RESEARCH REPORT

Public Awareness Campaign For Disaster Risk Reduction, Response Action & Early Warning In Maldives

by mooinc. pvt. ltd.

CONTENTS

BACKGROUND **4**
LITERATURE REVIEW **4**
HYPOTHESIS **10**
RESEARCH OBJECTIVES **11**
METHODOLOGY **11**
PART ONE: SECONDARY RESEARCH METHOD **12**
SECONDARY RESEARCH OBJECTIVES 12
METHODOLOGY 12
LIMITATIONS 19
CONCLUSION 19
PART TWO : PRIMARY RESEARCH **20**
PRIMARY RESEARCH OBJECTIVES 20
RESEARCH QUESTIONS 20
METHODOLOGY 20
QUESTIONNAIRE SURVEY 20
METHOD OF DELIVERY 21
FINDINGS 21
QUALITATIVE ANALYSIS 41
DISCUSSION **43**
LIMITATIONS **43**
CONCLUSION **44**
REFERENCES **44**
APPENDIX A **45**
APPENDIX B **58**
INDEPTH INTERVIEW TRANSCRIPTS 1 59
APPENDIX C **68**
APPENDIX D **77**
APPENDIX E **90**

BACKGROUND

For centuries, Maldivians have co-existed in relative harmony with their natural environment, with the coral reefs and the surrounding oceans forming the lifeblood of the country. However, the inevitable impact of globalisation, tourism and the rapid pace of development have brought forth new socio-economic and cultural customs, alien and detached from the essential culture of the Maldives. Today, this unprecedented scale of urbanisation has nurtured new lifestyles and novel modes of social organisation, marked by a swift departure from sustainable forms of livelihoods. In some islands, such dynamic shifts have irrevocably set in place untenable and dangerous practices that threaten the very social fabric and hence survival of the islands.

The need to revitalise the beliefs of our ancestors and their harmonious way of life therefore has become an urgent and pressing concern. The necessity of this was no doubt seen on December 26, 2004, when the Maldives faced the first and worst disaster ever recorded in its national history. For a country that had never experienced devastation at such magnitude, the tsunami exposed the acute vulnerability of the Maldivian people to natural calamities, but also more importantly, exposed their lack of knowledge and the coping capacities available to respond in wake of such hazards and disasters.

Understanding that people must be given the skills to prepare and cope, it is also essential that they learn to avoid lifestyle and livelihood practices that increase their vulnerability to an impending disaster. Through a phenomenological enquiry, it is hoped that this research will unveil new insights into the attitudes of and risks perceived by Maldivians, and the actual risk felt.

This research has been conducted for the UNDP funded Public awareness 'Campaign for Disaster Risk Reduction, Response Action, Mitigation & Early Warning in The Maldives'. The study is an attempt to explore people's attitudes and perception towards disaster risk, and identify avenues to rejuvenate locally embedded knowledge systems and capacities.

LITERATURE REVIEW

Comprehending Disaster Risk Management

Disaster risk management has become of mounting concern in development practice and theory given the increasing frequency of natural events in recent years. The devastation that follows from such natural phenomena have called for policies centred on planned and rapid response to disasters. It is therefore argued that disasters are closely rooted in the development trajectory of a country (Nakagawa and Shaw, 2004), in that they are not 'extreme events created entirely by natural forces, but manifestations of unresolved problems of development' (World Bank, 2009). Such views contend that rising vulnerabilities of populations have increased the risk and frequency of disasters, especially for the developing world that lack the capacity to mitigate against them. The World Bank (2009) has recently highlighted that developing countries suffer the greatest costs when a disaster hits – with more than 95 percent of all deaths being disaster related and losses due to natural disasters being 20 times greater (as a percentage of GDP) than in industrialized countries (World Bank, 2009). Understanding people's perception towards disasters therefore must consider the diverse contexts in which they take place.

Disasters are defined as a 'serious disruption in the functioning of the community or a society causing widespread material, economic, social or environmental loss which exceeds the ability of the affected society to cope using its own resources.'(CBSE, 2006). The term hazard on the other hand is used to describe naturally occurring events such as rainfall, floods, swell surges and earthquakes. In making this distinction, disasters occur only when conditions favour its creation; through the compound effect of hazard, vulnerability and insufficient capacity or measures to reduce risk and impact on the vulnerable population.

Studies on disaster management also draw on the key issues of human impacts on the environment and poorly planned development in turning recurring natural phenomena into human and economic disasters (World Bank, 2009). It asserts that allowing dense populations on a floodplain or permitting poor or un-enforced building codes in earthquake zones is as likely to cause casualties and losses as the real impact of disasters.

Vulnerabilities

Literature concerning disasters, and even development, focuses strongly on vulnerabilities. Vulnerabilities are the extent to which a geographic entity or community is likely to be damaged or disrupted by the impact of particular hazard, by

their physicality and proximity to hazardous terrains or disaster prone areas (Gupta and Sharma, 2006). Vulnerabilities are often categorized into physical and socio-economic vulnerability. Physical vulnerability focuses on the impact of hazards and disasters on the environment, infrastructure and technical capacities of people, while socio-economic vulnerability is concerned with impact on socio-economic contexts of populations.

Attention to these vulnerabilities is essential to understanding community perceptions on disaster risk and many emphasise the importance of economic diversification in the creation of disaster resilient communities (Ibid.). However, small island economies such as the Maldives are generally less diversified in their production and export structures due to their small size, as well as the narrow range of human and non-human resources and markets available. Their physical geography further exacerbates their vulnerability, and the limited land availability to congestion as dense population growth, urban centres and agriculture compete for space. Natural disasters, therefore, tend to have relatively more severe impacts on smaller countries with narrow economic bases rather than larger ones with wider economic bases (Ibid.).

Another key variable that stands out in disaster research is the role of gender. It has been argued that while the poor suffer the most in times of disasters, the poor generally tend to be female. Households with female heads are often the worst off, and disasters push them further into the poverty trap due to limited access to resources as opposed to male led households. In a society that has a higher proportion of female-headed households, the collective impact on society is much greater (Attz, 2008). In the Maldives, vulnerable groups have been identified as those not covered by the public safety net. They include large families with no breadwinner, mainly households headed by single women (divorcees and widows), and certain single elderly. The large majority of these groups are located in the outer atolls.1

Understanding Capacities

Capacity can be defined as the ability to command the resources, means and strengths which exist in households and communities that enables them to cope with, withstand, prepare for, prevent, mitigate or quickly recover from a disaster (CBSE, 2006). These include human capacity, physical and socio-economic capacity. Hazards are always prevalent, but the hazard becomes a disaster only when there is greater vulnerability and poor capacity to cope with it. In other words the frequency or likelihood of a hazard and the vulnerability of the community increases the risk of communities being severely affected.

Capacities can be enhanced by an individual or his or her household's access to social relations. The culture, social organization and power distribution of localities significantly shape people's perception and attitudes, and Nakagwa and Shaw, 2004 argue that risk reduction strategies must nurture existing cultural and social norms to facilitate risk preparation and disaster recovery. They argue that social capital, defined by networks of trust and social norms, is central to this in enhancing collective action and disaster recovery. Resilience to disasters is sometimes measured with the depth and strength of social relations of communities (Social Capital). In times of disasters and emergencies, an individual or household can call on their social capital to strengthen other capitals, such as financial and physical. Social capital 'entitles' people to shelter, food, tools and other materials that are owned by, or controlled by others (Brouwer and Nhassango, 2006).

Understanding Risk Perception

Risk is a measure of the expected losses due to a hazard event occurring in a given area over a specific time period. Risk is a function of the probability of particular hazardous event and the losses each would cause (Plapp and Werner, 2006).

The level of risk is contingent upon:

- Nature of the hazard
- Vulnerability of those elements affected
- Economic value attached to those elements

When one refers to disaster management, the real implication in this sense is disaster risk management (Ibid.). Disaster risk management includes all measures that reduce disaster related losses of life, property or assets by either reducing the hazard or vulnerability. Given that this research aims to understand the perception, attitudes and behaviour of people in context of hazards and disasters from its initial impact to recovery, it is necessary to uncover the many layers shaping these factors.

Research on disaster risk perception reveals that people have diverse perceptions of hazard and disaster risk, and there is a

strong tendency for a community to adopt a zero-risk attitude when they have already experienced a hazard or disaster. A zero-risk attitude can also develop when people relinquish all self-responsibility in the belief that physical infrastructures and protective barriers can safeguard against hazards and disasters (Ibid.).

It has also been noted that women and men experience disasters in diverse ways (Attz, 2008), in terms of their perception, their response and role. It can be argued therefore that disaster risk management is a highly gendered concept, and the roles women and men play reflect their position in the household and society.

In many ways, people's perceptions, attitudes and beliefs and how these are moulded into behaviours are highly subjective in that they are influenced by cognitive, personal, situational and contextual factors. This implies that risk holds different meanings for different social groups as one's perception, attitudes and beliefs are premeditated by the governing norms and cultures socially reproduced within society (Tatsuki et al, 2003).

Risk in itself appears in two forms:

1 . Dread risk: exemplified by a perceived lack of control, threat, fatal consequences and unfair distribution of risks and benefit

2 . Unknown risk, exemplified as unknown, unperceivable and novel risks with delayed impact.

Literature also emphasizes the centrality of religion and spiritualism play in defining people's perception of disasters and their accompanied risks. These forces appear either as coping mechanisms or prisms through which people attempt to understand the destructive trail disasters leave behind (Bhatti, A [no date]).

Putting Disasters and Vulnerabilities into context: The Maldives' Experience

The Maldives is composed of 1190 islands spread across the Indian Ocean, of which only 200 are inhabited. The remaining islands serve either as resorts, industrial and agricultural lands or are left uninhabited. The unique geography and physical landscapes of the islands have become a strong determinant in identifying the level of vulnerability and the capacities available to the people residing in them. The size and location of islands determine the type of employment, the level of development and the resources that contribute to the durability of a population to prepare, respond and recover from hazards and disasters.

Hazard Analysis

The most prevalent hazards in the Maldives are rainfall, flooding, udha, swell waves, tsunamis, and windstorms. While these impact on varying scales, there is a distinct pattern in which hazards are distributed across the country. The following illustrates the geographical distribution of hazards:

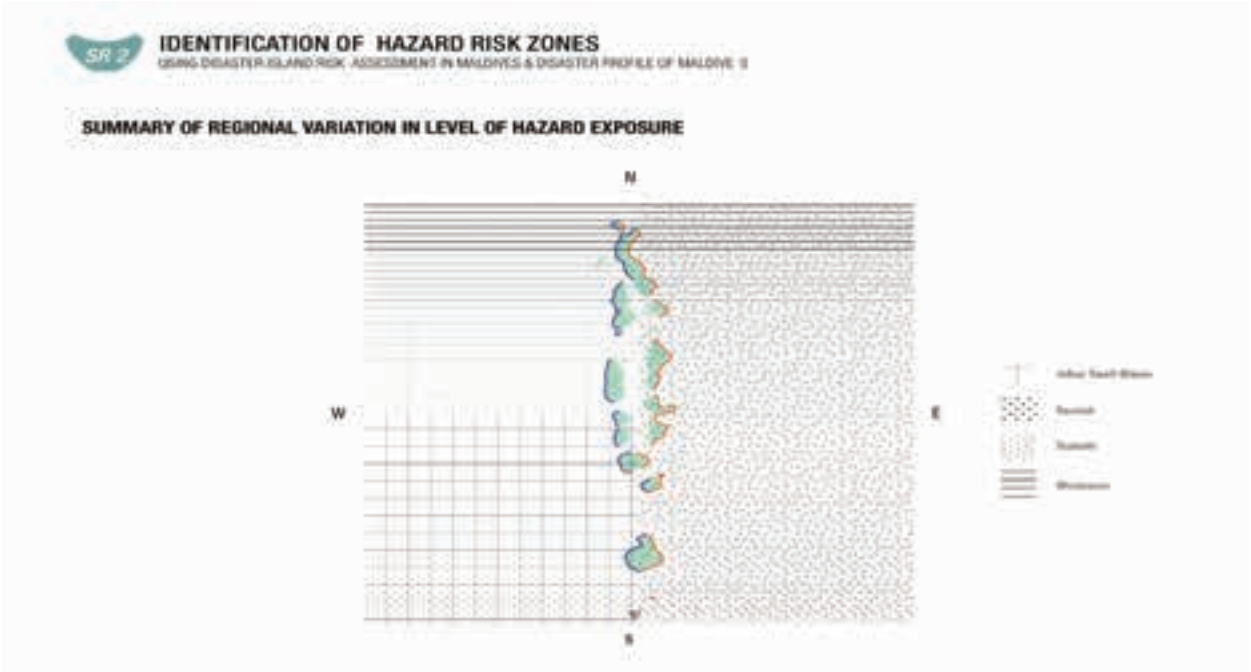


Figure 1: Summry f Regional `Variations in Level of Hazard Exposure taken from Disaster Risk Profile of the Maldives (UNDP, 2006)

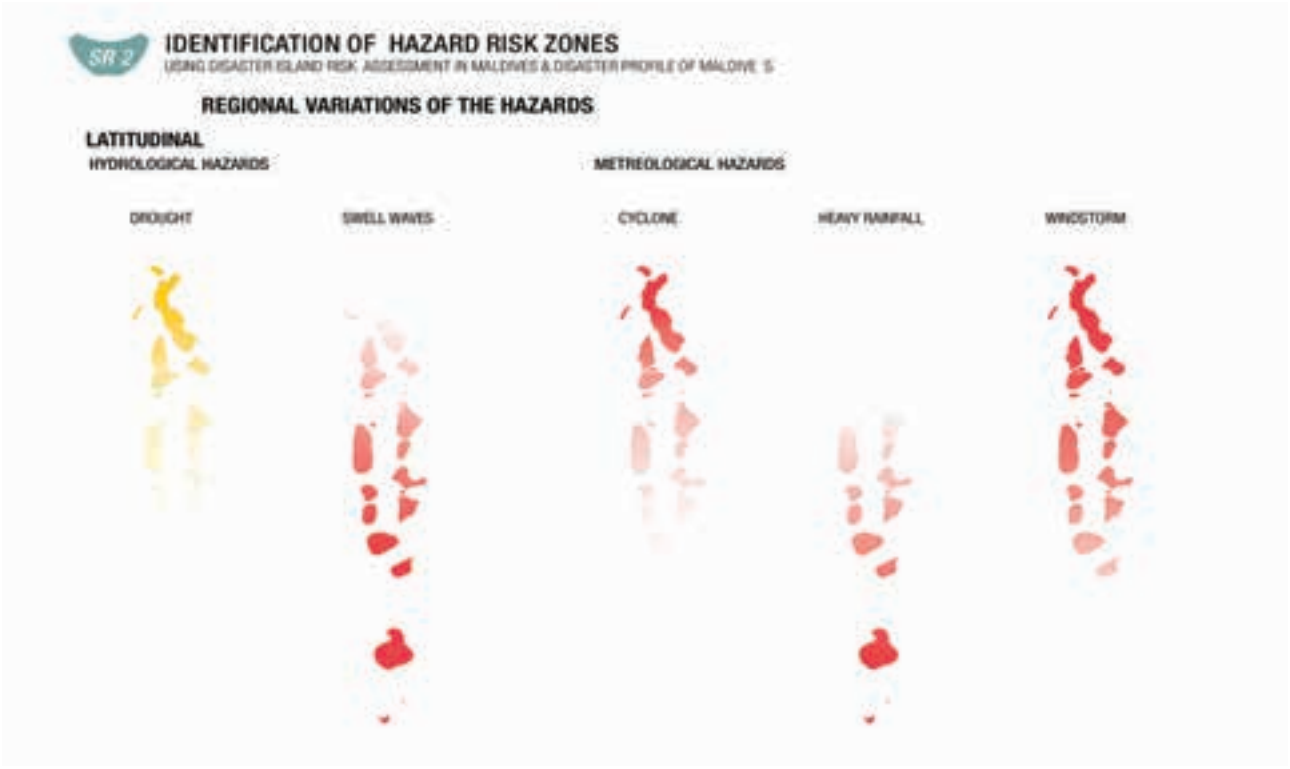


Figure 2: Latitudinal `Variation in Hazard Expsoure taken from Disaster Risk profile of the Maldives

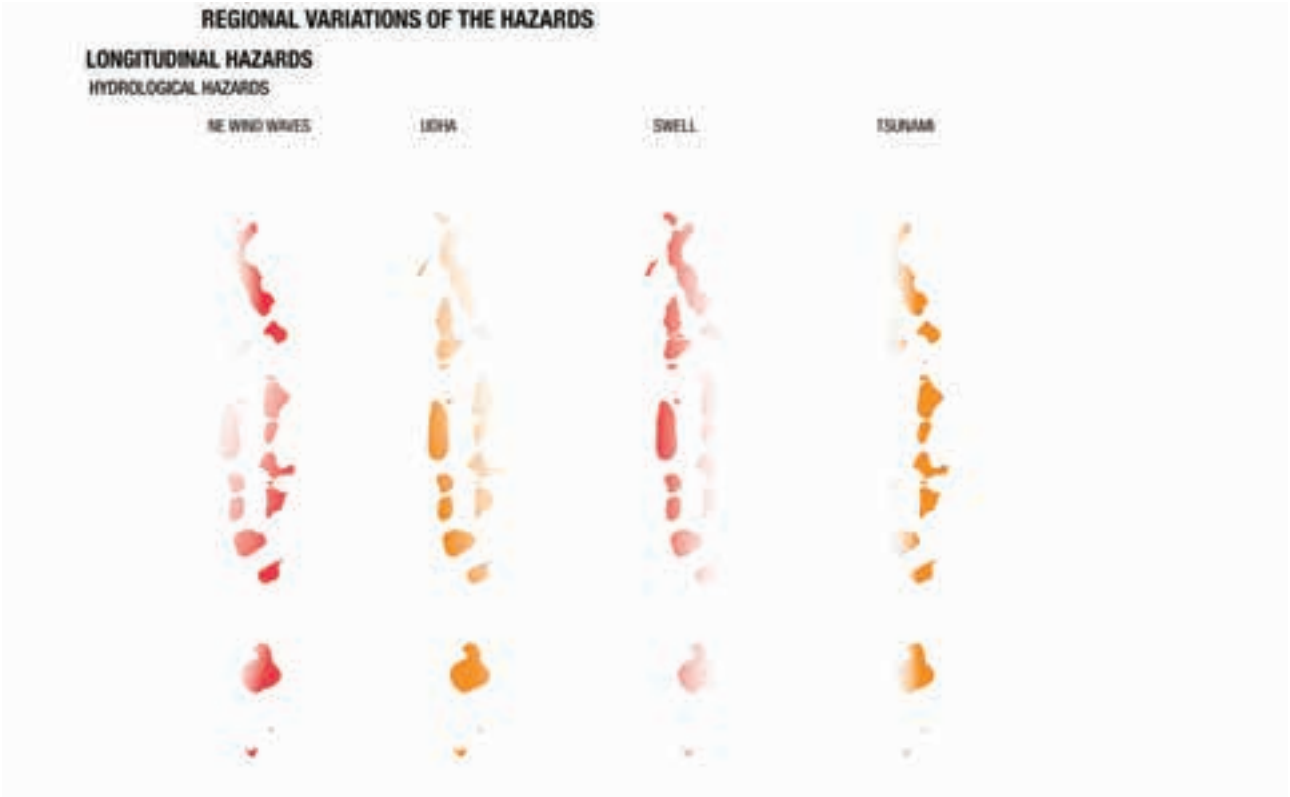


Figure 3:Longitudional variations in hazards taken from Disaster Risk profile of the Maldives

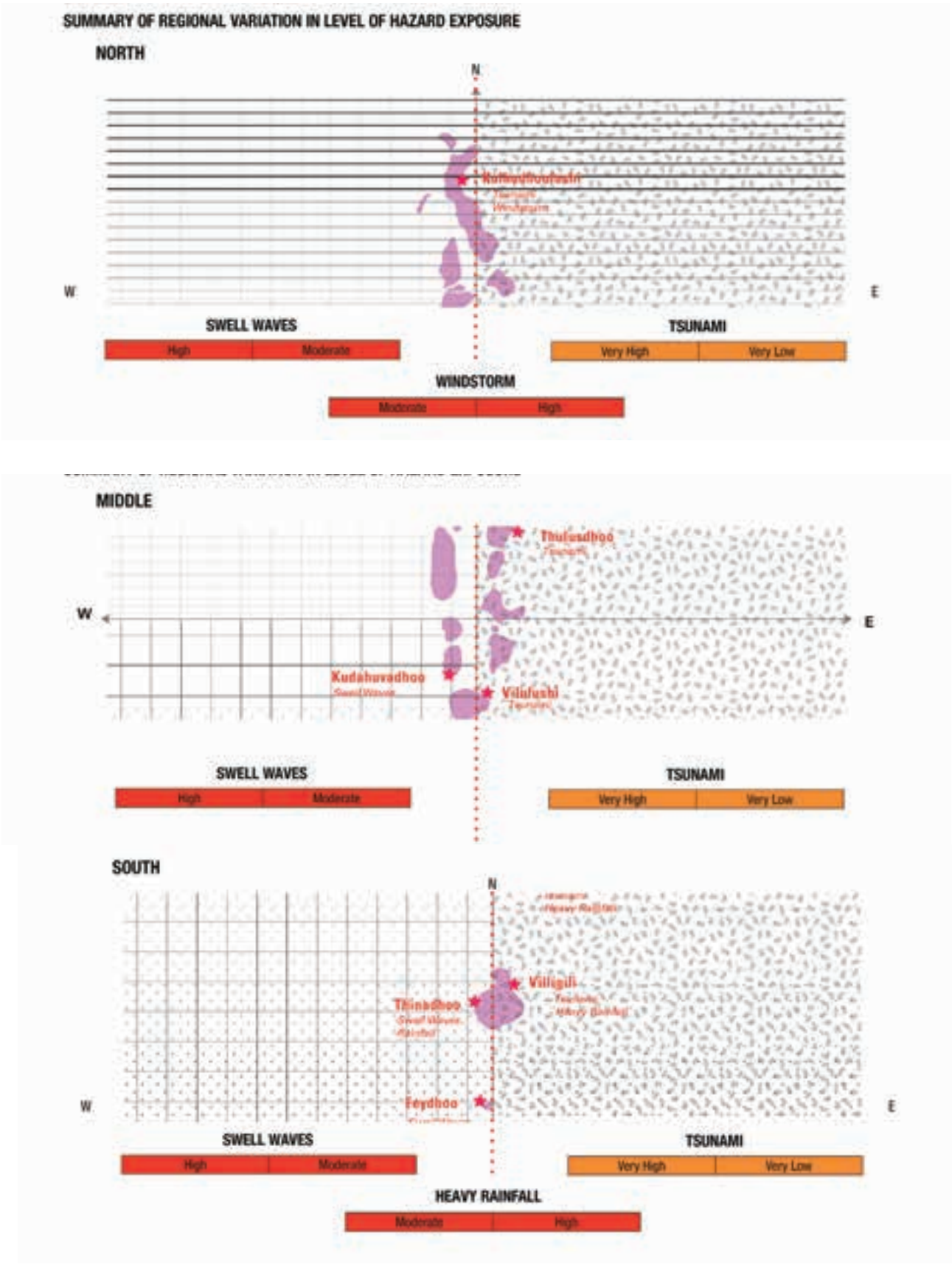


Figure 4: Severity and Frequency profile of the Maldives region wise, taken from Disaster Risk profile of Maldives

An anthropological enquiry

Historical accounts of the Maldives reveal a rich cultural mélange of different races and peoples. The strategic geographic location of the islands made it a key transit point in the international trade of the time between the East and West, as well as a place of refuge for the shipwrecked. Key historical sources give detailed insights into the traditions and cultures of the Maldives, showing light on the many historical layers forging and reinforcing the beliefs, attitudes and behaviors of Maldivians today.

Figure 5: `Showing the Athropoligical study of regional influences during Maldives Histroy

Furthermore, the folk tales, poetry and the songs of the past reveal the deeply embedded relationship between Maldivians and their natural environment. These art forms, shrouded in mysticism and metaphorical meanings suggest that the natural environment was greatly hallowed and respected by the local people. Folk tales, poetry and songs have also been found to be essential guides to surviving and navigating the islands and recent research has revealed how each island and atoll had folk songs detailing the features of their natural habitat and surroundings (known as athelveshi or environment song). These findings support the argument that traditional and customary Maldivian life and livelihoods were fundamentally derived from the physicality and geographic location of the island.

An excerpt: The Huvadhoo atoll Athelveshi as narrated by Dhon Aisaage Saudiyya & her husband Nooh (Saeed, 2003)

"On a rainy night, a little boy was crying. His mother kept him outside the house. After a while some one came to borrow the hunigendi, [coconut scraper] for scraping coconut, the mother without opening the door said, "It is standing next to the house wall, so take it. The person took the boy and walked him through the Mashigando [marshland]. At times the boy was neck deep in water.... the song continues to tell of the places the child saw that night. At dawn the person, who is actually a "ferithaa", a non- human spirit, returned the child back to his home. The fereithaa asked for a gift in return, and the boy gave the fereithaa one of his eyes."

The metaphorical gesture of offering his eye as a gift elucidates the immense value of the knowledge he gained of his island, but more significantly, this symbolic act shows that the boy had little importance for the power of sight, given his newfound knowledge, to navigate his way across his island.

HYPOTHESIS

Hypothesis were developed from consise reading of disaster and risk related literature, which enabled identification and understanding of the basis by which publics knowledge, perception & behaviour, in relation to disaster preparation, response and recovery could be judged and evaluated.

HYPOTHESIS 1•

People's perception of risk is determined by previous experience with hazards and disasters

HYPOTHESIS 2•

People's perception of risk is determined by the physical features of their environmental surrounding

HYPOTHESIS 3•

People's perception of habitat security is primarily based upon social factors, rather than environmental factors.

HYPOTHESIS 4•

Gender determines perception of hazards and disasters and associated risks

HYPOTHESIS 6•

Age and level of education determine people's agency towards disasters

HYPOTHESIS 7•

- Religious beliefs are more likely to influence people's perception of disaster risk and safety than scientific rationality

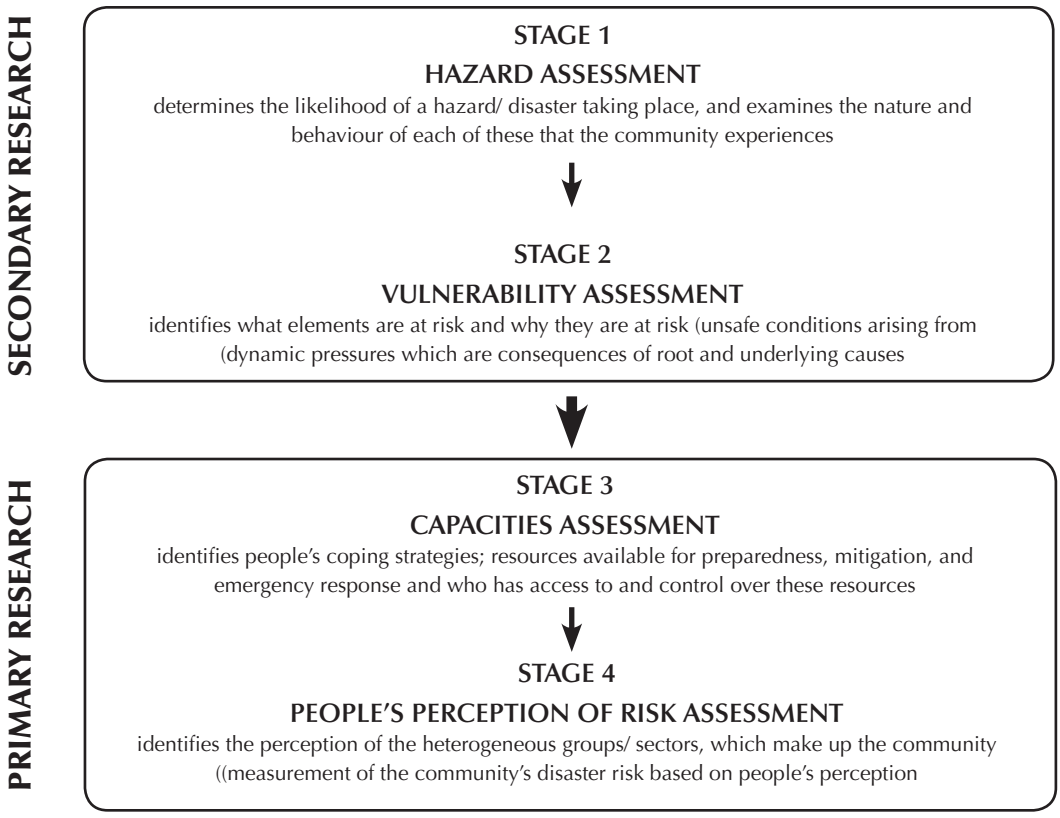
RESEARCH OBJECTIVES

The primary objective of this research was to measure the gap between, actual reality of hazard exposure and vulnerability island wise and attitudes and perceptions among general public within each island about their level of knowledge and attitude towards the risks.

METHODOLOGY

A two part research methodolgy was used to meaure the actual risk against perception of risk. Secondary research methodology utilised exsiting secondary sources to measure the hazard exposure and social and phsycial vulnerability of each island.The primary research will focus on acquring public perception, knowledge regarding risk felt, and assess their current capacity to prepare, respond, and recover from disaster.

The following is a Risk Assessment Model useful in understanding the two-part research methodology2



ADB (2001) Social Protection in Asia and the Pacific, Asian Development Bank, http://www.adb.org/Documents/Books/Social_ 2 (Protection/prelims.pdf. (last accessed 28 February 2009

PART ONE: SECONDARY RESEARCH METHOD

Secondary Research Objectives

Hazard Assesment

Determines the likelihood of a hazard/ disaster taking place, and examines the nature and behaviour of each of these that the community experiences

Vulnerability Assessment

Dentifies what elements are at risk and why they are at risk (unsafe conditions arising from dynamic pressures which are consequences of root and underlying causes)

Methodology

The tsunami as the only major disaster experienced by the Maldives provided vast amounts of data that have been used herein as baseline data to develop vulnerability indicators and assess impact levels. Using a number of sources available, in particular the Tsunami Impact Assessment (2004) and Developing a Disaster Risk Profile of the Maldives (UNDP, 2006) together with the Vulnerability and Poverty Assessment III (2004),and Maldives census data (DNP 2006) the findings of these were collated together and extrapolated to assess the physical and socio economic vulnerability and hazard for each individual inhabitat island. The following indicators shown in Table 1, were developed inorder to assess the actual risk of each island

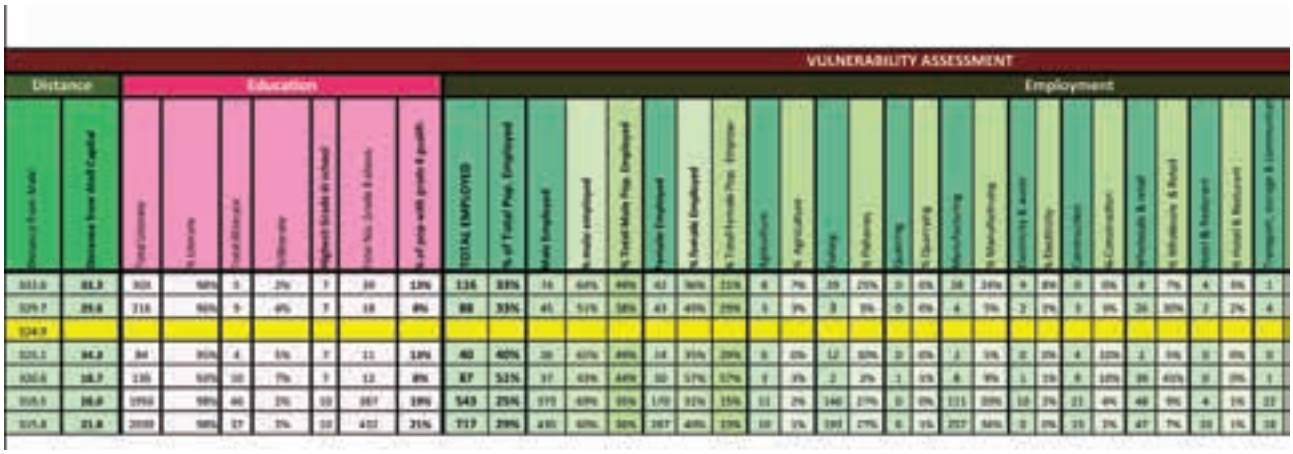
SOCIO-ECONOMIC VULNERABILITY	PHYSICAL VULNERABILITY
Level of economic diversification	Level of congestion/ population density
Engagement in vulnerable economies such as agriculture, manufacturing and fisheries which rely on physical assets and natural resources	Tsunami impact on basic infrastructure-households & social amenities - schools, health posts and hospitals
(Population Displaced (Internally/ Externally	Tsunami impact on physical infrastructure - roads and harbours
High Poverty Index	Tsunami impact on physical assets - machines, equipment and boats

Table 1: Hazard and Vulnerability Indicators

Consolidating secondary research findings and choosing the case studies

Using Microsoft Excel, the data collected from the above stated reports were graphically presented as pie charts which

were then mapped accordingly across the Maldives.(see Appendix A for visualisation of data)



VULNERABILITY ASSESSMENT																																					
Distance		Education							Employment																														
311.6	31.3	303	98%	5	2%	7	10	13%	116	33%	51	44%	44%	42	36%	21%	6	7%	29	25%	0	0%	26	24%	9	8%	0	0%	4	7%	4	3%	1				
329.7	29.6	218	96%	9	4%	7	18	8%	88	33%	45	51%	38%	43	49%	25%	1	3%	3	3%	0	0%	4	5%	2	3%	3	3%	26	30%	2	2%	4				
124.9																																					
325.1	44.3	84	95%	4	5%	7	11	13%	40	40%	20	65%	44%	14	35%	20%	0	0%	12	30%	0	0%	2	5%	0	0%	4	10%	2	5%	0	0%	0				
320.6	18.7	135	90%	10	7%	7	12	8%	87	51%	37	43%	44%	30	57%	57%	1	3%	2	2%	1	1%	8	9%	1	1%	0	10%	39	45%	0	0%	1				
318.5	38.0	1793	98%	46	2%	10	167	19%	543	25%	273	69%	35%	170	31%	15%	11	2%	140	27%	0	0%	111	20%	10	2%	21	4%	48	9%	4	1%	22				
319.8	21.8	2033	98%	37	2%	10	411	21%	719	29%	435	60%	36%	287	40%	19%	10	1%	193	27%	6	1%	257	36%	2	0%	15	2%	47	7%	10	1%	18				

Table 2: Excel sheet with all secondary data consolidated

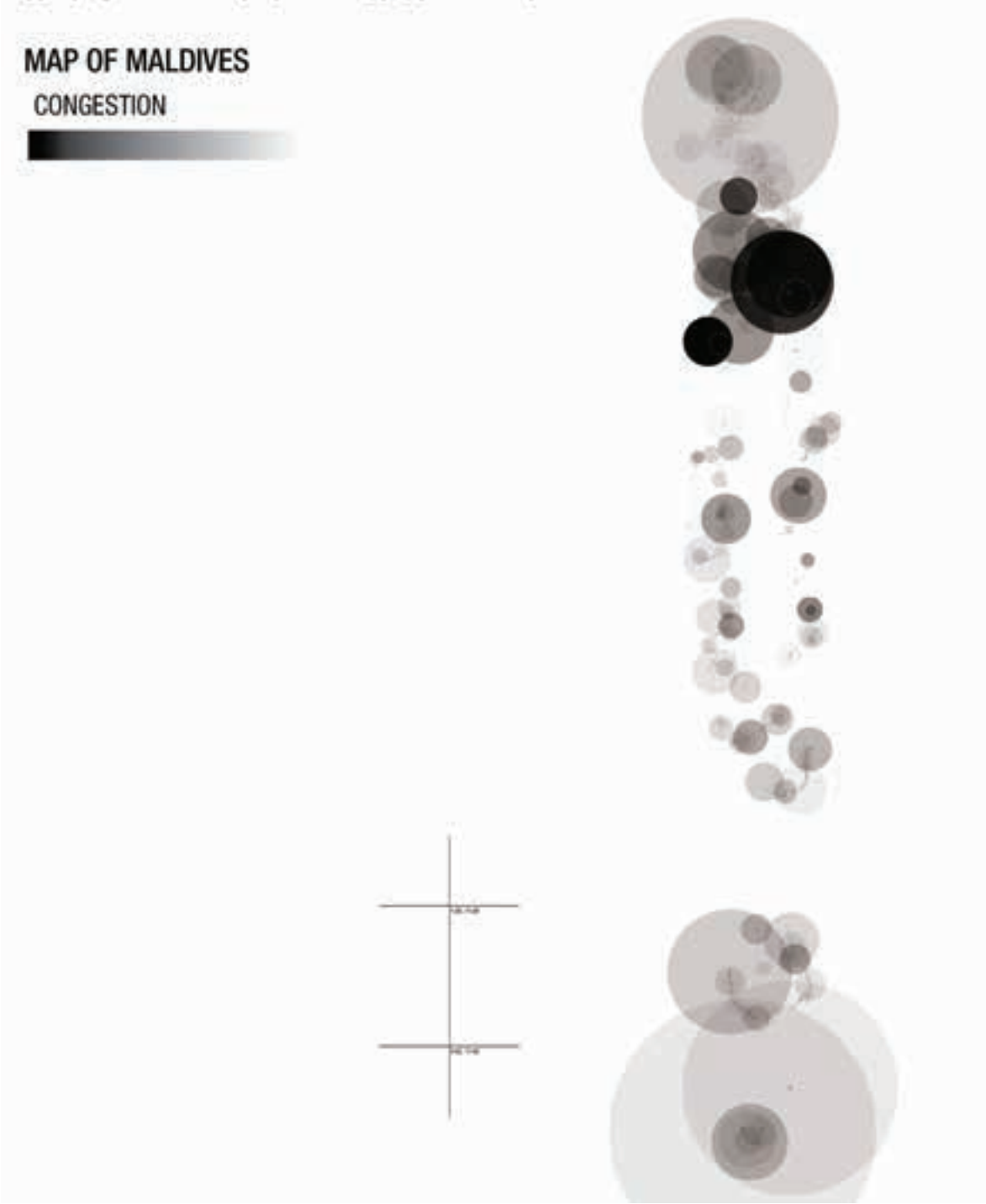


Figure 6:Congested map against employment by sector mapped regionally

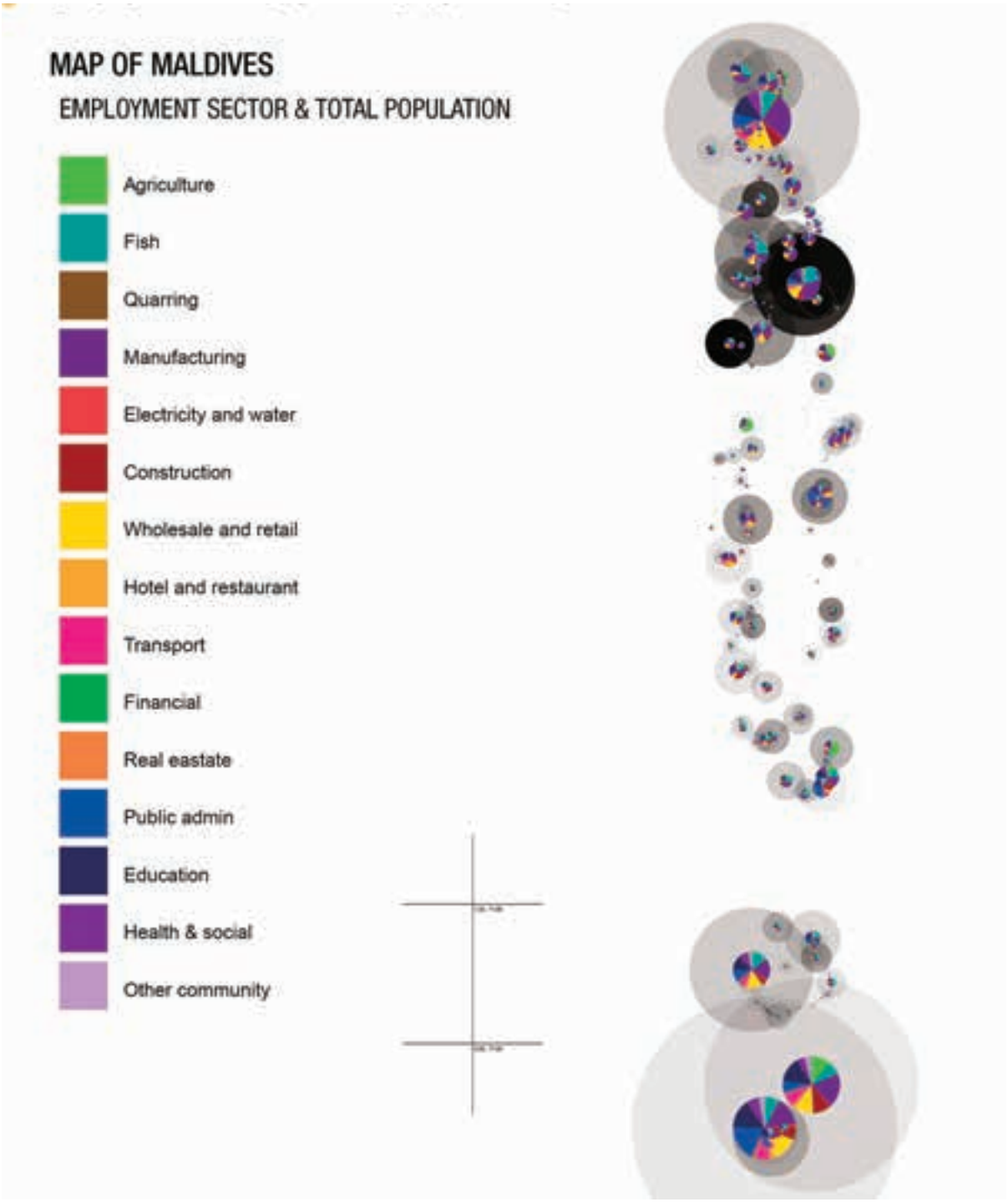


Figure 7: Congestion and Employment secondary data mapped regionally

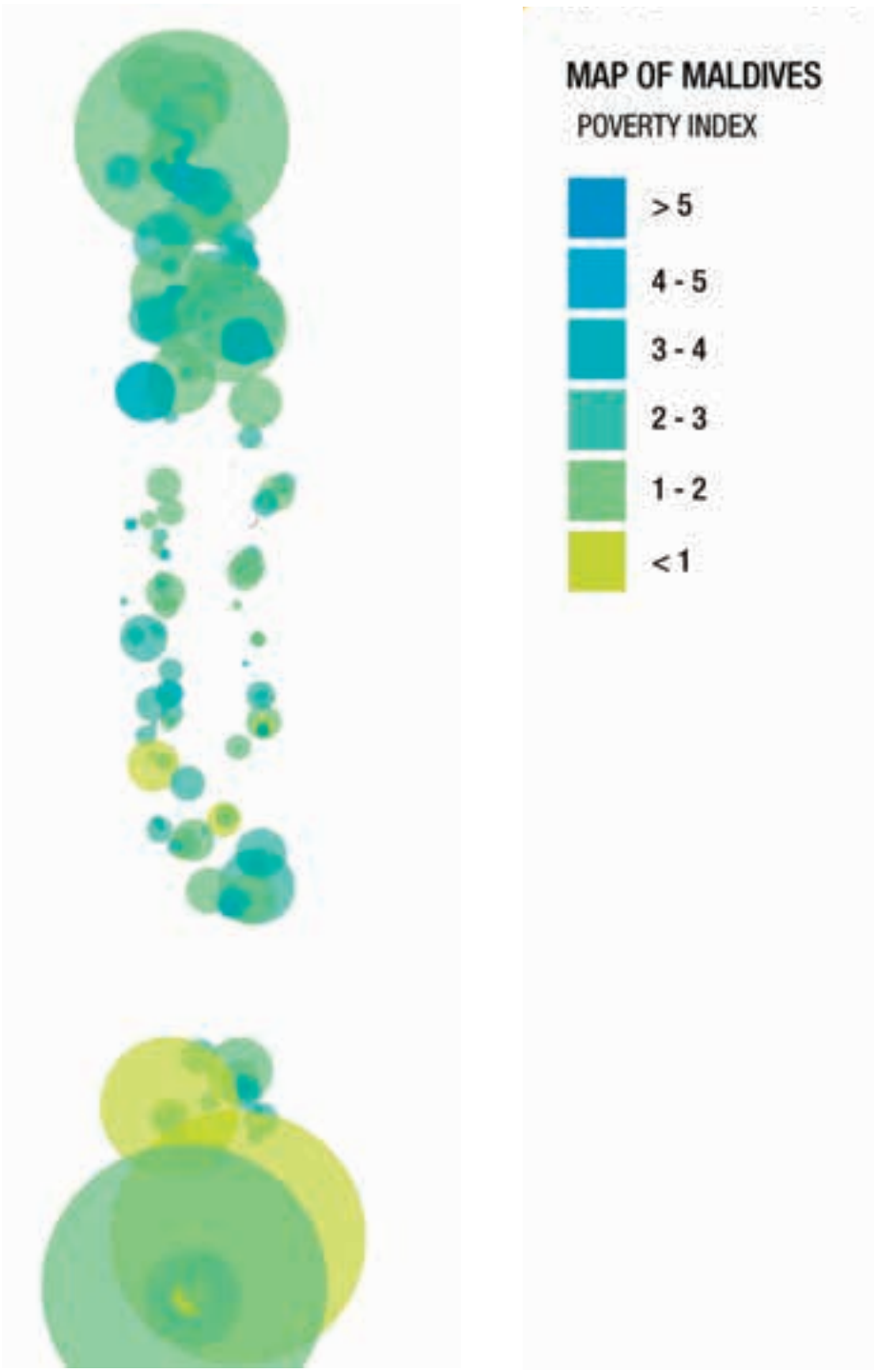


Figure 8:Poverty index for each island mapped

Island Vulnerability & Impact Assessment

The islands were then plotted on a proximity-impact grid which measured the location of the islands within the tsunami hazard zone and the level of impact experienced during the tsunami, including other vulnerability indicators. These were useful in deciphering why anomalies appear; such as those islands, which do not lie in the tsunami hazard zone but nevertheless, felt the worse impacts of the disaster. Such analyses helped focus the study on the diverse factors contributing to an island's risk, which was later useful in building the primary research methods.

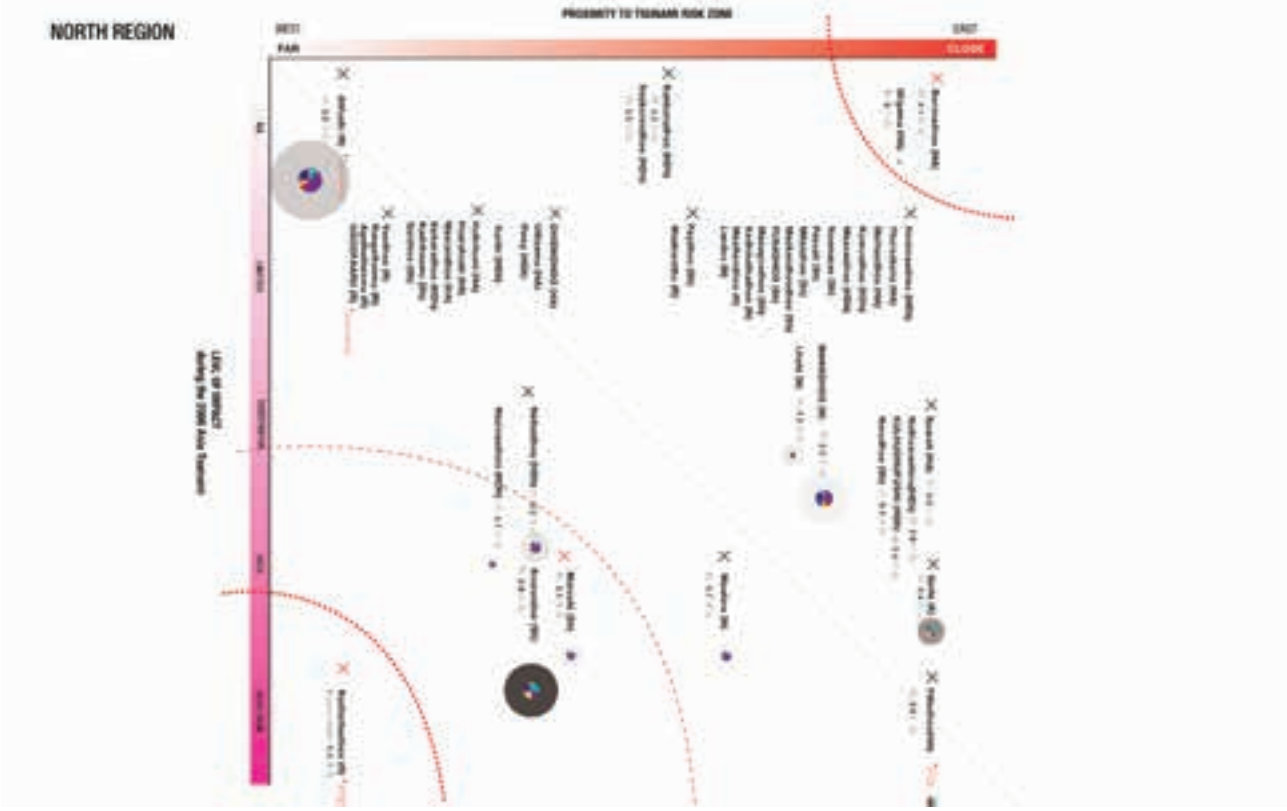


Figure 9: Impact assessment based on assessment made by NDMC

Through this rigorous analytic process, a total of six islands were chosen for the study to gain an intensive understanding of the varying perceptions, attitudes and behaviours with regard to disaster risk and preparation. The secondary research analyses revealed the relative similarities in socio-economic and demographic patterns across all the islands, with some marginal differences in occupational and economic groups. As such, the important variables in assessing the research .objectives, in line with disaster literature were the cultural variations in social norms governing society

The following islands were identified as significant in understanding variations in vulnerability

Haa Alif. Filladhoo

Chosen as a case study because it was representative of islands located in the high-risk tsunami zone. It has both a high social and physical risk of exposure to tsunami impact, as well as a high social and physical risk of exposure to multi-hazards. There is little economic diversification with its economy focused heavily on agriculture (41%), and the VPA (2005) poverty indicators reveal a low level of poverty in the island. The total population stands at 548 with a population density of 2. This island suffered significant physical damages during the tsunami and had its population displaced internally within the island.

Haa Alif. Kelaa

Chosen as a case study because it was representative of islands located in the high-risk tsunami zone. It has both a high social and physical risk of exposure to tsunami impact, as well as a high social and physical risk of exposure to multi-hazards. There is little economic diversification with its economy focused heavily on agriculture (31%), and the VPA (2005) poverty indicators reveal a low level of poverty in the island. The total population stands at 1200 with a population density

of 6. While the island is relatively similar to the above island in terms of its socio-economic patterning and geographic location, this island suffered little or no physical damages during the tsunami. This fact made it an extreme case that required further study to decipher why the island was saved from the impact.

Raa Atoll Dhuvaafaru

Chosen as a case study because it represented an island that has been built on the model of safe-island. It is equipped with new infrastructure designed to withstand the force of floods and high tidal waves and storm surges. The new resident population of Dhuvaafaru people moved to the island after the destruction of their island during the tsunami, however historical records suggest that the Kandholhudhoo people initially originated from the island of Dhuvaafaru. Such migratory patterns within the atolls would further allow an evaluation of the influence of geography, physical infrastructure and design on the perception of risk. Raa Atoll Kandholdhudhoo is located in the windstorm and swell surge zone. It has both a low social and physical risk of exposure to tsunami impact, but has mid-range social and physical risk of exposure to multi-hazards. The severe impact of the tsunami made this island inhabitable and the population lived in temporary shelters in neighbouring island Ungoofaru before been moved to their present island of Dhuvaafaru.

Dhaalu Atoll Kudahuvadhoo

Chosen as a case study because it was representative of islands located in the high-risk tsunami zone and has both a high social and physical risk of exposure to tsunami impact. There is significant economic diversification, but the main focus is on manufacturing accounting for 25% of the island's employment. The total population stands at 1639 with a population density of 24. This island suffered no physical damages during the tsunami and served as a host island. Today, islanders of Dhaalu Atoll Gemendhoo have become residents in the island.

Laamu Atoll Isdhoo

Chosen as a case study because it was representative of islands located in the high-risk tsunami zone. It has both a high social and physical risk of exposure to tsunami impact. There is little economic diversification with its economy focused heavily on agriculture (48%), with 76% of females employed in the sector. The total population stands at 1559 with a population density of 65. This island suffered significant physical damages and loss of lives during the tsunami. The island's historical and cultural significance would enable the exploration of the cultural factors influencing disaster risk perception and attitudes.

Seenu Atoll Meedhoo

Chosen as a case study because it was representative of islands located in the earthquake and flooding zone. It has both a low social and physical risk of exposure to tsunami impact, but has a long history of experience with flooding. It has a diverse economic base with manufacturing and fishing being the predominant forms of livelihood. The island's historical and cultural significance would enable the exploration of the cultural factors influencing disaster risk perception and .attitudes

Empirical evidence of hypothsis

Some of the hypotheses devised were checked against anecdotal and empirical evidence taken from personal accounts of those who had experienced the tsunami.

HYPOTHESIS 2•

People's perception of risk is determined by the physical features of their environmental surrounding

Evidence

- Densely populated communities at greater risk due to congestion
- Urbanization has an impact on the level of risk, in terms of vulnerability to disasters.
- Land reclamation activities to alleviate pressure of congestions increases the risk of hazard event becoming a disaster

HYPOTHESIS 4

Gender determines perception of hazards and disasters and associated risks

Evidence

- There is evidence during the recent Tsunami 2004, that community mobilisation especially women within the community through WDCs that were actively involved in the immediate response and aftercare.
- As soon as the external aid arrived and relief task force was mobilised, people who were involved in the immediate response stage, i.e. women, became disempowered. Women were not included in any decision making r

HYPOTHESIS 6

Age and level of education determine people's agenc

y towards disasters

Evidence

- Certain occupational groups have increased access to vital information necessary for disaster awareness and prevention, as well as preparedness.
- Agricultural based economic communities and islands, has greater knowledge of the dynamics of the physical environment, enabling greater resilience during a hazard event.

Limitations

Given the short span of time available to gain a cultural understanding of highly diverse and scattered populations across the Maldives, the research utilized all available information regarding the study of hazards, disasters, and risk perception as well as all secondary sources pertaining to the research questions addressed above.

Since the only available data regarding hazards and disasters focused on the tsunami, the lack of data pertaining to other hazards may have also affected the quality of the Scondary research methodology.

Conclusion

What has been presented here has been achieved through a rigorous and intensive study of all available and accessible secondary data, both quantitative and qualitative. The aim now is to conduct the primary research to determine the gaps in the knowledge, people's perception and attitudes and hence their behaviors to disaster risk. It is hoped that this research will contribute to a strengthened understanding of the multiple factors contributing to why people behave in certain way and why hazards and disasters often occur in the most unexpected of places. Furthermore, the study will attempt to identify the resources available to the communities that will enable them to overcome hazards and disasters.

PART TWO : PRIMARY RESEARCH

Primary Research Objectives

The primary objective of this research was to measure attitudes and perceptions among general public about natural disasters, with special emphasis on:

- Measuring perceived risk and actual risk felt
- Identifying where people sourced information on disasters and hazards

Research Questions

- What perception do people have of natural hazards and disaster?
- How have previous experiences with natural disasters shaped people's perception of risk and security?
- How aware are people of their local environmental surrounding?
- Which social organizations/ institutions are people more likely to trust?

Methodology

The study was conducted over a period of three months from August- October 2009, in 21 islands (Appendix D) across the Maldives. The islands were chosen via a community risk assessment approach adapted from the Risk Assessment Model proposed by the ADB (2001), using data from secondary resources, in particular the Tsunami Impact Assessment (2004), Developing a Disaster Risk Profile of the Maldives (UNDP, 2006), the Vulnerability and Poverty Assessment III (2004), and Census (2006). The secondary data findings were collated together, and after consultations with the Working Group3, sample islands were identified in each hazard zone based on their experience with the tsunami, and their level of physical and social hazard risk and vulnerability.

Questionnaire Survey

The second stage of the study was based on primary research to uncover the unique cultural and social characteristics determining people's perception, attitudes and behaviours to natural hazards and disasters. A population-based questionnaire (see Appendix C) which included close-ended and open-ended questions was determined as the ideal research instrument. Due to time and financial constraints, focus groups could not be held with the communities but it was hoped that the section on locality mapping and open-ended questions included in the questionnaire would enable participants to provide qualitative and visual representations of their particular geographies.

Prior to the development of the questionnaire, in-depth interviews, (Appendix B) were held with a specialist in the field of disaster management as well as an experienced elderly fisherman to find linkages between scientific and indigenous knowledge about the local environment. These interviews and intensive consultations with the Working Group guided the process of finalising the questionnaire used for the study and its method of delivery. The 8-page questionnaire (see Appendix C) was produced in booklet format and inquired about inter alia age, gender, employment, education; memories attached to one's locality, individual roles and actions during disasters and perceived sense of risk and safety.

3 Working Group was composed of different Government and Non-Government sectors: Department of Meteorology, National Disaster Management Center, and UNDP.

Method of Delivery

With the cooperation of the National Disaster Management Centre (NDMC,) the Island Administration Offices, and Island schools, the surveys were sent to the respective islands via Maldives Post in sealed envelopes with instruction guidelines for facilitators on how to complete and submit the survey when it is administered (Appendix D). The facilitators included school teachers and participants were selected with the assistance of schools involved.

The aim was to design a methodology that was less restrictive and which was inclusive of even smaller groups in the population. It was decided that purposive sampling focused on non-proportional quota sampling, with the minimum number of sample units in each category specified, provided the best means to undertake the survey.

Survey findings were entered into Excel and data analysis was undertaken using SPSS 17.0 with the visuals produced through software designed specifically for this research. The data was analysed both aggregately and individually for each island.

Findings

Quantitative Analysis

The primary objective of the survey was to understand community attitudes and perceptions toward disaster risk, thus the findings concern subjective responses of participants. The total population surveyed was 1489 people with a 45% response rate. Data collection was complete by October 2009. The participants were primarily female (63%), while males composed 37% of the survey population, with the modal age of respondents being in the age group under 10- 29 years (74%). For this reason, the findings must be viewed with caution and are considered to be exploratory.

HYPOTHESIS 1

People's perception of risk is determined by past experience with hazards and disasters

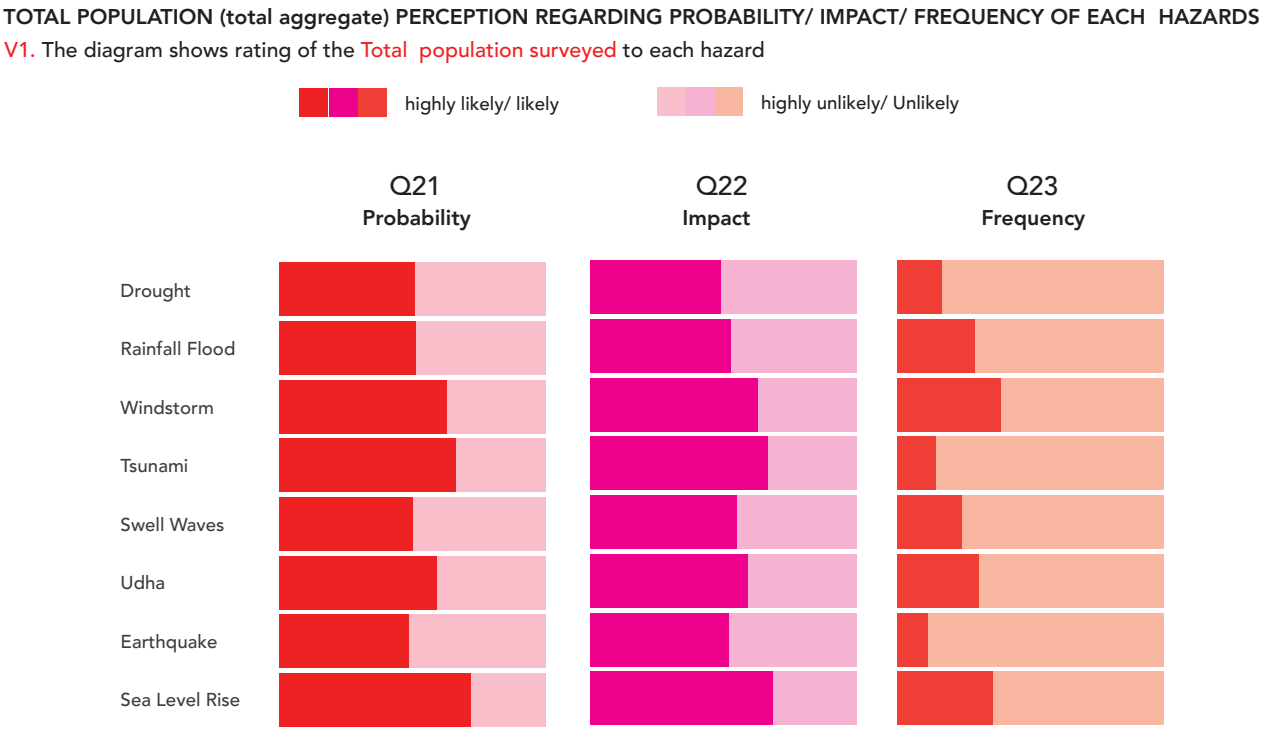


Figure 10: Total aggregate perception regarding probability, impact, frequency of each Hazard

Aggregate data revealed that irrespective of geography, communities perceived hazards and disasters in a relatively linear manner. With regard to the probability of a hazard occurring in their island, majority of respondents were comparatively split equally over its likelihood. This is more so for hazards such as drought (49% stating likely and 51% stating unlikely), rainfall flood (50% stating likely and 50% stating unlikely), swell waves (50% stating likely and 50% stating unlikely), and earthquake (50% stating likely and 50 % stating unlikely). However, there is a significant difference in people's perception to the following hazards, udha (59% stating likely and 41% stating unlikely), windstorms (63% stating likely and 37% stating unlikely), tsunami (67% stating likely and 33% stating unlikely) and sea level rise (72% stating likely and 28% stating unlikely).

Q21: PERCEIVED PROBABILITY OF EACH HAZARD STRIKING ISLAND WISE

V2. The diagram shows the rating of the total population within each island for probability of different hazards striking the island

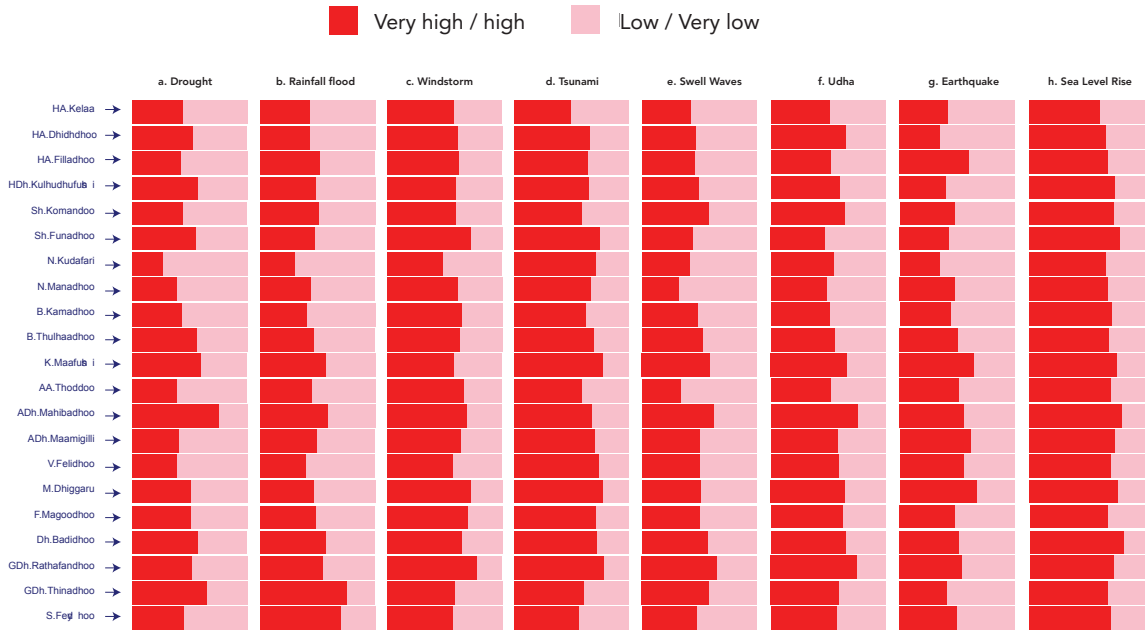


Figure 11: Perceived Probability of each hazard island wise

Q23: PERCEIVED FREQUENCY OF EACH HAZARD ISLAND WISE

V4. The diagram shows the rating of the total population within each island for percieved frequency of different hazards occuring.

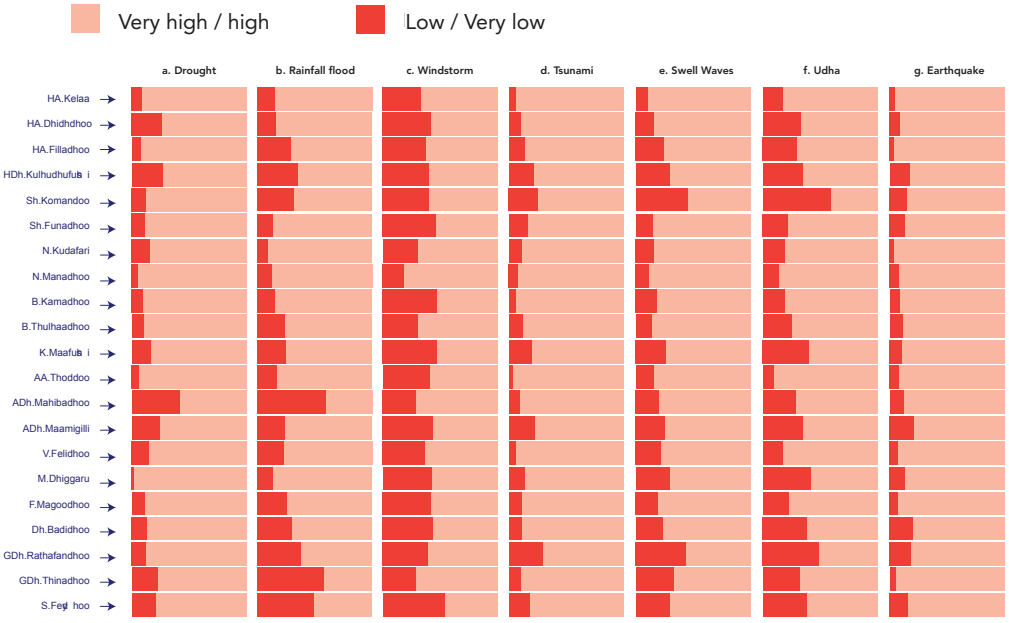


Figure 12: Perceived Frequency of each hazard island wise

At the individual level, respondents from ADh. Mahibadhoo perceived high probability of droughts (67%) and rainfall flooding (59%), while 42% perceived high frequency of droughts and 60% perceived high frequency of rainfall flood. GDh. Thinadhoo and S. Feydhoo perceived high probability of rainfall flooding (65%, 52%, and 45% respectively) and also perceived high frequency of rainfall flooding (58% and 49% respectively). Sh. Komandoo population percieve the highest frequency of Udha (59% stating high/ vey high) and Swell Waves (45% high & very high).

Generally the looking at the perception of frequency which is based on experience, it could be stated that Southern most islands perceived high frequncy of rainfall flood, compared to nothern and center islands, with the exception of Mahibadhoo. Udha and Swell waves which are hydrological hazards are perceived to be less frequent in center islands in comparison to Northern and Southern islands

Q22: PERCEIVED IMPACT OF EACH HAZARD ISLAND WISE

V3. The diagram shows the rating of the total population within each island for percieved impact of different hazards.

Figure 12: Perceived Impact of each hazard island wise

When you look at perception of impact each hazard would likely have on island, there is no significant difference between islands. At an individual level it could be noted that Adh. Mahibadhoo percieve high level of impact from all hazards in relative terms to other islands, with most impact being perceived from Rainfall Flooding (70%) & Sealevel rise (78%). HA.Kelaa could be noted for its perception, as generally they seem to perceive low impact from generally all Hazards in comparision to other islands.

In general terms peoples perception of impact is highest for Tsunmai,Sealevel rise and Windstorms, with no significant regional variations. The most variation in perception between islands is in regards to the perception of impact from Drought. Drought & swell waves are perceived in general to have lowest impact amongst all islands.

PERCEIVED LIKLELIHOOD/ IMPACT/ FREQUENCY OF DIFFERENT HAZARDS BY ISLAND POPULATION

V5. The diagrams shows the population perception of likleihood/ impact and frequency of Windstorms/ Tsunami/ Earthquakes in relation to actual hazard index conducted by UNDP (Developing Disaster Risk Profile of Maldives vol 1 & 2 by UNDP)

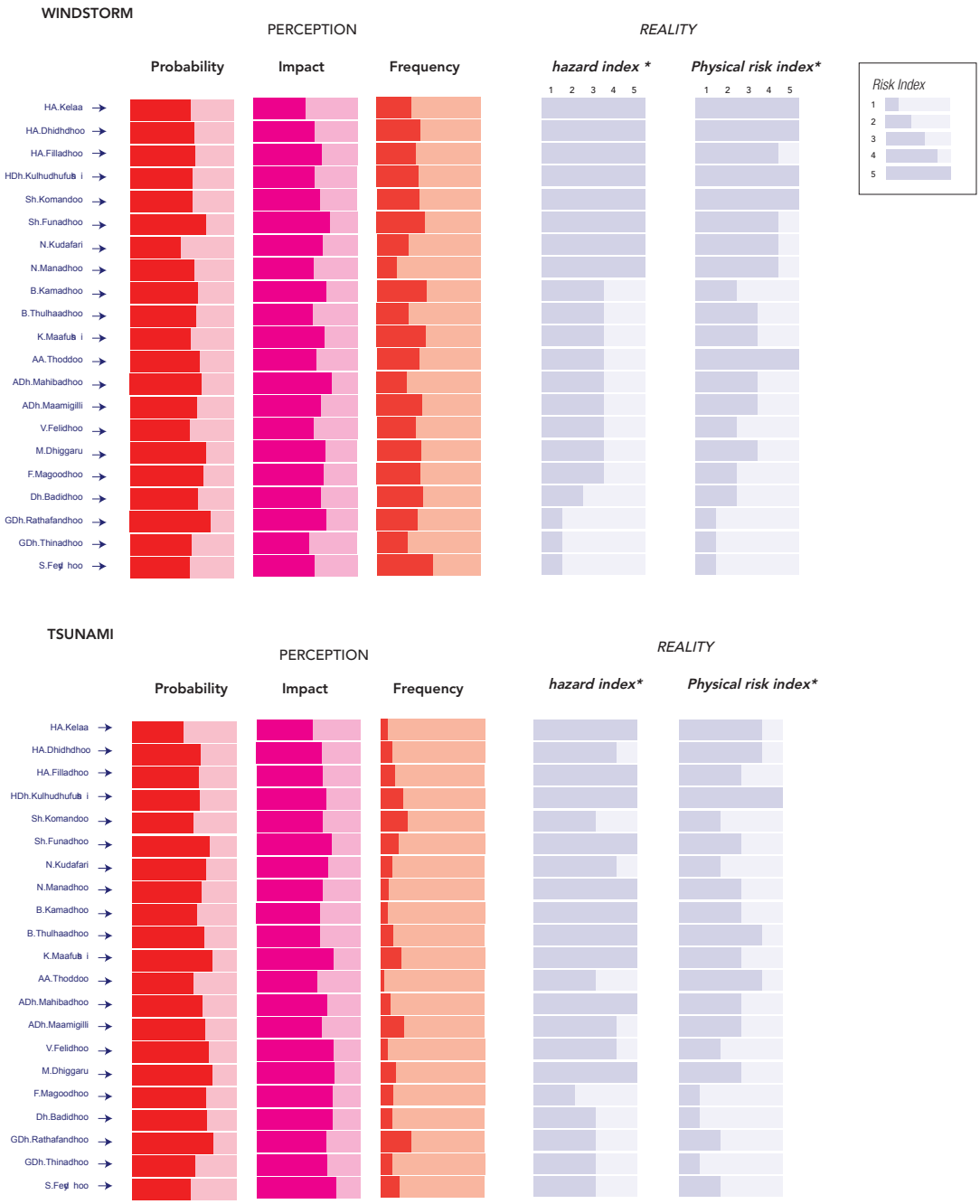


Figure 14: Percieved Likelihood/ impact/ frequency in relation to actual risk by island

There is no correlation between actual hazard risk index per island and the perception regarding frequency & probability of the hazard by the island population, as seen from above diagram. Although hazard index for windstorm is high in the northern region in comparision to southern region, this is not evident in peoples perceptions of frequency and probablity of windstorm effecting their island.

HYPOTHESIS 2

People's perception of risk is determined by the physical features of their environmental surrounding

The study identified island size and level of congestion as proxy indicators to test the hypothesis. People's perceived level of congestion in their islands was assessed against actual levels of congestion, while both island level congestion and size were cross-tabulated with perceived sense of safety to identify whether a relationship existed.

For the entire study, a positive association was found between perceived level of island safety and island size (x2= (2, N= 1392) = 10.097, p = 0.06) [Fig. 1] with 88% of those reporting greater sense of safety also stating their islands to be big and this figure decreasing to 80% in smaller islands.

Q19_safety * Q09_islandsize Cross tabulation						
			Q09_islandsize			Total
			1	2	3	
Q19_safety	1	Count	522	392	265	1179
		Expected Count	504.8	411.6	262.6	1179.0
		% within Q09_islandsize	87.6%	80.7%	85.5%	84.7%
	2	Count	74	94	45	213
		Expected Count	91.2	74.4	47.4	213.0
		% within Q09_islandsize	12.4%	19.3%	14.5%	15.3%
Total		Count	596	486	310	1392
		Expected Count	596.0	486.0	310.0	1392.0
		% within Q09_islandsize	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.097[a]	2	.006
Likelihood Ratio	9.929	2	.007
Linear-by-Linear Association	1.983	1	.159
N of Valid Cases	1392		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 47.44.			

Fig.15: Cross-tabulations of perceived island safety and island size

A significant positive correlation was also observed between perceived level of island safety and spatial quality of the island (x2= (1, N= 1391) = 20.759, p= 0.00) [Fig. 2], with 89% of those reporting lower levels of congestion also stated their island to be safe, while only 11% reported their islands to be spacious yet unsafe. It is interesting to note however that 80% of those reporting congestion on their islands deemed it to be safe as well in contrast to the 20% who felt unsafe. While this shows a positive association between subjective sense of space and safety, it does not account for why even those who deemed their islands to be smaller and more congested reported higher levels of safety.

Q19_safety * Q10_islandspace Cross tabulation					
			Island Space		Total
			Congested	Spacious	
Perceived Safety	Safe	Count	474	710	1184
		Expected Count	503.9	680.1	1184.0
		% within Q10_islandsapce	80.1%	88.9%	85.1%
	Unsafe	Count	118	89	207
		Expected Count	88.1	118.9	207.0
		% within Q10_islandsapce	19.9%	11.1%	14.9%
Total		Count	592	799	1391
		Expected Count	592.0	799.0	1391.0
		% within Q10_islandsapce	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.759[a]	1	.000		
Continuity Correction[b]	20.070	1	.000		
Likelihood Ratio	20.514	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	20.744	1	.000		
N of Valid Cases	1391				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 88.10.					
b. Computed only for a 2x2 table					

Fig.16 Cross-tabulations of perceived island safety and island congestion

GEOGRPAHICAL FEATURE & RISK PERCEPTION

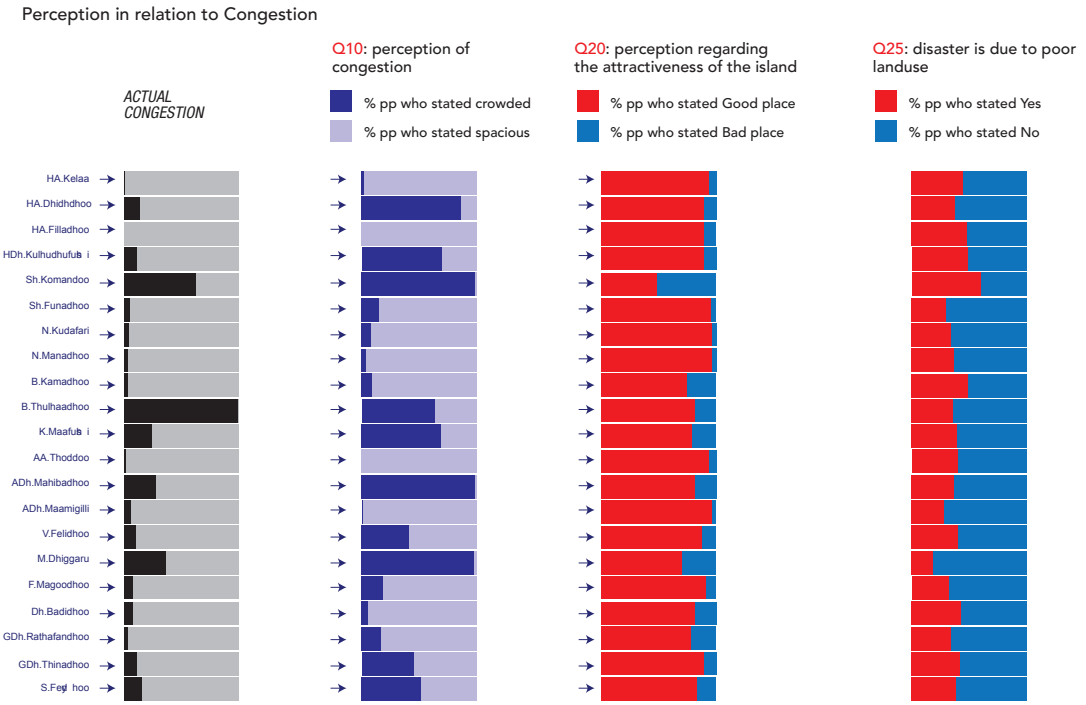


Figure 17: Howing relationship between actual congestion and perceived congestion in relation to risk perception

The findings on subjective level of congestion were compared against actual data from the Census (Government of Maldives, 2006), defined as Population Density. At the island level, perceived congestion is notably higher in the following islands of Ha. Dhidhoo (86%), HDh. Kulhudhufushi (70%), Sh. Komandhoo (86%), ADh. Mahibadhoo (98%), and M. Dhiggaru (98%). Interestingly, B. Thulhaadhoo had the highest level of actual congestion but also had the lowest perceived level of congestion (64%). B. Thulhaadhoo also had the highest perceived environmental quality of life with 81% stating their island was good to live in, and low attribution of disasters due to poor land use with 63% stating that improper land use and disasters were unrelated. The perception regarding the the attractiveness of the island is lowest in Sh. Komandoo, which also had the highest perceived congestion, as well as as the highest percentage of people who attribute disaster to poor landuse (61%)

Interestingly, aggregate data assessing people's perception of built structures and their ability to reduce risk showed that 66% (N= 1453) believed trees were highly beneficial, 40% (N= 1452) thought sea-walls were highly beneficial and 32% (N= 1434) thought solid housing would benefit. However, 37 % (N= 1421) thought dredging was not beneficial and 53% (N= 1431) thought high-rise buildings would not benefit at all.

HYPOTHESIS 3

People's perception of habitat security is primarily based upon social factors, rather than environmental factors.

To understand why people rated their islands to be safe despite the size and congestion, it was necessary to identify what role social capital plays in influencing the relationship between perceived safety and spatial quality. The variable whether people lived with family was included, and it was observed that this positive association was further enhanced as those living in proximity to their family members (x2= (1, N= 1371) = 15.654, p= 0.00) [Fig. 3] reported higher levels of safety regardless of the size of and congestion in their island. Out of people who perceived their island to be congested, 81.2% of people living with family, perceived their island to be safe while only 75.6% people living away from family percieved their island to be safe.

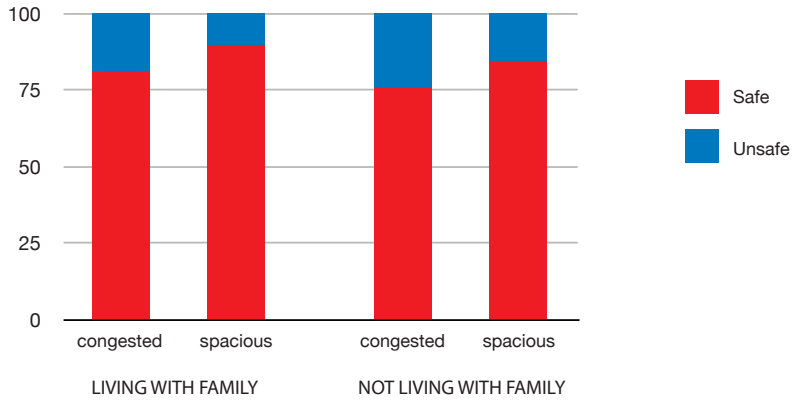


Figure 18: Perception of Island safety in relation to perception of space

Q19_safety * Q10_islandspace * Q11_livefamily Cross tabulation						
Live with family				Island Space		Total
				Congest-ed	Spacious	
Yes	Perceived safety	Safe	Count	368	578	946
			Expected Count	390.3	555.7	946.0
			% within island space	81.2%	89.6%	86.2%
		Unsafe	Count	85	67	152
			Expected Count	62.7	89.3	152.0
			% within island space	18.8%	10.4%	13.8%
	Total		Count	453	645	1098
			Expected Count	453.0	645.0	1098.0
			% within island space	100.0%	100.0%	100.0%
No	Perceived safety	Safe	Count	99	120	219
			Expected Count	105.1	113.9	219.0
			% within island space	75.6%	84.5%	80.2%
		Unsafe	Count	32	22	54
			Expected Count	25.9	28.1	54.0
			% within island space	24.4%	15.5%	19.8%
	Total		Count	131	142	273
			Expected Count	131.0	142.0	273.0
			% within island space	100.0%	100.0%	100.0%

Chi-Square Tests						
Q11_livefamily		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
1	Pearson Chi-Square	15.654[a]	1	.000		
	Continuity Correction[b]	14.959	1	.000		
	Likelihood Ratio	15.398	1	.000		
	Fisher's Exact Test				.000	.000
	Linear-by-Linear Association	15.640	1	.000		
	N of Valid Cases	1098				
2	Pearson Chi-Square	3.428[c]	1	.064		
	Continuity Correction[b]	2.888	1	.089		
	Likelihood Ratio	3.436	1	.064		
	Fisher's Exact Test				.070	.045
	Linear-by-Linear Association	3.415	1	.065		
	N of Valid Cases	273				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 62.71.						
b. Computed only for a 2x2 table						
c. 0 cells (.0%) have expected count less than 5. The minimum expected count is 25.91.						

Fig.19 Cross-tabulations of perceived island safety and island congestion by proximity to family

HYPOTHESIS 3A

Increased social cohesion enhances the resilience of communities to disasters

Aggregate data showed that 78% of the survey population chose family units as the social institution they are most likely to trust in a disaster. However, Ha. Kelaa and Gdh. Rathafandhoo had the lowest trust levels in family with 64% and 65% respectively. 10% responded others which many participants stated to be God. The most active institutions in previous experiences with disasters were identified as others (25%) with many stating island community, 19% choosing nearby islands, 13% choosing school students and youth associations, 12% choosing International NGOs, 9% choosing Island Development Office, 6% choosing Island Office, and only 1 % choosing Local NGOs.

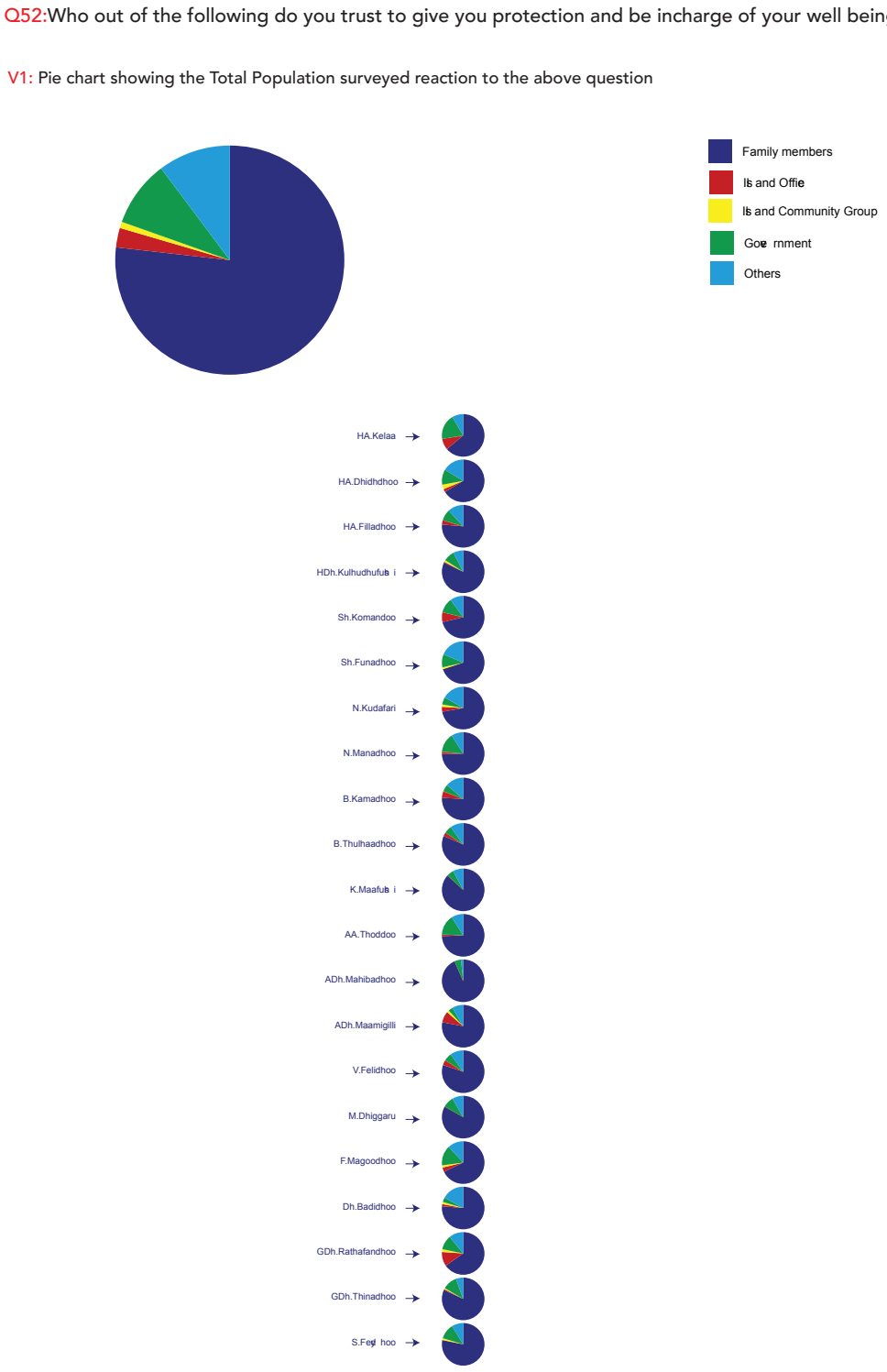


Figure 20: Showing trusted social networks during disasters nationally and islandwise

80% and 93% believed unified action could minimize impact of tsunami and rainfall induced flooding respectively; however at the island level 27% of respondents (for flooding) and 33 % (for tsunami impact) disagreed in Gdh. Rathafandhoo, while 32% of respondents from Sh. Komandoo disagreed with regards to unified action against tsunami impacts.

Figure 21: Showing the perception in relation to social cohension and resilience to Natural disasters

HYPOTHESIS 4

Gender is a determining factor influencing people's perception of hazard and disaster related risk

Gender is argued to be centerfold in any issue concerned with disaster management and risk reduction, as well as disaster risk perception (Takeuchi and Shaw, 2008). The study found no significant differences between men and women's perception of risk towards hazards and disasters. Both men (98%) and women (98%) perceived disasters to be naturally occurring events (x2= (1, N = 1414) = .313, p .576) [Fig. 4], both men (86%) and women (88%) perceived disasters to be chance events (x2= (1, N = 1264) = .591, p = .207) [Fig. 5].

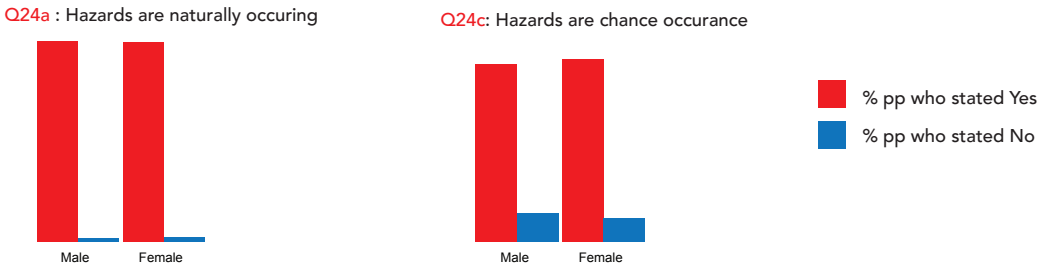


Figure 22: Showing perception regarding Natural Disaster occurance and gender

Statistics		
Q02_sex		
N	Valid	1445
	Missing	44
Mean		1.63
Median		2.00
Mode		2
Std. Deviation		.482

Q02_sex					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Men	531	35.7	36.7	36.7
	Women	914	61.4	63.3	100.0
	Total	1445	97.0	100.0	
Missing	System	44	3.0		
Total		1489	100.0		

Q24a_disasternatural * Q02_sex Cross tabulation					
			Sex		Total
			Male	Female	
Hazards are naturally occurring	No	Count	10	21	31
		Expected Count	11.5	19.5	31.0
		% within Q02_sex	1.9%	2.4%	2.2%
	Yes	Count	514	869	1383
		Expected Count	512.5	870.5	1383.0
		% within Q02_sex	98.1%	97.6%	97.8%
Total		Count	524	890	1414
		Expected Count	524.0	890.0	1414.0
		% within Q02_sex	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.313[a]	1	.576		
Continuity Correction[b]	.138	1	.710		
Likelihood Ratio	.319	1	.572		
Fisher's Exact Test				.708	.361
Linear-by-Linear Association	.313	1	.576		
N of Valid Cases	1414				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.49.					
b. Computed only for a 2x2 table					

Fig.23 Cross-tabulations between gender and perception of disasters as natural outcomes

Q24c_disasterchance * Q02_sex Cross tabulation					
			Q02_sex		Total
			1	2	
Q24c_disasterchance	No	Count	66	89	155
		Expected Count	58.9	96.1	155.0
		% within Q02_sex	13.8%	11.4%	12.3%
	Yes	Count	414	695	1109
		Expected Count	421.1	687.9	1109.0
		% within Q02_sex	86.3%	88.6%	87.7%
Total		Count	480	784	1264
		Expected Count	480.0	784.0	1264.0
		% within Q02_sex	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.591[a]	1	.207		
Continuity Correction[b]	1.376	1	.241		
Likelihood Ratio	1.572	1	.210		
Fisher's Exact Test				.217	.121
Linear-by-Linear Association	1.590	1	.207		
N of Valid Cases	1264				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 58.86.					
b. Computed only for a 2x2 table					

Fig.24 Cross-tabulations between gender and perception of disasters as chance event

However, a significant positive association was observed between people's attitudes towards the thesis that disasters were man-made (x2= (1, N= 1419) = 7.730, p= .005) [Fig. 6]. The expected count for men and women was 408 and 692 while actual count was 430 and 671 respectively, with 25% of women rejecting the thesis. A positive correlation was also found between men and women's perception of the thesis that enhanced knowledge would enable hazards and disasters to be predicted (x2 = (1, N= 1419) = 8.092, p = .004), with 88% of women and 82% of men responding yes [Fig. 25].

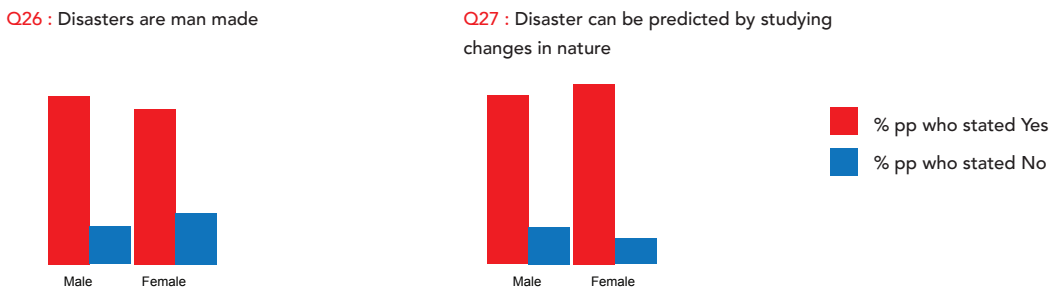


Fig.25 Perception regarding Disaster, its cause and predicatability in rleation to gender

Q26_disasterhumanimpact * Q02_sex Cross tabulation					
			Q02_sex		Total
			1	2	
Q26_disasterhumanimpact	No	Count	97	221	318
		Expected Count	118.1	199.9	318.0
		% within Q02_sex	18.4%	24.8%	22.4%
	Yes	Count	430	671	1101
		Expected Count	408.9	692.1	1101.0
		% within Q02_sex	81.6%	75.2%	77.6%
Total		Count	527	892	1419
		Expected Count	527.0	892.0	1419.0
		% within Q02_sex	100.0%	100.0%	100.0%

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.730a	1	.005		
Continuity Correctionb	7.368	1	.007		
Likelihood Ratio	7.891	1	.005		
Fisher's Exact Test				.006	.003
Linear-by-Linear Association	7.725	1	.005		
N of Valid Cases	1419				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 118.10.					
b. Computed only for a 2x2 table					

Fig.26 Cross-tabulations between gender and perception of disasters as man-made

Q40_peopleactionriskreduction * Q02_sex Cross tabulation					
			Q02_sex		Total
			1	2	
Q40_peopleactionriskreduction	0	Count	52	99	151
		Expected Count	55.5	95.5	151.0
		% within Q02_sex	9.8%	10.8%	10.4%
	1	Count	464	799	1263
		Expected Count	464.1	798.9	1263.0
		% within Q02_sex	87.4%	87.4%	87.4%
	NULL	Count	15	16	31
		Expected Count	11.4	19.6	31.0
		% within Q02_sex	2.8%	1.8%	2.1%
Total		Count	531	914	1445
		Expected Count	531.0	914.0	1445.0
		% within Q02_sex	100.0%	100.0%	100.0%

Chi-Square Tests			
	Value	Df	Asymp. Sig.(2-sided)
Pearson Chi-Square	2.154[a]	2	.341
Likelihood Ratio	2.097	2	.350
N of Valid Cases	1445		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.39.			

Fig.27 Cross-tabulations between gender and perception of knowledge to reduce disaster risk

HYPOTHESIS 6

Level of education and age determine people's agency towards disasters

Agency here is defined as individuals' capacity to act and conceptualise independently, rather than being dependent or passive observers. A series of questions regarding hazards and disasters were asked to test this hypothesis, and age group 10- 19 and the secondary education group composed the largest sample population for the study. Below are frequency tables for age and education groups:

Statistics			
		Q01_age	Q04_education
N	Valid	1481	1406
	Missing	8	83
Mean		2.80	2.90
Median		2.00	2.00
Mode		2	2
Std. Deviation		1.113	2.593
Percentiles	25	2.00	2.00
	50	2.00	2.00
	75	4.00	3.00

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 10	4	.3	.3	.3
	10-19	853	57.3	57.6	57.9
	20-29	225	15.1	15.2	73.1
	30-39	271	18.2	18.3	91.4
	40-49	108	7.3	7.3	98.6
	Over 50	20	1.3	1.4	100.0
	Total	1481	99.5	100.0	
Missing	System	8	.5		
Total		1489	100.0		

Education Groups					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	297	19.9	21.1	21.1
	Secondary	705	47.3	50.1	71.3
	GCE 'O' Level	189	12.7	13.4	84.7
	GCE 'A' Level	32	2.1	2.3	87.0
	Diploma	24	1.6	1.7	88.7
	Degree	4	.3	.3	89.0
	Masters	3	.2	.2	89.2
	No Education	7	.5	.5	89.7
	Basic Education	145	9.7	10.3	100.0
	Total	1406	94.4	100.0	
Missing	System	83	5.6		
Total		1489	100.0		

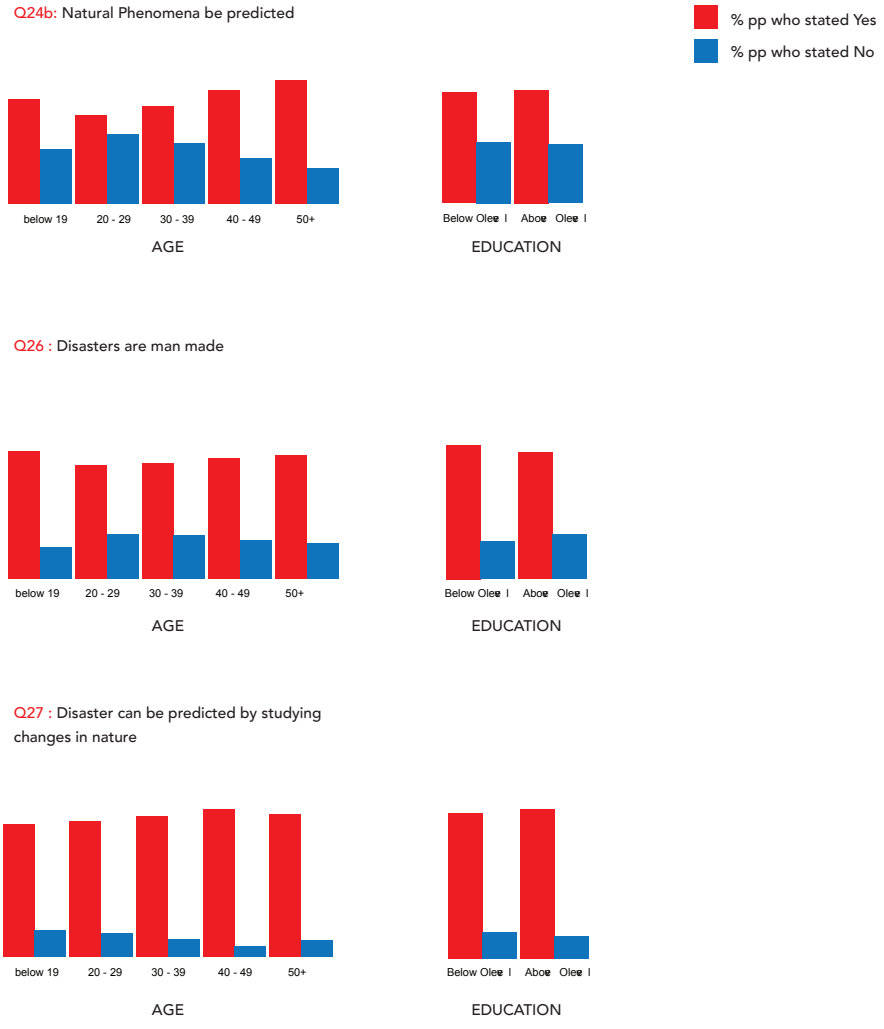


Figure 29: Diagram showing relationship between age and education in relation to perceptions regarding disasters

With regard to the question, 'Disasters can be predicted by studying changes in nature', 80% of all age groups stated yes. Majority of respondents across all education levels also answered yes, with the GCE 'A' Levels category having the highest positive response at 91% followed by primary level students (89%). Interestingly, those with basic education and no education also responded in the same pattern with 90% and 86% stating yes respectively. It is interesting to note also that with regards to the question `Natural Phenomenas like flooding, earthquake and windstorm can be predicted', there is a slight trend which shows that, middle age groups are more sceptical in comparision to older and younger age groups. This is also evident in relation o the question, 'Disasters are man-made'., where 80% of people within the younest age groups (below 19) stated 'Yes', which then dropped from 71% for 20 - 29 age group, before it started rising to 73% for age 30-39 and 76% for age group 40 - 49 and 77 % for age group 50 & above.

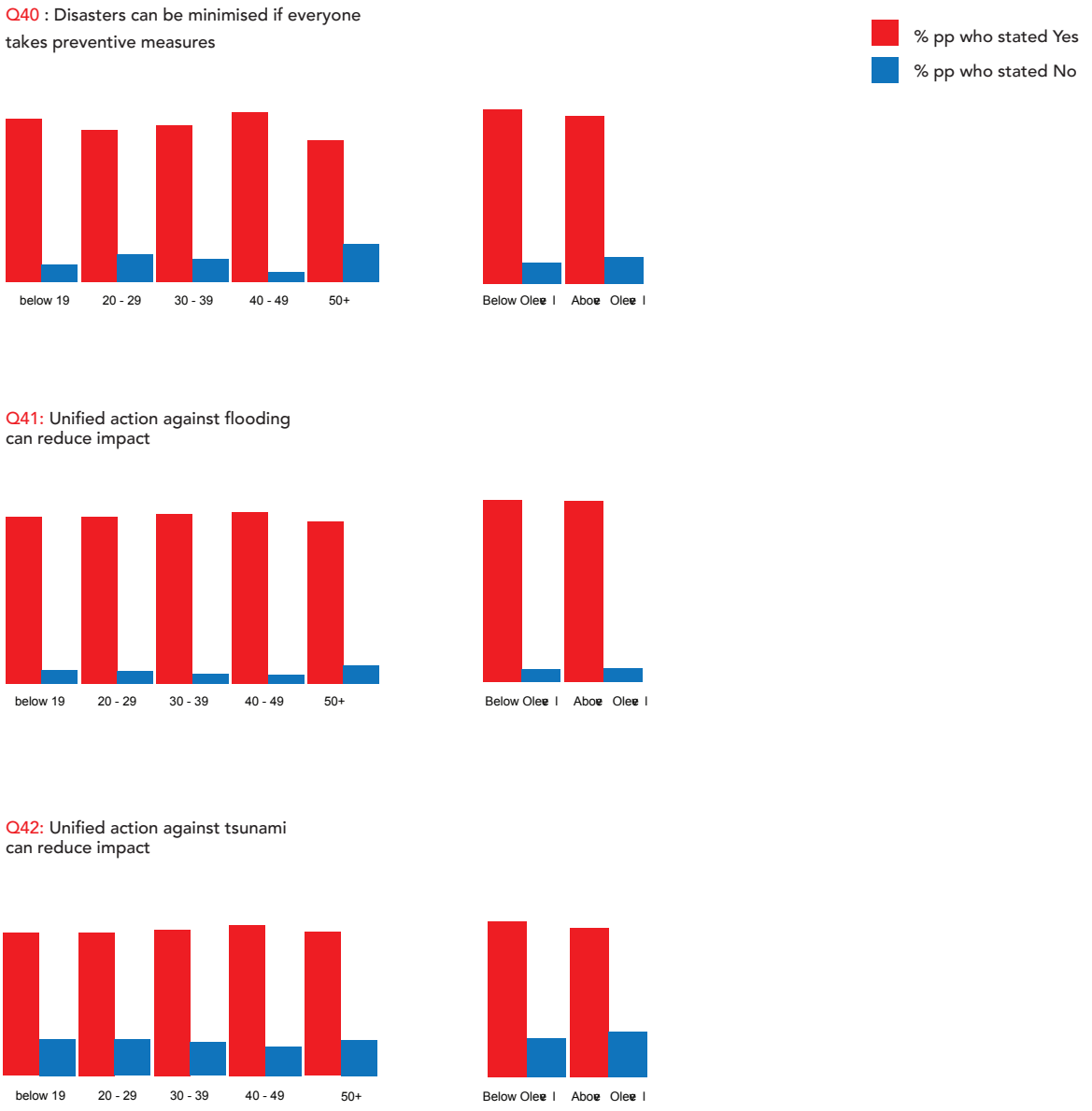


Figure 30: Diagram showing relationship between age and education in relation to perceptions regarding social cohesion.

90% of respondents from nearly all education levels thought that rain flood related disasters could be minimised if everyone takes unified action, while 100% of those with no education responded similarly. In relation to age, the response although overwhelmingly positive to the thesis, has slight variations, with older age groups being slighlty skeptical, evident from 21 % who responded negatively in 50+ age group.

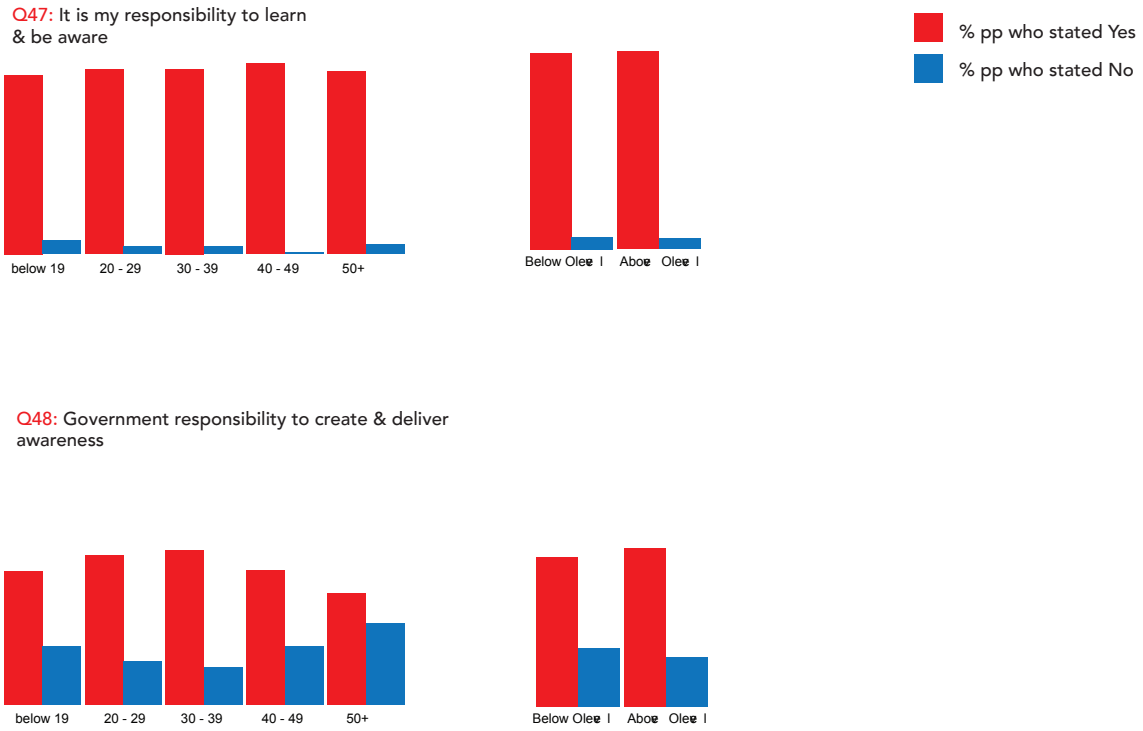


Figure 31: Diagram showing relationship perception regarding who is responsible during natural disasters.

90% of respondents from nearly all age groups and education levels thought that it was one's own responsibility to learn about disasters. 70% of respondents in the 10-29 age category did not agree that it was the Government's responsibility to deliver information regarding disasters while 80% of those from 30- 39 age category did. 70% of those from primary, secondary, GCE 'O' and 'A' Level and basic education categories, and 85% of those with basic education thought it was the Government's responsibility to provide information.

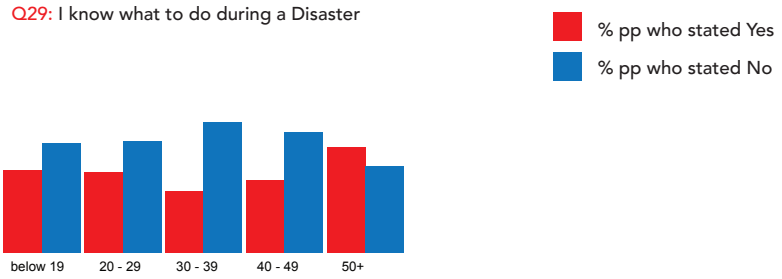


Figure 32: Diagram showing knowledgability of people in different age groups and education level regarding what to do during Natural Disasters

Findings revealed that with increased age, perceived level of knowledge regarding what to do in a disaster decreased generally. 42% of those in the age groups below 19 years, 32% of those in 30-39, 37% of those in 40-49, except for 50 above age group. 55% of those in this group responded they had sufficient knowledge.

HYPOTHESIS 7

Religious beliefs are more likely to influence people's perception of disaster risk and safety than scientific rationality

Research has revealed the dominant influence of religion and spiritualism on people's perception and conceptualisation of hazards and disasters (Bhatti [no date]), and the questionnaire asked a series of questions to test this hypothesis. The findings showed that 98% of people thought hazards and disasters were natural phenomena, 64% thought hazards and disasters could be predicted, 88% thought hazards and disasters were chance events, and 85% thought disasters could be predicted by studying changes in nature. While 78% of people thought disasters were man-made, only 40% thought they were due to poor land use. Research also found that majority of population surveyed didn't believe zero-risk could be achieved, as they answered predominantely negatively 81% said no to the thesis that Disasters due to Natural hazards could be stopped permanently,whereas they believed overhwelmingly positively to the thesis that Disaster could be mini-mised, 82%.

It was observed that the age group 40-49 perceived hazards and disasters and associated risk differently than the other age groups with majority of respondents within this age group responding negatively to the thesis that natural disasters could be predicted and that disasters are man-made.

Qualitative Analysis

The survey also included a section with open-ended questions that focused on individual's sense of place and events that shaped the way they perceive their home island. The aim of this was to generate knowledge on how communities identified and valorized space on their islands, either through memories, songs, stories or poetry that in turn created unique identities for those spaces. The most commonly acknowledged favourite place was the beach because of its pristine beauty and its function as a recreational and socializing space, although with the exception of people of Sh. Komandoo, who stated "The Jetty", as their most favourit place (see Appendix E). This is of interest in correlation with the fact that its one of the most congested islands in actuality and in regards to perception of people who were surveyed.

Other spaces acknowledged were the island mosques and schools, also for their beauty and function as places of worship and learning.

Favourite place

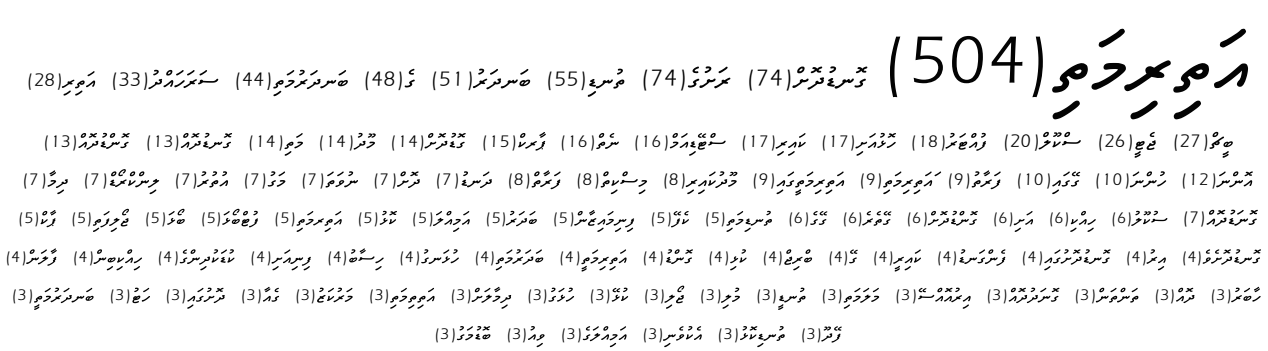


Figure 33: Wordcloud showing the total population aggregate for favourite place nationally

Sh.Komandoo

Favourite place

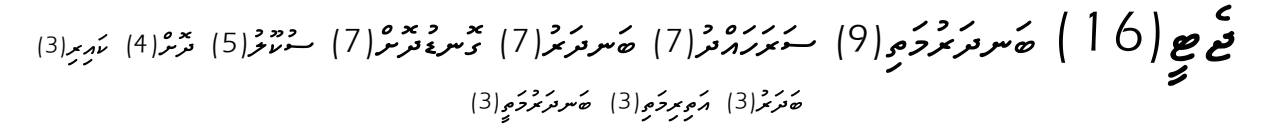
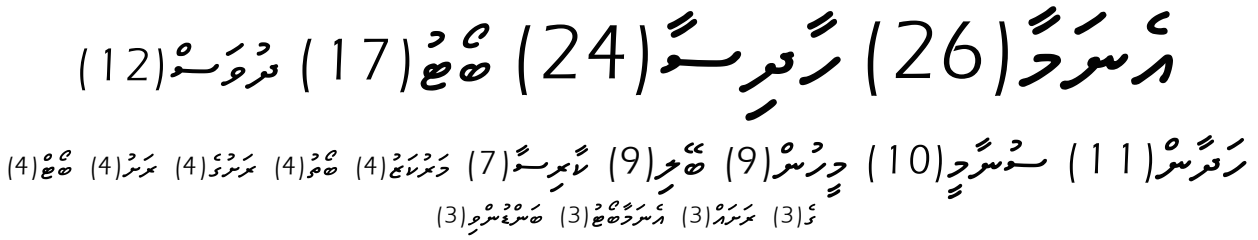


Figure 34: Wordcloud showing the total population aggregate for favourite place in Sh. Komandoo

While each island carried their own unique memories, a significant finding was the impact of the 2004 tsunami in shaping people's perception of time and place. The tsunami was identified by most communities as their longest memory and was associated with feelings of fear and harm caused upon loved ones and places of value.(see appendix). This is with the exception of the island of Thinadhoo, who stated "Enamaa incident", a their longest memory, which was an earlier event during the same year as the Tsunami (2004), involving a boat named "Enamaa" which fell victim to the rough seas, killing everyone on boat, majority of whom were residents of Thinadhoo. The reason being stated were similar to other islands who stated tsunami, one of harm and loss of loved ones.

Longest Memory



Why

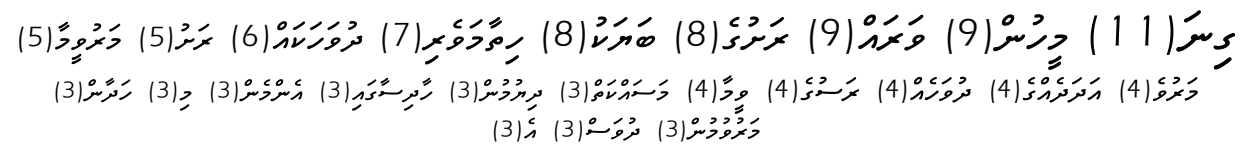


Figure 35: Wordcloud showing the aggregate longest memory of population surveyed in Thinadhoo

It was also found that songs, stories and poetry all carried through the unique identities and experiences of each island studied. Thinadhoo again is of interest as majority of people surveyed on the island had a very unified and common answer, unique to the island, i.e. the "Thinadhoo song"

Song, Poetry

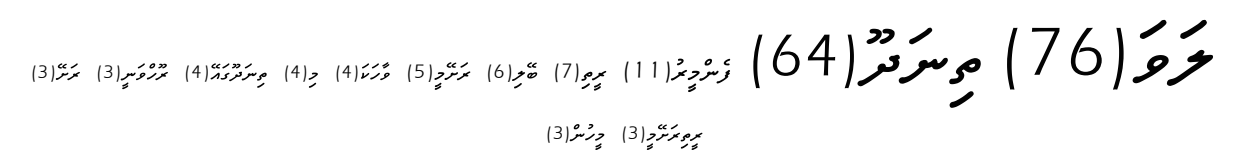


Figure 36: Wordcloud showing the aggregates song or poetry they relate to the island of population surveyed in Thinadhoo.

The surveyed population was also asked to draw the shape of their island, to evaluate their perception of the shape in relation to the actual shape of the island. Generally, it could be stated that the population surveyed had varied view of their island shape, especially in islands which has been recently urbanised, or reclaimed. It is interesting to note, from all

the island surveyed, the population suryved in AA. Thodoo & Ha. Kelaa which were the least urbanised out of all , had the most consistent drawings, and came most close to matching the actual shape of the island.

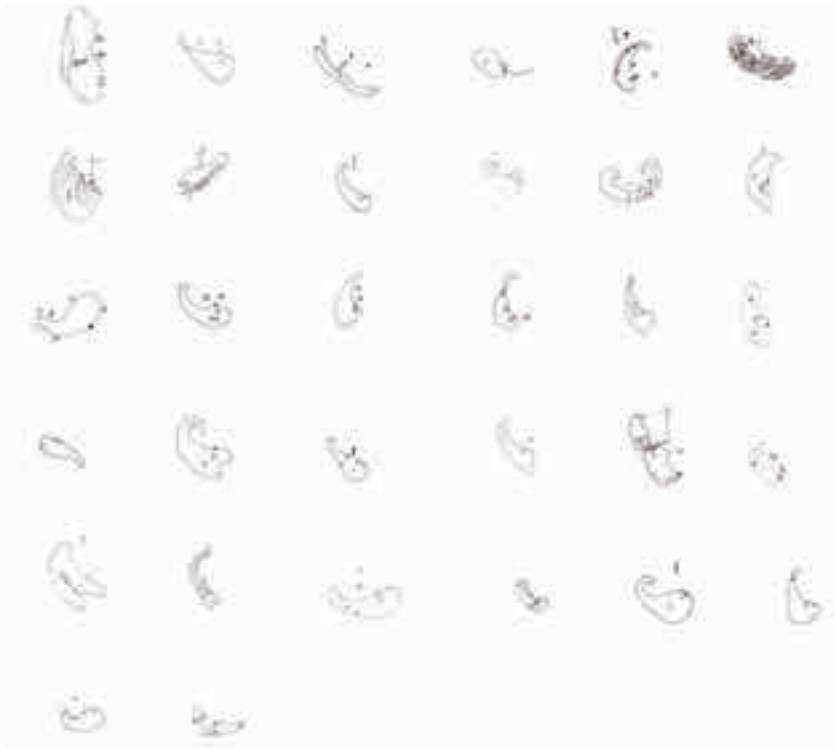


Figure 37: Ha. Kelaa: Drawings of the island shape by surveyed population on the island

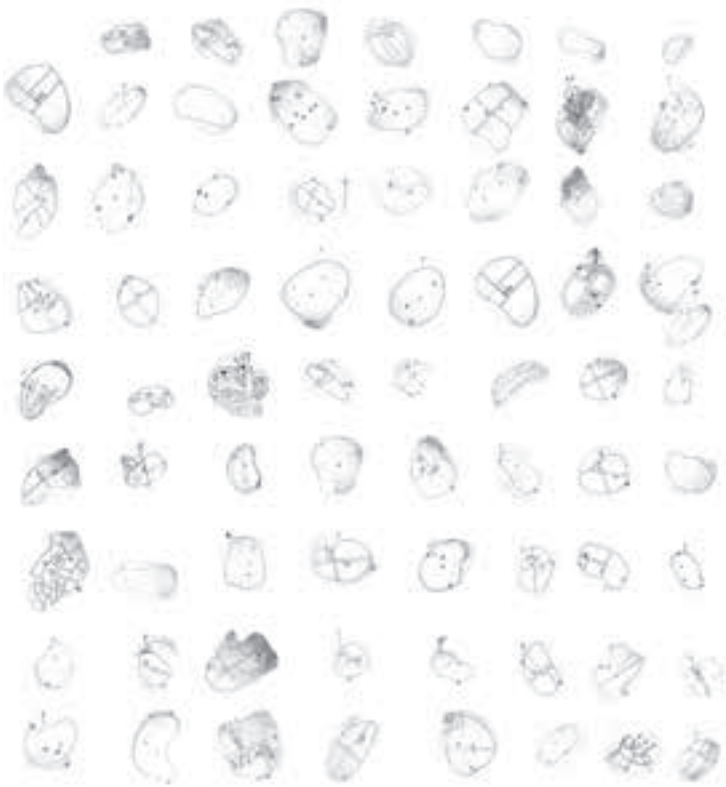


Figure 38: AA. Thodoo: Drawings of the island shape by surveyed population on the island

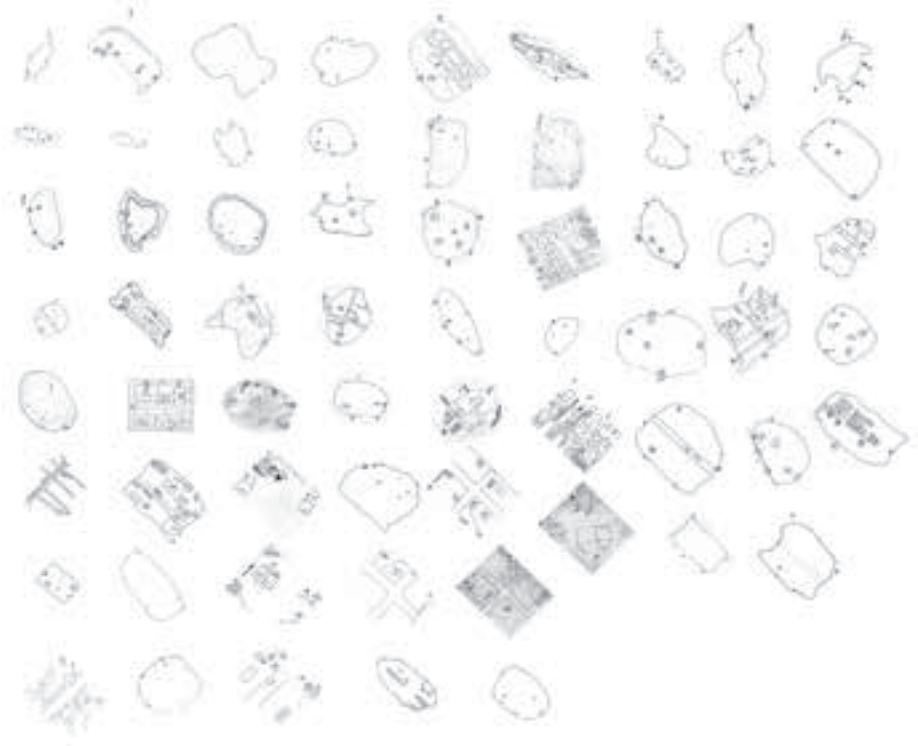


Figure 40: B. Thulhaadhoo: Drawings of the island shape by surveyed population on the island

As you are able to observe in figure 38, the population surveyed in Thulhaadhoo, which is one of the most densly populated islands, has very disverse perception of the shape of their island, with quite a number of them focusing on actual layout of the islands, and road infrastructure, rather than the actual shape. The road struture seems to the dominate feature enabling them to navigate and orientate within the island. The level of reclaimation and urbanisation has clearly made the population less aware of the actual shape of the island. This also clearly evident in the Sh.Komandoo surveys, see figure 41.

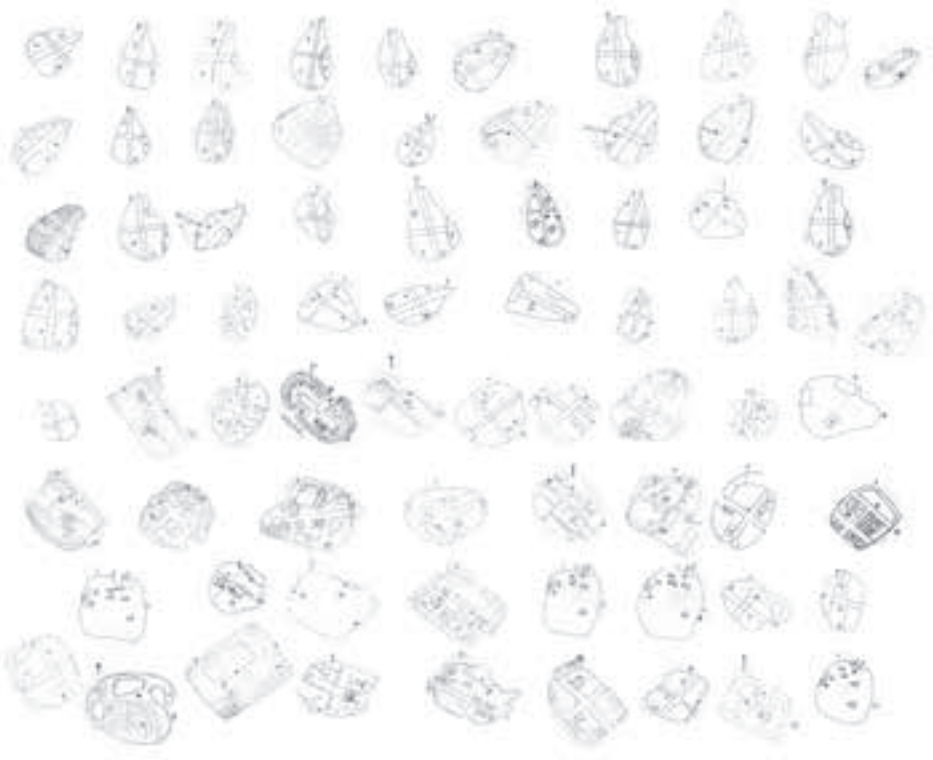


Figure 41: Sh. Komandoo: Drawings of the island shape by surveyed population on the island

It can be observed very clearly in regards to the respondents in Sh. Komadoo, there are two very distinctive shapes, one which is shaped like a pear, and the other more square shaped. The Sh.Komandoo we see today which is one of the most urbanised and congested islands in Maldives, comes closer to the square shape. Hence when we researched the drawings in correlation to age, predominately older age group, 39 - 40 age group all drew the pear shaped island, and the students predominately drew the square shaped islands.

DISCUSSION

The findings revealed that perception of risk to hazards and disasters did not largely correlate with actuality. This pattern is visible across all the focus areas:

Perceived levels of risk did not compare with actual distribution of hazard and disaster risk zones across the Maldives. The islands in the north, mainly in Ha., Sh., N., Atoll which are located in the high risk windstorm zone did not perceive high levels of risk to windstorms, whereas those in the southern atolls had comparatively higher levels of perceived risk. This pattern is evident in islands located in other hazard and disaster risk zones. Interestingly, two cases stand out in which perception and actuality aligns. GDh. Thinadhoo and S. Feydhoo which lie in the rainfall flooding risk zone also had high levels of perceived risk to this hazard.

This shows the relevance of past experiences with disasters in determining perceived levels of risk. Aggregate data revealed a relatively equal distribution of responses for the first category of hazards (earthquakes, droughts, swell waves) which can be explained by the lack of experience Maldives' as a geographical entity has had with these hazards. The second category is composed of hazards that the country has been exposed to at some degree; these include windstorms, rainfall flood, udha, tsunami and sea-level rise. The latter cases of hazards and disasters are unique in that both have been widely publicised; the tsunami as the first nation-wide disaster experienced by the Maldives and sea-level rise due to the Government's strong advocacy role in the realm of climate change and sea-level rise.

Similarly, perceived levels of congestion did not match with actual congestion levels and a community's perception of safety was not based on environmental features but rather the depth and strength of social networks across the islands. This belief is further sustained by communities' perceived strength of island-level social actors, meaning family, youth associations, connections with neighbouring islands, school students, community based organisations and the communities themselves.

However, the findings also showed that communities did not hold zero-risk attitudes (Plapp and Werner, 2006), in that they did not rely on built structures as protective measures against hazards and disasters. This is also evident in the fact that predominantley everyone agreed that Disasters can only be minimised and not stopped.Communities presented in the findings hold a high regard for self-responsibility with regard to seeking and gaining knowledge on hazards and disasters, but also felt that the Government should play an active role in assisting communities. The latter point is less so for younger generations who felt that Governments should not have to play a central role in disseminating information.

While this study found no significant influence of gender or education on perception of risk towards hazards and disasters, it was observed that the age group between 30-39 held more conservative beliefs regarding the occurrence of disasters and how they could be mitigated. Furthermore, the findings show the significance of age in determining subjective notions of individual knowledge and capacities with regard to hazards and disasters. It is evident from the findings that younger age groups (below 19) and older age group take a more rational point of view regarding the causes and occurance of Natural hazards. This is evident in the fact that young age group and older age group perceived the thesis that hazards could be predicted and are due to man made influences more so than the middle age groups, who seem more skeptical.

The findings also revealed that with the exception of a few islands, people surveyed generally had no distinctive sense of identification on an island level, but more so in a national level. This is most evident in the fact that all stated "The beach" as their favourite place, and longest memory as tsunami irrespective of which island they inhabite. This shows the predominante influence mainstream media and our environment has on unifying the community culturally in memory and identity

LIMITATIONS

Due to time and budgetary constraints, questionnaire surveys were used to gain as much knowledge about the communities in the Maldives. It must be noted that due to the outsourcing of participant selection to the schools, the survey did not fully represent the wider population of the Maldives. While the study has revealed an ample understanding of subjective perceptions of risk towards disasters, it is acknowledged that the use of more qualitative methodologies such as focus groups would have enriched the data.

It is also acknowledged that hazards and disasters are two different terms, however the study has used these inter-changeably for the purpose of simplifying understanding for the communities involved in the research.

CONCLUSION

This research is aimed to be a more exploratory rather than representative study of community perceptions of risk towards hazards and disasters in the Maldives. Nevertheless, the data yield through this study provides a rich view into the values and norms held by Maldivians to their land, and the ways in which these value-constructs shape their perception of risk.

The study highlighted that perceptions of risk towards hazards and disasters are based upon subjective norms of place and space. Despite the diversity of islands studied, the commonality of social values binds these places together. The study has shown that irrespective of geography or physical features of islands, communities perceive risk in their own terms that are influenced more by social networks of trust founded on family, kinship and community ties rather than size, space or built environment.

The findings also confirmed the shortcomings of current policies in educating individuals about the risks and preparatory measures required to act in the face of a hazard and disaster. More importantly, the study revealed that communities are more proactive actors in society, composed of individuals ready to learn and be prepared for the unforeseen rather than passive and dependent observers. These reinforce the need to provide information and knowledge to communities in a sustainable manner, and in a way that integrates indigenous knowledge with scientific knowledge.

REFERENCES

ADB (2001) Social Protection in Asia and the Pacific, Asian Development Bank,

http://www.adb.org/Documents/Books/Social_Protection/prelims.pdf. (Last accessed 28 February 2009)

Attz, M. (2008) Natural Disasters and Remittances- Exploring the Linkages between Poverty, Gender, and Disaster Vulnerability in Caribbean SIDS, United Nations University.

Brouwer, R and Nhassango, J. (2006) About bridges and bonds: community responses to the 2000 floods in Mabalane District, Mozambique in Disasters (2) pp. 234- 255

Bhatti, A. (No Date) Risk Perception, Culture and Communication: A South Asian Experience at the SESSION VI. Saturday 1.9/9:00-10:30 disaster and development: a vital connection, www.dscrn.crc.ensmp.fr/helsinki-papers/session6/6.htm (last accessed on 13 March 2009)

Plapp, T and Werner, U. (2006) 'Understanding Risk Perception from Natural Disasters: Example from Germany, in Amman. DanninMaur and Vuliet. (eds.) Risk 21: Coping with Risks due to Natural Hazards in the 21st Century, Taylor & Francis Group: London.

Tatsuki, S., Hayashi, H., Zoleta-Nantes, D. B., Banba, M., Koichi, H., and Tamura, K. (2003) in The Impact of Risk Perception, Disaster Schema, Resources, Intention, Attitude, and Norms upon Risk Aversive Behaviour among Markana Residents: Structural Equation Modeling with Latent Variables, Paper Presented at the Asia Conference on Earthquake Engineering.

Takeuchi and Shaw (2008). Gender and Disaster Risk Reduction: Perspective from Japan, Kyoto University.

UNDP (2006) Developing a Disaster Risk Profile for the Maldives, Volume One and Two

Vulnerability and Poverty Assessment (2004) Ministry of Planning and National Development, UNDP and IBRD, Ministry of Planning and National Development: Government of Maldives

World Bank (2009)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTURBANDEVELOPMENT/EXTDISMGMT/0,,menuPK:341021~pagePK:149018~piPK:149093~theSitePK:341015,00.html (accessed 3 March 2009)

World Bank, Asian Development Bank and the UN System (2005) Joint Needs Assessment on Tsunami Impact and Recovery: Government of the Maldives.

CBSE (2006) Natural Hazards and Disaster Management, A Supplementary Textbook in Geography, Central Board of Secondary Education: Delhi.

Gupta, M and Sharma, A. (2006) Compounded loss: the post-tsunami recovery experience of Indian Island communities in Disaster Prevention and Management, (15) pp 67- 78

Nakagawa, Y. and Shaw, R. (2004). Social Capital: A Missing Link to Disaster Recovery in the International Journal of Mass Emergencies and Disasters, Vol.22, No.1, pp. 5-34, (UNCRD): Kobe.

by mooinc. pvt. ltd., in association and corporation of UNDP and NDMC