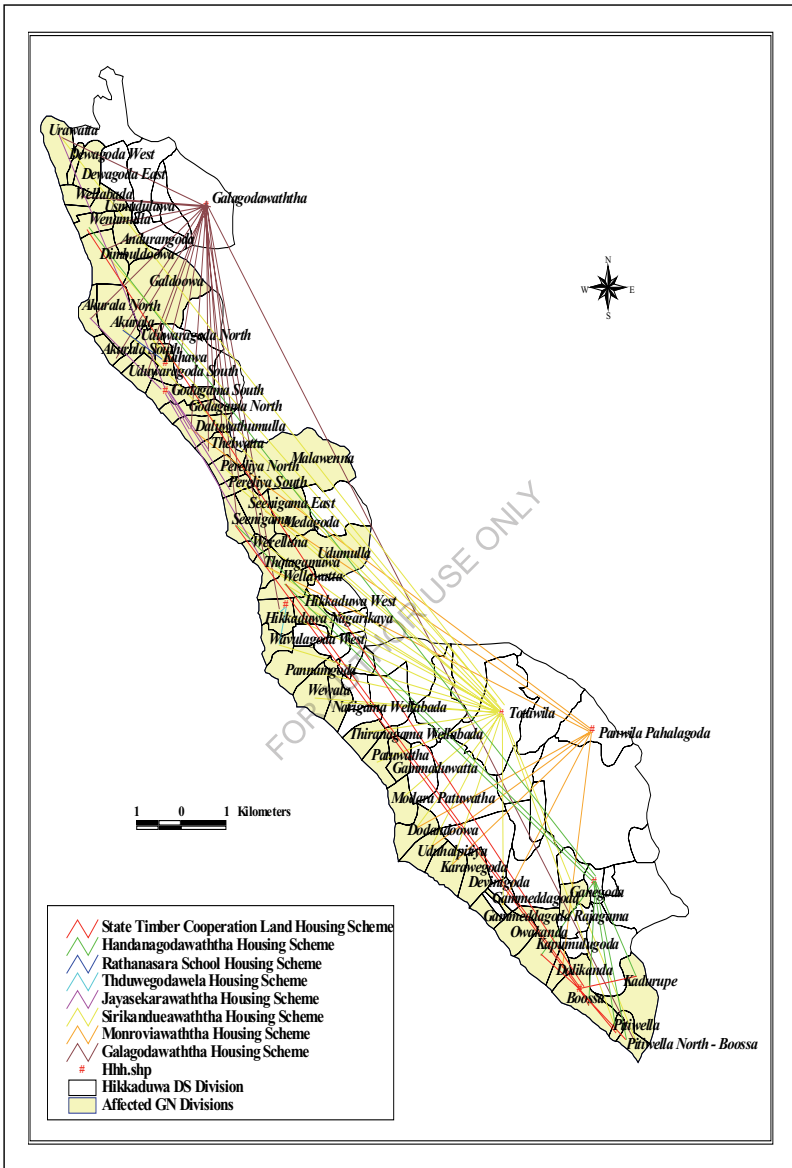
When resettlement pattern is examined we found that majority have migrated into Galagodawatte housing scheme, which is located in Galagodawatte GN division. The present study therefore, selected this scheme for its investigation. This is clearly visible in figure 6.5 and map 6.2.

Figure 6.5 : Migration to resettlement areas



Source: Data obtained from Hikkaduwa Divisional Secretariat

**Map 6.2 : In-Migration to Resettlement Schemes**



Source: Data obtained from Hikkaduwa Divisional Secretariat

Galagodawatte was not a Tsunami affected area but this was selected as suitable for relocation of people who were affected by the Tsunami disaster. This scheme is located about 9 kilometers interior and regarded as a non-fertile land, which is not suitable for cultivation. At present, there are 823 available houses in this scheme and they have been built by various non-governmental organizations. With regard to other studies in relocation schemes due to natural hazards, we find that in a survey of Bangladesh floodplain residents, short-distance relocation was the option because 88 percent of migrant households had remained within 2 miles from their previous residence( Zaman, 1991).

Following case study (case study 6.1) shows perceptions of the women in the new area mentioning that the distance is a huge problem for them since they were living in a urban locality, prior to the Tsunami disaster. Coming in to a rural locality and far away from their original place of residencies appears to be very inconvenient for them.

#### **Case Study 6.1**

Prior to the Tsunami disaster, Somawthie and her family lived happily and comfortably in the Akurala South division, Hikkaduwa DS division of the Galle district. It was an urban locality and the public transport facilities were ample. Their family consisted of elderly parents, Somawathie, husband and three children. Their family livelihood was fishing and Somawathie was engaged in the coir industry. The Tsunami affected them adversely. They lost all their property and two children in the Tsunami.

After the Tsunami they were offered a new house in the Galagodawatta housing scheme. Unfortunately they had problems in getting accustomed to the new environment. Shomawathie and family were unwilling to reside in an unfamiliar environment. They faced many

challenges in the new locality; such as pollution, scarcity of water and bad roads. The lack of schools, health facilities, public amenities and cordial relationships with friends adversely affected Somawathie's family. The problems that existed at the time of re-settlement only aggravated in the post Tsunami era.

Unfortunately, they got a low standard house and lost contact with the people who had lived with them previously. The new house didn't have a kitchen or proper sanitary facilities. The new locality lacked other infrastructure facilities as well. They had to travel a long distance to the dispensary for health requirements.

They faced financial difficulties in the new locality. Her husband's income decreased, while Somawathie was unemployed. They didn't have any extra sources of income either. The cost of living in the new area was very high; especially the transportation costs. They were unable to economize by sharing expenses with relatives since all were living in different places after the Tsunami.

In the new settlement basic facilities were very poor; especially women, children and elders had to undergo much hassle and difficulty. The transportation costs were exorbitant. Children had to travel a long distance for schooling, incurring high expenses for parents. The three wheel hires to attend to the health needs of the elders were exorbitant.

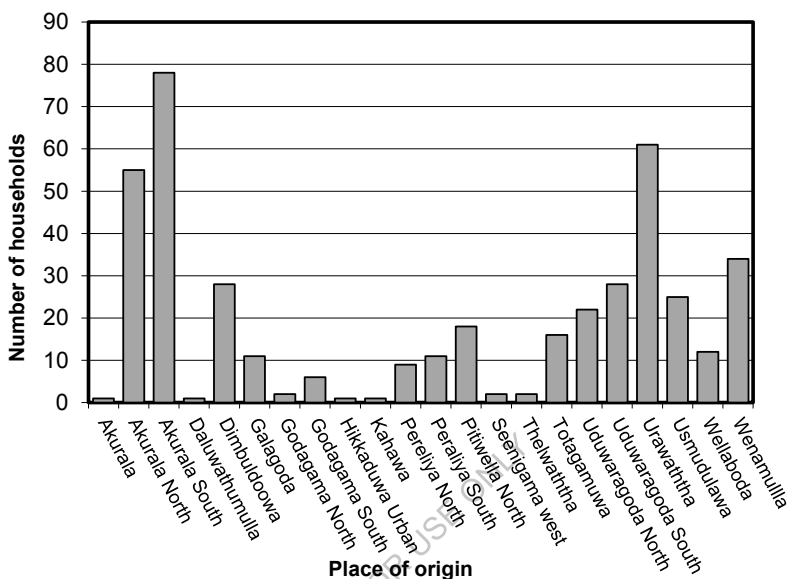
They had to live in constant fear in the new locality. Women were harassed on the roads. People from adjoining village commenced relationships with the new settler girls, frightening them. Due to these inter personal factors life in the new settlement was a nightmare.

## 6.5 Place Of Origin Of The Migrants

The majority of the migrants to the Galagodawatte housing scheme have come from Akurala North and Akurala South GN divisions, which are regarded as highly affected areas (Figure6.6).



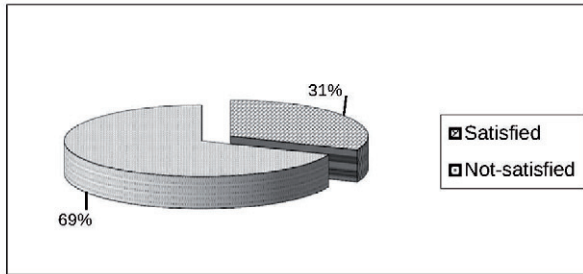
**Figure 6.6: Migrant household population in Galagodawatte Scheme by place of origin**



Source: Data obtained from Hikkaduwa Divisional Secretariat

Akurala North and Akurala South were densely settled areas with urban facilities. Our investigation suggests that about 69 percent who migrated are not satisfied with the new settlement. A 44 percent said changes in the new environment, lack of public utilities, limited sources for earnings and high cost of living are the main reasons stated by the respondents for their dissatisfaction in the new location. Usually in less developed regions, hazardous areas are often settled by poor households, perhaps because they have no choice in residential location (Chan, 1995).

Figure 6.7 : Whether satisfied with the new settlement



Source: Survey Data

The following case study (case study 2) shows the views of old women who live in the resettlement area. This shows how much they suffer in the new locality.

#### Case Study 6.2

Lilawathie was 78 years old. Prior to the Tsunami she lived with her unmarried daughter, son and his family. Her husband had previously died of a heart ailment. Their house was completely damaged in the 2004 Tsunami. Their lives were completely disrupted by the Tsunami disaster.

Subsequently, they lived in a temporary shelter for two years. Lilawathie and her unmarried daughter occupied the new house after the Tsunami. The new house was not built satisfactorily; the roofs were leaking and the walls were cracked. The sanitary facilities were very unsatisfactory. Clean drinking water was scarce and the cesspits overflowed. Her son and family lived separately in a rented house. He was engaged in fishing industry and re-commenced his business. The son's financial support helped Lilawathie and daughter to survive.

After the Tsunami, they faced many unprecedented challenges in relocating in the new locality. Lilawathie emphatically said they settled

in the new house as they had no other alternative. Surviving in the new area led to many psychological difficulties. Some of the problems which made life difficult in the area were scarcity of water, lack of health facilities, increased transportation costs and environmental pollution by heavy machinery used for road construction.

In the new resettlement there was no freedom to attend the temple for rituals. Lilawathie, who was previously very pious and devout, now even refrained from observing sil in the temple. The people in the adjoining village were not friendly and treated Lilawathie and daughter suspiciously, as strangers. There were frequent quarrels and drunken brawls in the surrounding houses. Establishing new connections in the new locality were not easy. Lilawathie and daughter were very lonely and isolated. Survival in the resettlement was difficult for senior citizens like Lilawathie.

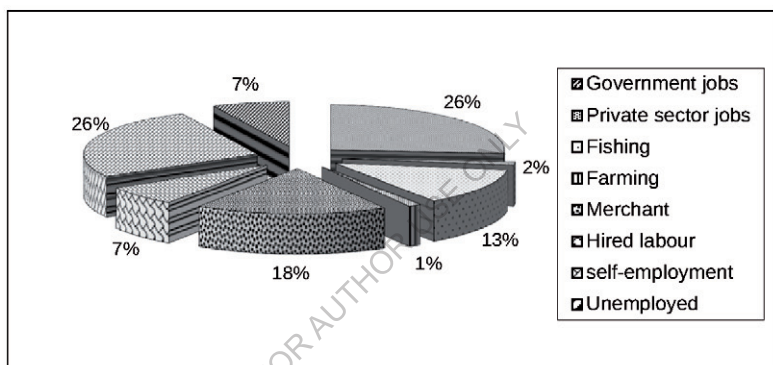
The lamentations of elderly women such as Lilawathie are very pathetic and heart rending, “The final stages of my life cannot be spent with rest or relaxation. It would have been so much better if I had died from the Tsunami. I’m fortunate that my son bears the expenses for us. In the past I was able to make an income by selling beetle chews, but this cannot be practiced here. My daughter has no income. What will happen to my unmarried daughter after I’m dead and gone? Even our relatives are not with us anymore. Aiyo! Aiyo! Is this my fate?”

## 6.6 Occupation Before Migration

As the sampled population is 30 percent of the total households in the resettlement area and the sample was selected with a systematic random sample, it is quite reasonable to accept the selection of the household to exhibit the characteristics of the entire migrant population. The following Figure exhibits the occupational status of the migrants before their mobility into the current place of residence. It seems that the

majority of them were engaged in government sector employment, but substantial proportions were self-employed people. In addition, businessmen accounted for a significant proportion. It should be noted that some argue that migrants tend to choose destinations that offer highest level of benefits (Graves,1983;Nelson, 1978) but in the present case, these migrants have no choice than migrating to the given settlement area.

Figure 6.8 : Percentage distribution of occupational status of sampled migrants



Source: Survey data

## 6.7 Present occupation of the migrants

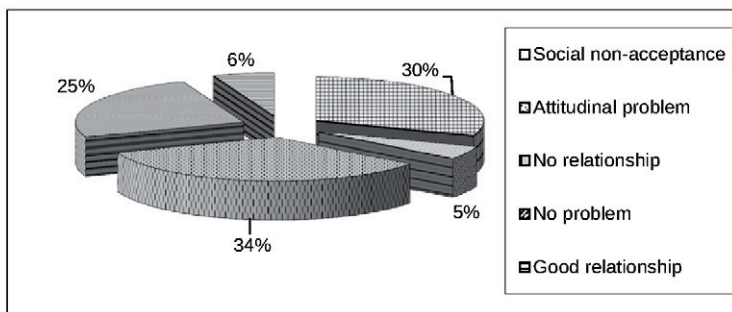
When the present occupation of the migrants was examined, about 56 percent have changed their original occupation and moved into new occupations. These changes have had a substantial impact on their income sources. About 76 percent lost their source of income, or had a reduction in the present income and cost of input; especially with regard to coir production activities.

The consequences of failed economic integration of migrants are all too evident (ILO, 2006). Persistent unemployment among migrants, increasing alienation, isolation and frustration, often fuelled by a combination of relative poverty, limited educational opportunities and the absence of supportive networks, can resist in social tension and disturbances. These issues often affect the local population in poorer and more deprived communities and not just migrants, and therefore required comprehensive economic and social strategies, involving governments at all levels as well as a wide range of other stakeholders, such as employers, local communities and civil society organizations.

## 6.8 Receptiveness of host community

Most people feel they have settled in a non-suitable place because of the non-receptiveness of the host community. The Figure below shows that only 30 percent feel comfortable about living in this area without much constraint. They are not fully exposed to the host community as they live further away from the village boundary.

Figure 6.9 : Opinion about the host community

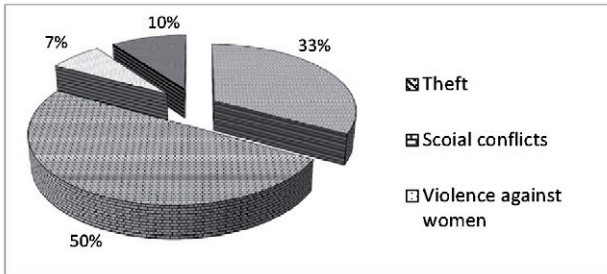


Source: Survey data

We further questioned the migrants by asking about their difficulties faced in the host community area. Social conflicts between the two communities and threat of theft from the host communities were cited as the major factors responsible for the difficulties. However, it is quite important to mention that about 7 percent reported that the violence against women as being a significant problem in the area.

It appears that integration into the new resettlement area has become problematic for the affected people. While the term is used and understood differently in different contexts, “integration” can be defined as the process by which migrants become accepted into society, both as individuals and as groups. It generally refers to a two-way process of adaptation by migrants and receiving societies, while the particular requirements for acceptance by a host society vary from country to country. The responsibility for integration rests with many actors: migrants themselves, host community, various public and private institutions and public sector organizations (ILO, 2006). Integration does not necessarily imply permanent settlement. It does, however, imply consideration of the rights and obligations of the migrants and host societies, of access to different kinds of services and the labour market, and of identification and respect for a core set of values that bind migrants and host communities in a common purpose.

Figure 6.10 : Difficulties faced by the migrants



Source: Survey data

Following case studies (case study 6.3 and 6, 4) show the difficulties faced by the resettlers as new comers in the resettlement area. They are facing lots of problems since they are strangers to this area. Receptiveness by host community is lacking and hence the resettlers feel that they are not suitable to this new locality. It can be further understood by looking at the following case studies of the young people's perceptions in this settlement scheme.

#### Case study 6.3

Nihal was an intelligent lad who had passed the Advanced Level examination. Prior to Tsunami, Nihal was an enthusiastic youth who was optimistic and excited about his future. Nihal's family comprised of mother, father and younger sister. His sister attended school and was much interested in her studies.

Prior to Tsunami Nihal formerly worked in a bookie and earned a good income. Other youth in his area worked in boutiques, some were self-employed in small business, some excavated lime stone, or helped tourists. Employment opportunities were ample in the pre Tsunami era.

Subsequent to losing their house in the Tsunami, they got a new house in Galagodawatta. In the re-settlement area there was a scarcity of

employment for many educated youngsters like Nihal. Some did temporary odd jobs to irk out a meager income for survival. Employment was scarce here. Nihal worked for an INGO for few days. All employment opportunities gradually cased in the new locality, in the aftermath of the Tsunami disaster.

Nihal is now very frustrated about life and has fears about his future. He detests being a hindrance to parents, as they were also surviving with difficulties. Life circumstances were very different from the past. It was very difficult getting adjusted to the new environment. Nihal and family were alienated from their friends and relatives.

Due to frustration, unemployment, poverty, anger and bitterness, many youth are now indulging in vices. They loiter during the day and consume alcohol as they have nothing to keep them occupied. They come home drunk in the evenings and are a burden to their families.

#### **Case study 6. 4**

The Tsunami disaster adversely affected Kamala's life. Her mother and grand mother died in the Tsunami. They lost all their earthly belongings in the Tsunami tidal waves.

Now Kamala lives in Galagodawatta with her two brothers and farther. They are faced with many indomitable challenges in the re-settlement. They do not have proper sanitation facilities in the new locality. Clean drinking water is scarce. Her two younger brothers are schooling. Kamala, herself still a teenager, now has to do all the household chores for the sustenance of her family. Kamala's farther did business prior to Tsunami at Wellawatta. Now her farther is unable to generate a sustainable income or attend to his business commitments as he cannot leave his orphaned children alone at home in a new locality.



Kamala and her younger brothers are scared to live alone during the day. People live in constant fear and insecurity as many families are headed by single parents after the Tsunami. At nights they cannot walk on the roads as drunken boys pass filthy and insulting remarks.

Kamala is now compelled to stay at home, though she has passed the GCE Advanced Level examination. It is tragic that young, ambitious, intelligent teenagers such as Kamla are unable to pursue their dreams and life ambitions due to unforeseen circumstance beyond their control. As she cannot spend the time alone during the day, she attends a sewing class to keep occupied.

The midwife in the area has quarters in the housing scheme. She is young and lives alone. Even the mid wife is unable to survive in the new locality due to harassment from the males. Kamala, a bewildered and orphaned teenager, lives in fear. Associations with the neighbors are limited as they are not known to Kamala's family. Kamala and her brothers have to face loneliness and isolation in the new settlement.

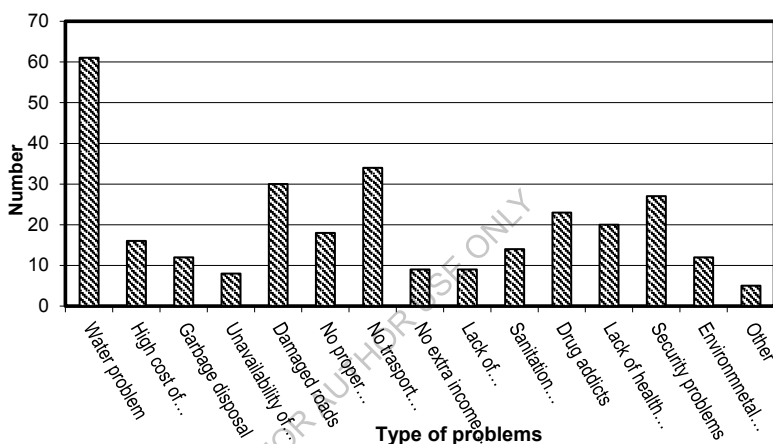
Living in unfamiliar surrounding after the tragic demise of her mother and grand mother is a harrowing experience for a young teenage girl. All the Tsunami affected residents are faced with many problems. Therefore, they are scared of getting acquainted with others. Tsunami victims resettled in the new locality live in a highly depressed situation, without hope for the future.

Kamala's anxieties and fears are very vivid, "The pressure I undergo (both physical and mental) during monthly menstrual period is terrible. There are no words to explain my feelings of insecurity and frustration. There is no place to have a cloths line to dry the washed clothes. The interior of the adjoining houses could be seen. There is no privacy. We are living with too many problems".

## 6.9 General problems associated at the place of destination

Our investigation suggests that major problems faced by migrants are water scarcity, damaged roads, transport problems, insecurity, drug addiction, and lack of health and educational facilities. This is clearly visible in the following figure.

**Figure 6.11 : general problems at the destination**



Source: Survey Data

Above findings are very much compatible with what Wolpert's has suggested in theoretical "stress-Threshold" model (1966). As indicated earlier it posited that migration is a response to stress experienced from the current residential location, with residential "stressors" including environmental disamenities such as pollution, congestion and crime. The model suggests that these "stressors" bring about "strain" which may lead to consideration of residential alternatives. Following case study (case study 6.5) shows the views of a community leader in the resettlement area about the problems facing by the resettlers. Case study 6.1, 6.2, 6.3, 6.4

also showed the problems and stresses of the people who have resettled in the new locality.

### **Case study 6.5**

Mr. Herath, a qualified teacher by profession, is a community leader in the area. His family was Tsunami affected. His mother and wife lost their lives in the Tsunami. Now Mr. Herath lives with his daughter and son in the resettlement in a new locality. Despite tragic circumstances, Mr. Herath is optimistic about the future and determined to educate his children.

Many other affected people from various divisions in the Hikkaduwa are now re-settled in Galagodawatta. They are faced with many challenges and problems. Though basic facilities are provided in the scheme, it is difficult for people to adjust to the new environment. The resettlement lacks satisfactory basic facilities and amenities which people enjoyed prior to Tsunami. Residents are now faced with many problems in health, transportation and education sectors.

There are many housing schemes. Various people from different social backgrounds are residing in these schemes. Cast differences are strictly adhered to in this part of the country. The rejection of the settlers by the host communities is due to cast differences. Houses are allotted for non Tsunami victims as well. The strained inter personal relationships between Tsunami survivors are causing undue stress to a disaster affected community.

When allocating new houses, the localities they lived in previously were not considered. The fishing communities were mostly affected by the Tsunami. Due to accustomed habits acquired by living in close proximity to the sea, the behavioral patterns of the fishing communities are not generally accepted by the public. Therefore, fostering new social acquaintances are difficult. Residents are not comfortable about

associating neighbours due to caste and class differences. Problems arise when residents participate in organized programmes for community development. Some Tsunami affected people do not participate in community work as they are now accustomed to the dependency syndrome.

Some nights the residents get organized as vigilant groups and patrol the area, but this cannot be done regularly, so it is not practical. There are problems regarding security. The unoccupied houses are utilized for various irregular activities. Some of the allotted houses are disposed, resulting in fresh unknown neighbors settling. These mal practices cannot be controlled due to largeness of the housing schemes.

## 6.10 Conclusion

This chapter attempted to find whether the massive displacement took place due to Tsunami has made any significant impact on the physical and social mobility pattern of the affected people. In this regard, the present study selected the largest resettlement scheme in Hikkaduwa DS Division and carried out a detailed investigation. It is also important to mention here that available literature on disaster and migration were also reviewed in order to understand the mechanism underlying that relationship and also to interpret the results obtained through our study in a more meaningful way by placing the study in a theoretical context. The findings of the study showed that majority of the displaced people has been reported in Galle district and Hikkaduwa DS Division in Galle district and therefore this area is determined as the highest Tsunami risk prone area. In addition, an attempt was made to show the significant of the magnitude of the displacement in Hikkaduwa by analyzing pre-Tsunami and displacement population within and outside GN division in the Hikkaduwa DS Division.

The analysis of in-migration to resettlement area showed that affected people have been relocated in the interior part and on a non-fertile land. Therefore as suggested in the conceptual framework, significant community is observed to their previous occupation from the present destination. In fact majority were not satisfied with the new settlement because of lack of public utilities, limited sources for earnings and high cost of living. Majority have changed their original occupation and moved in to new occupation as a result of loss of income from the previous occupation. Mainly from self-employment activities.

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## **Chapter Seven**

### **Influence of the Tsunami disaster on the Family Structure**

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#### **7.1 Introduction**

The main objective of this chapter is to examine the impact of the Tsunami disaster on the family structure. Studying the composition of the family after the Tsunami disaster is very important because there can be changes, which have occurred after the disaster and thus it is very important for one to examine these changes and their effects on the future population. However, the vulnerability of the family system with the disaster also can be discussed. Many changes can occur in the family system since most people lost livelihoods, residencies, companions etc. This may have an impact on the family structure and the investigation of such changes is the main aim of this chapter.

Usually, the trends and changes occurring to the family structure can be viewed as a reflection of basic demographic changes that have been occurring in the context of demographic transition (Dissanayake and Hugo, 1996). In this context, the family can move away from its previous state to another state where many changes can occur in the sex roles within the family; increased labour force participation of women, challenging conditions underlying traditional marriage, reduced number of children, increasing incidence of marriage breakdown and increasing proportions living alone or with no-relatives among unmarried adults. However, one can reasonably claim that “It is possible for a disaster like Tsunami to change the sex role within the family, move away from the traditional

marriage habits, increase the number of children or increase the desire to have more children and increase the incidence of re-marriages as hypothesized by this study”.

As discussed in previous chapters in this study, mortality, fertility, migration in the disaster areas have changed remarkably and thus one can reasonably hypothesize that

- When people lost family members there can be a reduction in the size of the family
- When people lost children they may have replace lost children by having another child or children which can affect the composition of the family
- When people loose spouses the incidence of remarriage may increase
- When people are displaced changes may occur to the family structure or to the nature of the family, due to the policies adopted by the government for resettlement of affected families

## 7.2 Vulnerability due to Tsunami Disaster

Following table highlights that a substantial number of children either have lost one parent or both parents due to Tsunami disaster.

**Table: 7.1 Orphans in the Hikkaduwa DS Division**

Category	Male children	Female children	Total
Father dead	37	27	64
Mother dead	56	29	85
Both parents dead	15	11	26

Source: Hikkaduwa Divisional Secretariat

Samurdhi beneficiaries and other social welfare recipients are covered by the government social protection schemes. Tsunami victims had a special scheme. Children, elders and women, as in many other Tsunami affected DS Division. In particular, women who lost breadwinners, old people who lost caregivers (such as sons/daughters) and children who lost both parents are highly notable in this regard. In addition, many who owned or rented tourist shops/restaurants/hotel and bicycles/vehicle renting places lost their livelihoods. Persons engaged in illegal limestone excavating activities lost their income.

**Table 7.2 Vulnerable Groups in Hikkaduwa**

Vulnerable group	Location	Reason
25 disabled	Many affected GN Divisions	<ul style="list-style-type: none"> <li>• Disabled, injured and sick persons due to the Tsunami do not have a proper social protection system</li> </ul>
255 Children who lost mother( 145) or father (99) or both( 11)	Many affected GN Divisions	<ul style="list-style-type: none"> <li>• No proper and systematic social security system for the affected children</li> <li>• Legal and Legislative barriers for the guardians</li> </ul>
65 women ( in fishing communities) who lost breadwinners	Many affected GN Divisions	<ul style="list-style-type: none"> <li>• Finding a new livelihood income for affected women is difficult</li> <li>• Representing the low income category</li> </ul>



40 elderly people who lost wage earners (son/daughter or both)	Many affected GN Divisions	<ul style="list-style-type: none"> <li>Adults cannot regularly take medicine and other essentials</li> </ul>
School drop outs and begging children	Peraliya, Seenigama and Thelwaththa	<ul style="list-style-type: none"> <li>No guardians</li> </ul>

Source: DLDP Hikkaduwa

Problem Encountered in the Social Protection are highlighted in the following table by looking at four vulnerable groups.

**Table 7.3 Problems encountered in the Social protection**

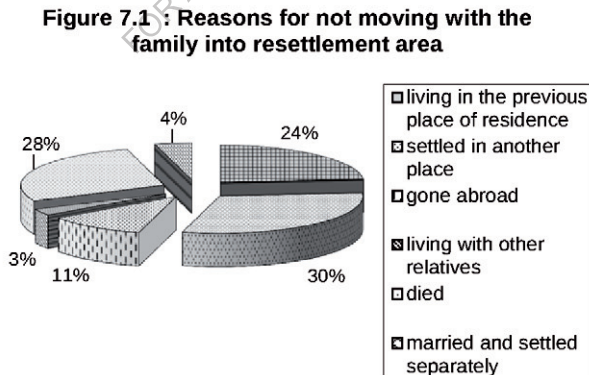
Vulnerable Group	Problem Encountered
Disabled	Non-availability of detailed information of the Tsunami affected disabled community members
Tsunami affected children	Complex issues in finding suitable guardians for orphans Absence of a proper system to provide financial and material supports for affected children Increase of child beggars and prostitution activities
Widows	Difficulty in the rehabilitation of mental depression of affected widows
Elderly who lost breadwinners	Non-availability of proper and accurate information about these adults

Source: DLDP Hikkaduwa

### 7.3 Factors Influencing The Family Size

The average number of children that affected people had at the time of the disaster was 2.59. Our investigation in Hikkaduwa DS division reveals that affected people have lost 1.41 children on average due to Tsunami disaster. During the immediate post-Tsunami period this has risen to 1.68 children. Although one can expect a decline in the mean number of children ever born under normal circumstances, what we observe here is an unusual pattern.

When we look at the average size of the family before the Tsunami disaster, we find it was 5.8. Our investigation suggests that about 75 percent of the people have not resettled in the new destination. The reasons why they are not with the family which moved into new resettlement area are summarized in the following figure.



Source: Survey Data

About 54 percent are still living in the previous place of residence or settled in another area and have not moved into the resettlement area.

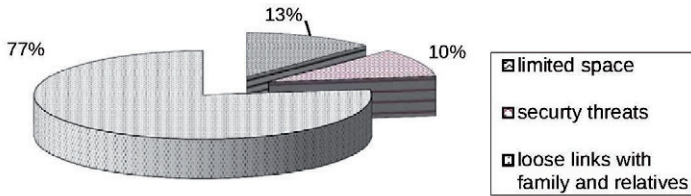
However, a substantial number have been already eliminated by deaths as well. Therefore, it is obvious that the size of the family after the disaster has considerably declined. It is also quite interesting to observe why they are reluctant to settle in the new location. The majority find insufficient space for all family members and some do not like to settle in a new locality thinking that they will have difficulties in adjusting to a new situation.

About 79 percent of the respondents have indicated that the “house to house” policy of the government has had a significant impact on the extended family structure that prevailed at their place of origin. However, 94 percent of the affected people are satisfied with the earlier family system, which was an extended family opposed to 6 percent who are happy with the nuclear type that existed at the place of destination because of the policy indicated before which provide the opportunity to allocate a house only for the head of the household. In this situation, sub-family units who lived with the main family were unable to obtain a house at the new location so they had to live either in the same place of residence used to live by the time of the disaster or find another location. Some sub-families of the Hikkaduwa DS Division has received houses but in the different place. “It is the recognition of the household with its emphasis on the nuclear family and the geographic distance separating the extended family as well as the disparity between access to information and control over its use that challenges the traditional ordering of family authority”( Bauer 1984)

Loose links with the family and relatives have been cited as the major problems faced today after moving into a resettlement area as depicted in the following figure( Figure 7.2). This suggests that the impact

of Tsunami disaster has adversely affected the nature of family that existed prior to the disaster.

Figure 7.2 : Problems faced by the nuclear families in resettlement areas

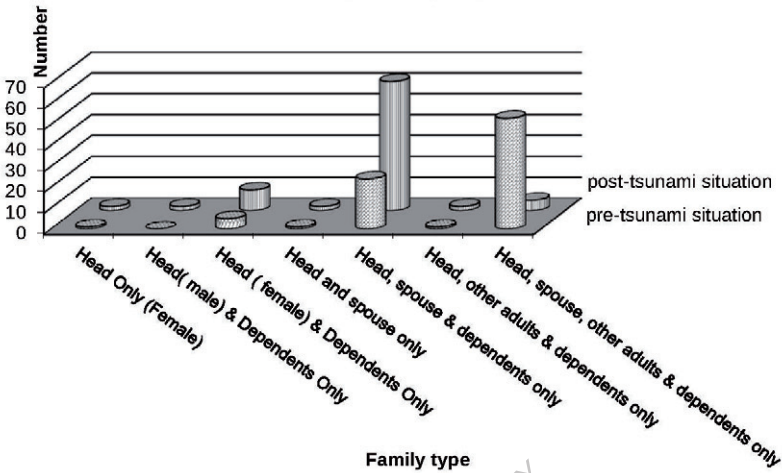


Source: Survey data

#### 7.4 Changing Family Structure

The following figure clearly shows a definite downward trend in the extended family system during the pre and post Tsunami situations. On the other hand, a significant increase is shown in respect to nuclear families in the post-Tsunami period mainly due to “house to house” which enabled only the head of household to obtain the ownership of the new house and also lack of space in the new house which failed to accommodate more members who were available at the previous place of residence. Lack of social networking may be one of the reasons for family violence after the disaster (Wilson, Phillips & Neal, 1998). It is also noticeable that single parent and female-headed households have slightly increased due to the loss of husbands in the disaster.

Figure 7.3 : Changing family structure, pre-tsunami and post-tsunami situation

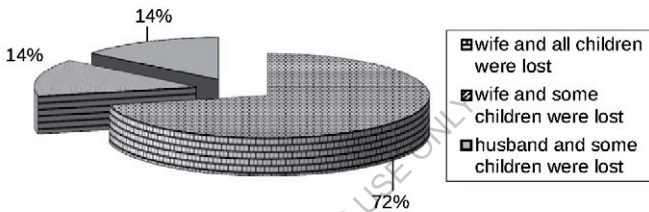


Source: Survey Data

Some claim that divorce and remarriage can disrupt both parents and children, and that children in particular are likely to suffer (Wallerstein and Blakeslee, 1989). Similarly one can reasonably argue that even the loss of spouses and then their remarriage, which occur due to a disaster like Tsunami, can upset both parents and children. The children are likely to suffer in that situation. For the most part, the family is viewed through one of its members, be it the mother, father or children. For example, studies have focused on how parental conflict affected children's stress after a hurricane (Wasserwtein & LaGreca, 1998) or how a disaster related death or injury of a family member had a consequent impact on stress disorders among individuals in that family (Goenjain et al, 1994). Other case studies have also focused on family unit disaster behaviours by describing family disruption after a (Argentinean) flood (Dunal et al, 1985), the remarriage of widows after a devastating earthquake (China) (Chen at al, 1992), Family

unit evacuations (Hultaker,1985;Perry,1994). From the sample of respondents in Hikkaduwa area, we found their age at marriage being 20.68. Those who lost spouses have remarried on average at the age of 32.3 years. Reasons for their remarriage are given in the following figure. This figure shows that about 72 percent of women lost husbands and children in the Tsunami disaster have got remarried below the ages of 35 years at the time of remarriage.

**Figure 7.4 : Reasons for remarriage**



Source: Survey Data

## 7.5 Elderly Population And Their Dependent Status

When the family structure has changed after the disaster that has impacted the elders in many ways. Within the extended family system they were able to share the income earned by family members. Within the domain of extended family relationships, the concern expressed and help given by the family members to older persons during sickness or disability is usually more conspicuous. In fact the main social security –comprising physical, emotional and monetary support for older persons- is provided by the family or close relations (U.N. 1996). In fact, investigations suggest this was true for Hikkaduwa as well.

The traditional solidarity between generations helps to ensure a sufficient level of social security. Such mutual help has not only been prevalent for the sustenance of family social and economic ties but has also extended beyond the domains of the family to the community level, especially at the time of marriages, sickness, old age disability and in Emergencies (U.N. 1997).

The average age of the elderly people in the sample was 68.8 years. About 76 percent of them are economically inactive now, and about 14 percent are engaged in coir and hired labour jobs. They are of course young elderly who still can engage in production activities. Their vulnerability position has further increased as the majority, (55 percent) have lost spouses and are living alone in the previous place residence. Most of them are females. Their health status indicates that they are suffering from various diseases at present and in dire need of health care assistance. Although 20 percent are looked after, they are living by themselves. In addition, 80 percent are cared for by their children.

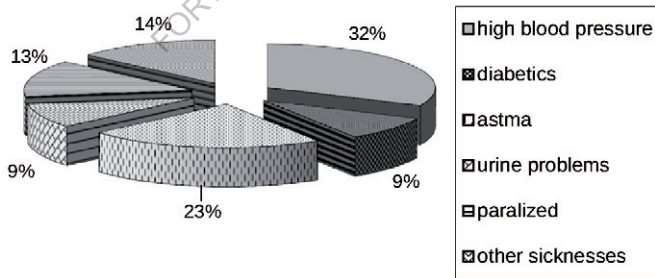
## 7.6 Elderly Population And Their Health Status

The problem of care for older persons is likely to be especially acute for older women, who constitute the majority of older persons in virtually all low mortality populations (Andrewa and Hennink, 1992; martin, 1988). Because of greater longevity among women in most countries in Asia, and the tendency for men to marry women younger than themselves, women are more likely than men to end their lives as widows. The implication of this is a serious gender asymmetry in the support and care of older persons (martin, 1988). The economic and social problems for older women are in many cases worse than for men. Older women are often economically dependent on others, especially in population where female economic

activity in general is low. The prolonged care of such women (because of longer life span) necessitate that those on whom they depend for livelihood, should have sufficient financial resources (U.N. 1996).

Health and age are monitored as important determinants of famine vulnerability in many studies. Pankhurst (1984) lists the elderly, the disabled, pregnant women or mothers, the chronically ill and children as particularly vulnerable groups in refugee camps. These groups have particular nutritional needs or disadvantages and may be more sensitive to food shortage, climate extremes, and other physical stresses that may accompany global change, and may not be move easily (Sinhe, 2006). The following figure shows the health problems of the elderly population in our sample of affected elderly population.

**Figure 7.5 : helath problems of the elderly population**



Source: Survey data



## 7.7 Conclusion

This chapter attempted to examine how Tsunami disaster influenced the family size, structure and dependent status of vulnerable categories in the family. The analysis revealed that more than one child is lost in the study area and that has affected considerably to the decline in the family size. It is also interesting to find that about 75% of the people have not moved in to the new settlement schemes as the “house to house” policy of the government, lack of space for more than one family to be in one housing unit and adjustment problems at the destination have been reflected as the reasons for not moving. These factors have tremendously contributed to the decline of the family size. The breakdown of extended family structure has created loose lives with the so called family and relatives so the Tsunami disaster has surely affected the nature of the family consisted prior to Tsunami. The present study also claims that loss of spouses and their re-marriages which occur due to Tsunami can upset both parents and children are likely to suffer more in that situation.

## **Chapter Eight**

### **Conclusion: Towards an understanding of the impact of Tsunami disaster on demography of Sri Lanka**

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#### **8.1 Introduction**

The main objective of this chapter is to summarize what the present study so far has researched and conclude by showing the impact of the Tsunami disaster on the demography of Sri Lanka. It is expected that the present study will provide a unique opportunity for demographers in particular, and other social scientists in general, to understand how a natural disaster can make changes in demographic phenomena. In addition, for those who are interested in studying future changes in Sri Lankan demography, this study will provide a sound scientific basis to make necessary assumptions and hypotheses in relation to changes in fertility, mortality and migration.

This chapter begins with an assessment of the extent to which the study objectives presented in Chapter One have been achieved, by relating the major findings of the study to these objectives. Secondly, the theoretical implications of the study are outlined. This section demonstrates how available theories related to fertility, mortality, and migration can be successfully adopted to explain the processes whereby Tsunami disaster affects the demographic components. Thirdly, it is shown how different methods of analysis and data sources are helpful to study the impact of disaster in various socio-economic perspectives. Fourthly, a number of implications of value to policy makers and planners are provided on the

basis of the study findings. Finally attention is drawn to future research directions.

## 8.2 Achievement of the Study Objectives

**The major objective of the present study was to examine the impact of Tsunami disaster on the demography of Sri Lanka.** It is submitted that the present study has not only been successful in establishing the applicability and the magnitude of the impact, but also in clarifying the nature of the impact on demography of Sri Lanka. In doing this, a number of more specific aims were addressed and the findings with respect to these aims are reviewed and summarized below.

*The first specific aim under the major objective was to examine the changes in relation to mortality among the Tsunami affected population in comparison with pre-Tsunami situation.* Chapter 4 of the present study was devoted towards achieving this aim. The theory suggests that mortality will differ according to environmental factors such as climate, weather, earthquakes and other natural disasters. Malthus in “positive checks” postulate relates cause of deaths which also include natural disasters and how it functions as a check on population. Omran in his epidemiological transition theory suggests these factors can be seen in the first stage of the epidemiological transition, named ‘Age of Pestilence and Famine’. These theoretical bases provided the present study a unique opportunity to understand morality and epidemiological situations during disaster periods where the magnitude of morality is usually significant. In this context, the present study analyzed the data obtained for Galle district, (one of the worst Tsunami-hit districts in the country) by using various mortality indicators. The study showed how the mortality situation considerably differed during

the pre- and post-Tsunami situations. Although the Galle district shows a normal mortality pattern which can be seen in a low stationary mortality situation, mortality level particularly at adult ages has increased significantly and even widening the gender gap with the Tsunami disaster. It is also important to note that IMR has increased to record level with the disaster as suggested by the present analysis. This suggests that a disaster like Tsunami disaster can become an important cause of death not only in the 'Age of Pestilence and Famine' as suggested by the theory, but even in the 'Age of Degenerative and Man-made Diseases'.

The Life table analysis carried out in the present research suggested that the Tsunami disaster had a significant impact in changing the life expectancies at birth. It was very clear from the present analysis that the Tsunami disaster has caused a reduction of 5.04 and 6.53 life years for males and females respectively; with the Tsunami disaster females were more disadvantaged because of higher deaths occurring to women during the disaster. Therefore, the Tsunami impact on mortality will have a long-term effect on future population growth as well.

***The second specific aim of the present study was to examine the effects of mortality that occurred due to Tsunami disaster on the future population growth.*** It was found that that the Tsunami mortality will reduce the future population number and also the annual growth of population. It is also important to mention that the study has estimated population for the year 2015 for males and females, separately. Since the present study has calculated the magnitude of the disaster on the future population growth through mortality, one can use the analysis of this study to make necessary mortality assumptions to make future population estimates or projections.

The third specific objective of the present study was to examine the risk of death occurring due to Tsunami at small-area population level and see whether it is different from the pre-Tsunami situation. *This will provide a unique opportunity to understand how the Tsunami disaster has made particular localities more vulnerable. A detailed analysis was carried out in Galle district with the use of DS divisional level data to examine this specific phenomenon. It was observed that the risk of deaths at all localities were at the same level and it was relatively low because of the low stationary morality situation experienced by the country, specifically in the south-west coastal region. However, the analysis showed clearly this has been broken down and disturbed severely with the Tsunami disaster since some areas can be seen as high-risk areas. Therefore, it is quite clear that disasters like Tsunami can have a significant impact on changing the risk of death at small area population level. This is compatible with the Malthus's idea that disasters can be treated as 'preventive checks' of population growth, although many subsequent writers have dropped Malthusian theory.*

*The fourth specific objective of the study was to examine whether the Tsunami situation can lead to increase in fertility during the subsequent Tsunami post-Tsunami years.* Our investigation suggests that the female population in childbearing ages have increased during the period 2001 to 2004, so the total number of births have increased during the that period because of the birth momentum as suggested by Coale. However, it was observed that there has been a clear decline in fertility during the immediate post-Tsunami years and the present study investigated this behavior thoroughly and concluded that this arose due to short run economic volatility which had a significant negative impact on fertility.

The rehabilitation process took more than two years; so families have become more vulnerable with regard to shelter and livelihood. This short-run stability has caused a decline in fertility.

*The fifth specific aim of the study was to explore whether women in the childbearing ages change their fertility behaviour after a time lag during the post-Tsunami disaster years.* It was found that the majority of the children who died due to Tsunami disaster were younger children and their mothers were still in their early years of childbearing age span. It was also revealed that the level of infant and child mortality during the pre-Tsunami period in the affected community was zero as no child has been reported dead. Our analysis showed that the fertility desires of the affected community are quite different to their desires before the Tsunami disaster and now they want more children. This is more than the fertility norm in that community; not only to replace the dead children but also as an insurance measure to face future disaster situations. This clearly shows that the affected women have decided to adjust their fertility behaviour because of the disastrous situation. A relatively high incidence of re-marriage was noticed among women who lost their husbands due to Tsunami disaster and thus an increase in number of children in their new marriage is desirable as well.

*The sixth specific aim of the study was to examine whether Tsunami disaster has influenced the internal migration pattern.* We analyzed the magnitude of the displacement of the people and concluded that Tsunami disaster has significantly influenced the migration pattern, particularly within the Divisional Secretariat Division; so it can be treated as short-distance migration. According to the magnitude of the

displacements at small area population level, we were able to determine what the Tsunami-prone and Tsunami-free areas are.

It was found that the resettlement schemes where migrants were supposed to resettle are located in somewhat interior parts of the DS division and are basically non-fertile lands, which are not suitable for cultivation. Since this internal migration observed with the Tsunami disaster was a 'forced' migration rather than a 'voluntary' migration associated with 'push' and 'pull' factors, a detailed analysis was carried out on the socio-economic mobility pattern of the migrants as well.

Therefore, *the seventh specific objective was to examine whether migration to resettlement areas that occurred due to Tsunami disaster has had any impact on the socioeconomic mobility of the migrants.* Our investigation suggested that migrants who have migrated to the resettlement schemes are not satisfied with the new destination due to lack of public utilities, limited sources of earnings and high cost of living. This suggests, (unlike in normal situation where migrants are attracted to a particular destination) that 'push' factors at the place of origin are in operation at the place of destination. This is why we witnessed a substantial minority of the affected people not moving into resettlement schemes. In addition, however those who have migrated have lost income at the place of destination as the majority had to change their original occupation and self-employment activities. Another major problem that the migrants encountered at the place of destination was the non-receptiveness of the host community since the host community is poorer than the migrants. This has led to several social conflicts including violence against women. Therefore, it is quite clear that this type of migration has significantly

influenced the migrants' socio-economic mobility pattern in a very unfavourable manner.

*The eighth specific aim of this study was to examine whether Tsunami disaster has influenced the family size, structure and dependent status of the affected communities.* When the entire population of the affected community was examined we found that the majority of the people could not move into the new resettlement schemes due to the governments 'house to house' policy which provided a house only to the head of the household. When there are many extended families and rented households, this policy did not allow many people to move into the new settlement schemes mainly due to the lack of space in those new houses. This has caused the decline in the family size as well as the structure of the family in the nature of the family that existed in the pre-Tsunami period. In addition, the loss of spouses due to Tsunami and high incident of remarriage have significantly affected the structure of family. It is quite important to observe from the present analysis that a substantial proportion of the elderly persons, mainly women, who lost spouses are still living in the affected communities without having the support that they obtained when their main breadwinners were together before they moved into the new resettlement schemes. Therefore, it appears that the vulnerability position of the elderly population has increased during the post-Tsunami period.



### 8.3 Theoretical Implications

The present study can be regarded as a pioneering study since it has attempted to establish the relationship between disaster and demography with the use of empirical data gathered from Sri Lanka. As indicated in Chapter two where the conceptual framework for the study is discussed, we indicated that there is no theory available to explain the ‘impact of disaster on demography’. However, the population theory which draws various aspects from Malthus’s idea about ‘positive checks’ on population growth, Omran’s ‘Epidemiological Transition Theory’ in which natural disasters’ are considered in the ‘Age of Pestilence and Famine’, Coales’ concept of ‘population growth momentum’, Lee’s ‘push and pull factors’ of migration, Ravenstein’s ‘laws of migration’, and Zelinsky’s concept of ‘social mobility’ of migrants have been used by the present study to show the impact of Tsunami disaster on the demography of Sri Lanka. Available literature suggests that this is the first of this kind of analysis which has attempted to show such a relationship. It is also important to mention here that the study has not only attempted to measure the magnitude of the impact of disaster on each demographic component but also tried to explain the mechanism underlying the relationship between disaster and demography. Therefore, this study can be recognized as an important crossing point which has introduced a novel dimension of ‘disaster and demography’ into demography discipline. Following are the major conceptualizations which arose from the present study for mortality, fertility and migration in relation to natural disaster situation:

#### **Disaster and Mortality**

- Although any geographical locality affected by a natural disaster shows a normal mortality pattern that can be seen in a low stationary

mortality situation, the mortality level particularly at infant, child and adult ages can increase significantly and even widening the gender gap with the disaster. This suggests that a disaster like Tsunami can become an important cause of death not only in the 'Age of Pestilence and Famine' as suggested by the theory, but even in the 'Age of Degenerative and Man-made Diseases'.

- A natural disaster can cause a reduction of life years for both males and females; but females will be in a more disadvantaged because of higher deaths occurring to women during the disaster because due to their more vulnerability position. Therefore, the Tsunami impact on mortality will have a long-term effect on future population growth.
- Although the risk of death at localities can be at the same low level relatively because of the low stationary mortality situation experienced by the country prior to a natural disaster, this can be disturbed severely with a natural disaster since some areas can be seen as high-risk areas. Therefore, it is quite clear that natural disaster can have a significant impact on changing the risk of death at small area population level. This is compatible with the Malthus's idea that disasters can be treated as 'preventive checks' of population growth, although many subsequent writers have dropped Malthusian theory.

### **Disaster and Fertility**

- There can be a clear decline in fertility during the immediate post-disaster years and this arises due to short run economic volatility. This has a significant negative impact on fertility as rehabilitation processes can take many years. So families become more vulnerable

with regard to shelter and livelihood. This short-run instability can cause a decline in fertility.

- Fertility desires of the disaster affected community can be quite different to the fertility desire prior to the disaster and now they will want more children than the fertility norm of that community; not only to replace the dead ones due to the disaster but also as an insurance measure to face future fatal disasters.

### **Disaster and Migration**

- A natural disaster can influence short-distance migration patterns of the affected regions because affected people will be reluctant to migrate to far away places because of the 'forced' nature of migration. Thus the governments are obliged to find new resettlement schemes closer to their original place of residence.
- 'Push factors' of migration at the place of origin can be operated in the opposite direction at the place of destination; since the resettlement schemes established after a natural disaster may not be attractive to many affected community due to the non-receptiveness of the host community and the great difficulty in maintaining livelihood activities people were used to at the place of origin, if they were self-employed people.

### **Disaster and Family**

- Loss of children due to a natural disaster can have a significant impact on the size of the family.

- If the type of family that existed in the place of origin or the affected area is an extended family, then the government housing policy addressing a ‘house to house’ policy may not be favourable to an extended family structure due to the lack of space to accommodate more people. This can have a great impact on the nature of the family size, as well as the structure of the family at the place of destination.
- In addition, the loss of spouses due to a natural disaster and high incident of remarriage can have significant impact on the structure of family. Particularly, a substantial proportion of the elderly persons, mainly women who loose their spouses and live in the affected communities without the support they obtained when their main breadwinners were together, can become more vulnerable during the post-disaster period.

#### 8.4 Methodological Implications

The present study has attempted to mix both qualitative and quantitative information together and come up with better results by minimizing the limitations that can arise with the use of one method alone. Both aggregate –level and micro-level data complement each other when integrated into a single analysis and can provide a more complete picture than if each were analyzed separately. In the present study, aggregate data obtained from the Department of Census & Statistics and the Department of Registrar General were used together with micro-level data obtained from our own field survey carried out in Hikkaduwa DS division in Galle district to explain the impact of Tsunami disaster on demography of Sri Lanka. The micro-level data provided us with considerable scope to utilize

firsthand knowledge of the sources and to exercise intuition by placing them in perspective within a solid matrix of aggregate data. It is expected that this type of analysis provides an opening to reevaluate the analytical approach and perhaps to reformulate the issues under investigation if these two types of data yield conflicting results.

## 8.5 Policy Implications

Since the present study was able to show the magnitude of the Tsunami disaster on future population growth through the effects of mortality, it is expected that this study will provide a sound base for the population planners and policy makers to adjust their plans accordingly. In addition, this analysis will provide us with the type of assumptions one needs to make when making future estimates of population and population projections.

The risk of death information calculated for the small-area populations can be of vital importance for policy planners associated with disaster mitigation activities to identify which area(s) that have a higher risk for future disasters. The methodology used for the calculation of risk of death can be used to calculate the same for other disaster affected area and thus priority areas needing more interventions.

Population policy planners will find this study very useful since this study shows reasons for a high fertility that can occur in the Tsunami affected area after a time lag. Therefore, an increase of fertility can occur during the post-Tsunami period as an adjustment process by the affected community. Population planners can make their plans accordingly rather than panicking that fertility in the affected areas will increase indefinitely.

Displacement data shows the Tsunami-prone and Tsunami-free areas in the affected regions. This will provide the policy planners associated with disaster mitigation to make their interventions by prioritizing areas suggested by the present study. Most importantly, the detailed in-depth analysis carried out by gathering information from the migrants on their perceptions about their newly resettled scheme indicates many problems faced at present such as, lack of public utilities, loss of income sources and high cost of living. Understanding such problems is very useful for the policy planners to make remedial measures to make the resettlement schemes more comfortable to the newly settled migrants.

It was revealed in this study that the disadvantages of the governments 'house to house' policy made some homeless, since the structure of the family in the affected areas was an extended family structure. This provides a unique opportunity for the government to think and readjust their housing policies for the disaster-affected people by observing the type of family that exists in the affected places.

Social planners will undoubtedly find this study very useful because it reveals how elderly women become more vulnerable due to the Tsunami disaster and also with the governments' housing policy for affected people. Therefore, an appropriate social protection scheme is essentially important to secure the accommodation, livelihood and health aspects of the elderly population, particularly those still living in affected areas.

## 8.6 Future Research Directions

By taking the Galle district as a sample, this study attempts to make inferences about the macro-level situation and Hikkaduwa DS division as a case study to gather in-depth information to understand the impact of Tsunami disaster on the demographic components at micro-level perspectives. This provides a unique opportunity for demographers to understand the importance of establishing the mechanism underlying the relationship between Tsunami disaster and demography of Sri Lanka in an appropriate theoretical framework. The present study showed that it was capable in conceptualizing the disaster effects on each demographic component to provide a great opportunity for demographers to carry out further research on the same direction in all the affected areas, especially by carrying out a large sample survey. Perhaps, the Department of Census & Statistics in Sri Lanka has the capacity and capabilities of running this type of sample survey, which will yield further understanding and justification of the relationship already established by the present study. In addition, micro-level information collected at various affected localities in various socio-economic setting will prove useful in order to find out if different socio-economic settings yield different results.

Since this study has provided a useful theoretical base for understanding the impact of natural disaster on demography with the use of Tsunami disaster in Sri Lanka, it useful to apply the same methodology (as this has been proven well) to other areas with disasters such as flooding, landslides, windstorms and severe-droughts. This will provide a unique opportunity for demographers to find out whether the conceptualizations put forward by the present study still hold for other disastrous situations as well.

## 8.7 Conclusions

The present chapter has indicated that this study was successful in achieving its objectives. The analysis carried out in this study contributed to the existing population theory by conceptualizing the natural disaster and demography relationship by using the Tsunami disaster in Sri Lanka. It presented important and useful policy implications not only to Sri Lankan population policy planners but for demographers in other countries as well. Therefore, we conclude that the examination of the impact of Tsunami disaster on demography of Sri Lanka has wide applicability for other settings where natural disasters have already occurred or can occur in the future, in order to have a clearer understanding of the impact of such natural disasters on the demography in those localities.

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