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# Using Game Technique as a Strategy in Promoting Disaster Awareness in Caribbean Multicultural Societies: The Disaster Awareness Game

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**The high vulnerability of Caribbean countries to multiple hazards is well documented. However, there is a paucity of knowledge related to variations in vulnerability within and among countries. As the Caribbean region moves towards cementing the arrangements for a Caribbean Single Market and Economy (CSME) that will allow greater multiculturalism among many countries of the region, internal disparities in vulnerability are likely to increase. Disaster managers of the region will be challenged with the development of strategies and techniques that will minimize disparities and allow equity in access to disaster information by all cultural groups. The Disaster Awareness Game (DAG) is a response to this challenge and was designed to evaluate levels of disaster awareness among different groups and countries of the Caribbean region as well as to promote awareness equitably to all cultural groups. Application of the DAG in the multicultural setting of the TCI suggests that this technique can be effective in promoting equitable access to disaster education.**

**Keywords:** disaster loss reduction, game technique, disaster awareness, disaster culture, multicultural landscape

## 1. Introduction

Hazards cannot be stopped, but their chances of becoming major disasters can be significantly reduced by increasing residents' level of awareness and preparedness. This research project is an attempt to measure the level of disaster awareness of and to empower vulnerable groups in society that are disenfranchised due to language or cultural differences through the provision of disaster education in a form that they can readily grasp to ensure disaster loss-reduction. In many Caribbean countries risk communication campaigns receive a lot of attention prior to an imminent threat or during the threat. The information that is relayed to the public is usually in the official language of the country with a few exceptions where warning information is relayed in a second or third language that is unofficially spoken in the country. While there is consensus among officials from many Caribbean countries that globalization is leading to an increasing presence of foreigners in their country, on the other hand very little effort has been undertaken to ascertain the level of hazard awareness and the ability of minority ethnic groups in the society to effectively respond during a natural disaster. The Disaster Awareness Game (DAG) technique described herein discusses how the design and use of this game technique can measure and promote disaster awareness among multicultural and multi-language groups in Caribbean societies.

### 1.1. Hazard and Disaster Vulnerability in the Caribbean

While definitions of what constitutes the Caribbean region differ among scholars, there is consensus that the region, however defined, is vulnerable to a slew of natural hazards and is regarded as the second most disaster-prone region in the world. Over the past three decades, more than 150 million people have been affected by environmental disasters worldwide. Of these, more than 100,000 have died and more than 12 million have been direct victims of these phenomena in Latin America and the Caribbean. In addition, the total amount of damage caused by disasters for the entire region is more than US$65million. Small Island Developing States (SIDS) in the Caribbean are among the most affected. The CRED database shows 475 disasters in 30 countries within the Caribbean between 1990 and 1996. Hurricanes and storms account for 47 per cent, floods for 29 per cent, earthquakes for 10 per cent and eruptions and droughts for 5 per cent each (CIFEG, 1997).

The primary economic base of the Caribbean region with its focus on agriculture, tourism, forestry and fisheries exports makes the economies of the region extremely susceptible to disasters (Nicholls, 2001; CIFEG, 1997; FAO, 2003; UN Dept of Econ and Social Affairs, 2004). Furthermore, countries with lower incomes tend to suffer more in terms of the number of people affected while countries with higher incomes tend to suffer greater economic losses. For example, over 4 million people have been affected in Haiti, the poorest (per capita GDP

US$1,600) and most populous (over 8 million inhabitants) of CARICOM member states but economic losses have been relatively low at about US$ 211 million. Bahamas, on the other hand, with a much lower population (approx. 300,000) but much higher per capita income (US$16,800) has suffered US$500 million in losses while only about 3,000 people have been affected. Jamaica and St. Lucia have, however, suffered highly both in terms of number of people affected (in relation to total population) as well as economic losses (ce et al. 2004). These disasters have caused widespread damage to social and economic infrastructure resulting in widespread social dislocation and suffering. In addition to direct and indirect losses, economic consequences are crucial given the repercussions for the development of a country's economy.

The situation concerning SIDS of the Caribbean region will continue to be one of exposure and growing disaster vulnerability due to new challenges and emerging economic, social and ecological issues (FAO, 2003; Ariyabandu, 2001). Consequently, these countries have to face certain peculiarities and inherent difficulties in planning for and responding to natural disasters. These include high probability that a single natural disaster event becomes a national catastrophe; high probability of impacts in multiple territories by the same event, given size and geographical proximity of the territories comprising the region; probability of impacts being experienced from more than one event in the same year or season; unsafe informal settlements in vulnerable locations; uninsured low income housing and inconsistent application of building codes; and heavy reliance on the environment and natural resources such as beaches and coastal resources which are vulnerable to extreme weather systems. These predictions are anticipated to become more dire with the changing multicultural profile of individual states and in the context of the Caribbean Single Market and Economy (CSME) which will allow greater settlement of people in countries with alien languages and cultures. Given the currently high level of disaster vulnerability and the bleak predictions of intensification, it is imperative that disaster risk management programmes and policies be developed. An integral part of these policies and programs must be due consideration of the changing multicultural landscape of the region and the adoption of modes of development that prevent risk exposure to all cultural groups.

### 1.2. Multiculturalism and Disaster Management: Caribbean Perspective

The generation of risk information and its timely and effective communication to stakeholders in a disaster management jurisdiction is the essence of strategies for hazard/disaster loss-reduction. However, the latter is a major challenge for disaster managers, especially in an increasingly globalized world characterized by higher levels of multiculturalism as more and more people migrate to locations outside their culture zones where not only languages differ, but also perceptions of and attitude towards hazard/disaster risk (tin, 2003). Disaster managers must therefore design effective risk communication strategies with information that is encompassing and inclusive. There is therefore an urgent need for disaster management decisions to reflect understandings of risk. Given the complexities of effectively communicating disaster risk to mixed cultural groups, there is increasing suggestion that multiple media be used to communicate information about all stages of the disaster management cycle. This is important because the disaster management cycle illustrates the ongoing process by which various stakeholders in the society plan for and reduces the impact of disasters, react during and immediately following a disaster, and take steps to recover from the impact. In that regard, a tool which can help to educate and encourage positive mitigation behaviour will lead to greater preparedness, reduced vulnerability or the prevention of disasters during the next iteration of the cycle. Although it is almost impossible to fully recoup the damage caused by a disaster, it is possible to minimize the potential risks by promoting awareness among people. The challenge however is in the design of educational tools that can effectively transfer and transmit knowledge across a broad spectrum of social groups. The increased movement of people and culture from countries of origin to regions of domicile adds a new dimension to this challenge because the international code of conduct requires that irrespective of language, race or creed, the needs of all residents be equitably catered for during emergency events. If jurisdictions are to effectively and efficiently carry out that mandate, risk communication techniques must be designed so as to allow equal access to information by all cultural groups. Language is a defining criterion of culture and as such, differences in language or poor language acquisition can prove a formidable barrier to communicating risk information or to raising disaster awareness. Since learning a new language requires time and patience, recent immigrants, as well as visitors to a country, may experience information gaps. In fact, some elderly people may never develop the language skills required to communicate effectively in a new society. Given the complexities of effectively communicating risk information among mixed cultural groups, the interactive involvement of stakeholders in the disaster education process is being recognized as a viable option. Irrespective of age group or educational level, games have long been recognized as an important educational tool. It is in this context that the Disaster Awareness Game (DAG) is being promoted in this paper as an option for promoting disaster risk awareness in mixed cultural societies of the Caribbean. In many Caribbean countries, the migrant cultural groups are often as large as that of the local population which poses serious problems for disaster managers with regard to awareness promotion. For example, in the Turks and Caicos Islands (TCI), nearly 65% of the resident population is comprised of migrants (Clerveaux, 2005), the majority of whom do not have competence in the national language - English. The challenges to and opportunities of disaster awareness promotion in multicultural societies are highlighted in the following sections of the paper.

### 1.3. Challenges and Opportunities for the Promotion of Disaster Awareness in Emergent Multicultural Societies

The superimposition of the physical vulnerability profile of the Caribbean on a social structure characterized by high levels of multi-language and multiculturalism highlights the formidable challenges to the dissemination and communication of hazard risk information for the reduction of hazard impacts. The biggest challenge is the design/application of techniques that allow equity in access to disaster information, irrespective of culture or language.

#### 1.3.1. Challenges to the Promotion of Disaster Awareness

Some of the primary challenges faced in the promotion of disaster awareness in a mixed cultural setting include language acquisition, the need for appropriate multimedia, cultural diversity and cost effectiveness.

i *Language Acquisition by Migrant Groups*

In light of the tendency to prioritize the national language as the medium of dissemination of disaster risk information, cultural groups that are not fluent in national languages are disadvantaged in terms of their access to this information through the traditional channels of radio, television and printed media. If national jurisdictions are to adhere to the international code of conduct as it relates to risk information, disaster management decision-makers must provide a medium of communication that is universally accessible and understandable to all people, irrespective of language, ethnicity and culture.

ii *Use of Appropriate Communication Media*

One of the main challenges faced by disaster managers in a multicultural environment is to ensure that the medium of communication for risk information is appropriate in terms of its comprehensibility and accessibility by all groups. This is especially crucial in the emergency phase of disaster management where time is important and can mean the difference between life and death. Disaster managers must ensure that a range of media are employed in the dissemination of risk information, as this increases the likelihood of accessibility by different groups.

iii *Cognizance of Cultural Nuances*

Immigrants not only transfer cultural characteristics from countries of origin to destinations but in addition, they carry with them perceptions, behaviours, attitudes and interpretations of disaster risk management issues. Cognizance by disaster managers of these cultural nuances must be a prerequisite for the effective integration of new cultural groups into the risk management portfolio of their jurisdiction.

iv *Cost-effectiveness of Information Dissemination Technique*

While utilization of a range of dissemination techniques would increase the possibility of access by different cultural groups, this would require funding and resources beyond the reach of many countries. This is especially true in the Caribbean region where countries are, for the most part, poor. In this regard, there is need to identify the most cost-effective technique for disseminating disaster information.

#### 1.3.2. Opportunities for the Promotion of Disaster Awareness

The flip side of the challenge to ensuring equity in access to disaster risk information is the creation of opportunities for the design of techniques that maximize resource utilization and allow efficiency in the promotion of disaster awareness. These *challenges* highlight the need to rethink the modus operandi for communication of disaster information and to bring to the fore novel strategies for disaster risk communication in a multicultural environment.

i *Recognition of Children as Conduits for Risk Information Transfer*

The tendency of migrants to agglomerate often alienates them from receiving critical information for disaster risk reduction. In addition, unless existing risk communication strategies take into account language and cultural differences, most migrant communities will fall outside the purview of traditional risk management strategies. However, irrespective of location or dominance of ethnicity, school curricula tend to be universal throughout a jurisdiction. In that regard, the promotion of disaster awareness within schools provides the opportunity for the transfer of risk information to migrant parents via their children.

ii *Design of Universal Techniques for Disseminating of Disaster Information*

While the use of multimedia in the communication of risk information in a multicultural setting is generally recognized as a viable option, this technique sometimes results in the distortion of information and as such, the information received by end users cannot be regarded as universal. Equity of access to disaster information underscores the need to ensure that the information received is universal for all groups.

### 1.4. Current Approaches and Their Effectiveness to Disaster Management in Multicultural Societies

Recently the increasing death toll among ethnic groups during a disaster impact has called for a shift in paradigm in the way disaster managers communicate risk information and respond to disaster management issues in multicultural/multilanguage societies. A strategic approach

for dealing with diversity in a society is vital for loss-reduction. Working effectively with culturally and linguistically diverse groups in the area of emergency management has become not only challenging over the years for emergency managers but also one of significant importance. The need has been widely recognized for emergency management organizations to develop polices and strategies for such groups.

An examination of the literature review revealed that there is a dearth of tools and approaches for ensuring the inclusion of multicultural issues in disaster management policies. This is mainly due to the fact that awareness of the need to treat multicultural groups as a group with special needs is recently being highlighted. However, several national and international agencies concerned with disasters have published guidelines for incorporating cultural considerations in disasters. For example, Solis et al (1995) prepared a detailed series of guidelines regarding cultural diversity and disaster management in Canada. Although not specific to any particular ethno-cultural group, they recommend that cultural variables be incorporated in training and prevention programs for disaster planners and responders. They note that ethnic minorities may often be at greater risk during disasters because of existing stress, poverty, and isolation and that communication barrier may interfere with interventions. They also point out the importance of ongoing outreach efforts to ethnocultural minority groups. Mitchell and McArdle (2003) offer guidelines for working with linguistically and culturally diverse populations in Australia. What is especially admirable about their paper is their discussion of specific disasters in Australia and the consequences for different cultural groups that were at risk in these disasters. Like others, they note that ethno-cultural cultural minority groups are at risk during disasters because of social, political, economic and communication barriers.

The United States of America Center for Mental Health Services of the Substance Abuse and Mental Health Services Administration of the Department of Health and Human Services (DHHS) offers a useful set of tips for teachers on the role of cultural factors in helping children recover from disasters. This Internet site, (www.mentalhealth.samhsa.gov/cmhs/emergencyservices/culture.asp), points out how cultures differ in social structures, values, communication, and social processes. They advocate that teachers and other providers learn cultural competencies to assist them in their efforts. The State of New York's Project Liberty (2002) published an explicit set of cultural competencies that are necessary for disaster agencies and workers growing out of recent disaster experiences in New York. Particularly useful is the emphasis placed on prevention through the development of training materials and disaster response strategies that consider ethno-cultural variables including identification of culture brokers, foreign language materials for different communities, and ongoing assessment and evaluation of the organizational cultural competence. One of the most popular disaster management strategies currently being utilized is the 'Community Based Disaster Management (CBDM) approach'. This approach calls for the inclusion of local community members in the planning process for their community. The premise of this approach is that policies/planning that solicited local community involvement are more likely to succeed than others (Pandey and Okazaki, 2005). However, this approach does not specifically make any mention of how to deal with communities that are diverse both in terms of language and culture.

The guidelines and approaches outlined above have made significant strides in educating and informing disaster managers and first responders of how to include multicultural issues in their disaster management planning in order to ensure effective communication during and after a disaster to reduce stress, miscommunication and other barriers that might arise during interaction. With the exception of the CBDM approach, their general focus has been on gaining competence in communicating with merged cultures or multilanguage groups and on the administrators rather than the individuals who are first responders during a disaster. On the other hand, the CBDM approach, while it calls for the inclusion of community involvement in policies/planning that will directly affect residents, it inherently assumes that all members of the community are homogenous and that involvement of the community in the planning process would result in meeting the needs of all its members. Generally, while these guidelines are useful, they tend to be more prescriptive in nature and as such are mainly concerned with building intercultural communication or personal skills relationships between disaster managers and multicultural groups. In other words, most of these approaches can be characterized as a command and control structure: one that is top-down and with a logistic centre approach. Additionally, these approaches are not specific tools that attempt to measure differences in level of awareness among the various groups that exist in their societies. This information would be important as it would provide disaster planners with insight as to existing information gaps or disaster myths that might be impeding mitigation efforts at the individual and community level. It therefore becomes more difficult to reduce the scale and losses of the tragedy. While it cannot be denied that intercultural communication competence is important, these guidelines alone will not help to reduce disaster impact. A tool is still essential in first ascertaining if there is a relationship between disaster impact and hazard awareness and then possibly attempting to change the current disaster culture by educating young children. The following discussion outlines how the DAG was developed and used to measure and promote hazard awareness and endorses the use of this tool as an efficient mitigation measure in encouraging disaster preparedness at the household level.

## 2. The Disaster Awareness Game (DAG): A Tool for Promoting Hazard/Disaster Awareness in Multicultural Settings: Case Study of the Turks and Caicos Islands (TCI)

The Disaster Awareness Game (DAG) is being proposed as a promising technique for the evaluation and promotion of disaster awareness in the changing multicultural landscape of the Caribbean region. At this stage, the DAG focuses on schools primarily because promotion of awareness among children not only represents future investment in disaster loss-reduction, but in addition, children are recognised as important conduits of risk information between schools and households. The testing of the DAG in the multicultural environment of the TCI provides an effective case study and also proved that DAG is an effective tool with great potential to become a benchmarking type tool for use in other multicultural environments in the Caribbean.

### 2.1. DAG Objectives

Awareness is an essential ingredient of the development of disaster resilience in any society. Multiculturalism provides an added dimension to the way in which awareness is promoted and the resultant nature of resilience. The DAG was developed as a strategy for enhancing resilience in multicultural societies of the Caribbean through the promotion of awareness in a manner that will allow equity in access to disaster risk information by multicultural groups. Emergency education through schools is effective, as children tend to be attentive to discussions on disasters. Children learn quickly and can transmit the information, often by translation, to their family members. The DAG technique combines a number of tools and measures designed to:

1 Measure levels of disaster awareness among children in multicultural environments as a means of informing interventions for disaster education,

2 Use children as conduits for the education of adults about disaster management issues that are relevant to their environment,

3 Encourage positive behaviour among vulnerable peoples at all stages of the disaster management cycle and,

4 Assist in dispelling myths about hazards, disasters and the management issues that pertain.

An overarching theme of the DAG is the relationship between attitudes to disaster information and social vulnerability. Playing of the game is intended to assess the level of knowledge of players within the context of the disaster management cycle. In that regard, the game navigates its players through preparedness, prevention, mitigation, emergency response and recovery/rehabilitation. The board game also helps to inform players of the consequences of poor environmental behaviour especially as these relate to hazards. There is a strong emphasis on measures that can be employed to mitigate hazard impacts and, by extension, contribute to the sustainability of households, communities and nations.

### 2.2. DAG Approach to Multicultural Disaster Preparedness/Management

When disasters strike, the impact is first felt at the community level. It is these communities that constitute what is referred to as "disaster fronts". Being at the forefront, communities need to have the capacity to respond to threats themselves. It is for this reason that residents should be educated on both pre-disaster mitigation and the post disaster response and recovery process. The DAG was designed accordingly. What makes the DAG one of the most promising techniques among the strategies and tools that are currently being used in disaster management jurisdiction is integrated in its fundamental design notion.

#### 2.2.1. Critical Considerations in Development of the DAG

Key issues considered in developing the DAG for mixed cultural groups included design concept, reading and comprehension ability, language acquisition and usability/cost-effectiveness.

i *Design Concept*

The DAG game consists of three levels, Basic, Intermediate and Advanced, and is adaptable to any stage of educational attainment. The board game layout is identical for all levels: the level is determined by the degree of difficulty of the questions contained on the game cards (**Fig. 1**). Currently, the DAG is in an electronic format which allows its users to adapt and format the game in accordance with the requirements of the local cultural environment in which it is being played by adjusting the level of challenge of the questions, the hazard profiles of different environments and the related question cards to reflect local vernacular, culture and hazard experience/exposure. Similarly, the game can be easily modified to focus on single or multiple hazards as well as on specific components of the disaster management cycle. This level of flexibility can be effective in prioritizing the focus of disaster management education in schools or community meetings. The interactiveness of the DAG in conjunction with simplicity of language and straightforwardness of information helps in the elimination of language-related bias in access to disaster risk information. In addition, the board game and question cards can be translated into multiple languages or dialects in order to ensure more universal relevance.

The DAG exercise conducted among school children in the TCI was undertaken at the Basic level of difficulty as prior consultation with teachers of the targeted age group deemed the level to be appropriate. The anticipation is that as the level of difficulty of the


**Fig. 1.** Disaster Awareness Board Game.

game increases from Basic to Advanced for a specific age group, both pre and post-test scores would decline but with higher post-test scores as participants would benefit from the information provided between pre and post-test. This is mainly because as one progresses to a higher level in the game, higher cognitive skills will be required to effectively analyse and respond to the questions.

ii *Reading and Comprehension Ability*

Once the content of the DAG board was developed, the next step was to determine the degree of difficulty of related questions. The importance of communication at their level of English proficiency is critical. In the game design for mixed cultural groups, reading and comprehension ability in a foreign language were key considerations. Because of this, consultation with migration and language specialists for the major languages spoken in the TCI preceded the development of the question cards. The preliminary game was designed to be tested in the mixed cultural environment of the TCI. As such, the consultation process established the reading and comprehension ability of second language speakers at the age group targeted by the game. The questions on the game cards relate to knowledge and management of the hazards highlighted on the board game. The use of multiple choice format for responses to questions was one of the outcomes of the consultation process. Limitation of response options to three was also informed by educators of the targeted age group. Further fine-tuning of questions occurred in relation to simplicity and straightforwardness. Appropriateness of the questions for the targeted groups was further assessed by circulating draft questions and response options among a panel consisting of migration and language specialists and disaster managers.

iii *Language Acquisition*

Many migrants are highly literate in their first language, while others have never learned to write in their mother tongue. Some are even native speakers of languages without a written form. Some migrants – who come from a wide variety of linguistic, cultural, and educational backgrounds – may have special needs because the nature and functions of discourse, audience, and persuasive appeals often differ across linguistic, cultural and educational contexts. In the TCI, the landscape is truly multicultural and is characterized by native Anglophone residents as well as Francophone and Spanish-speaking migrants. Although children fare better, the language acquisition skills of the adult migrant population in the TCI is minimal and as such, most fall outside the scope of traditional risk communication media. The language acquisition skills of migrant students involved

in testing of the DAG are still en vogue and although the language of the DAG process is English, simplicity was a major design consideration of the DAG.

iv *Usability/cost-effectiveness*

The primary attractiveness of the DAG as an education tool in the promotion of disaster awareness and risk-reduction is its low resource demand, simple technology and cost effectiveness. The inputs are low cost and easily available so the DAG process can be easily implemented in poor societies where resource availability is a major constraint. The DAG can be used as an educational tool not only for disaster management decision-makers in the TCI but also for the general resident population, allowing them to become more accountable for their actions. This is because the game has the capacity to educate players about different scenarios that are determined by the action taken by residents.

v *Reinforce Positive Mitigation Behaviour*

In addition to its potential as a disaster awareness benchmarking tool, the DAG has many advantages, including its ability to enhance the level of hazard/disaster awareness by encouraging positive mitigation behaviour. Positive behaviours are encouraged in the game by rewarding players with moving one place forward for a correct response. Players can also advance if their game pieces fall on a position that suggests positive disaster management behaviour. Likewise backward movement (penalty) can occur if the game piece falls on a location that indicates detrimental disaster management behaviour or for incorrect responses to questions. The DAG also serves to identify cultural nuances and ensure that they are contextualized in the design of strategies for the dissemination of risk information.

## 3. DAG Methodology

The DAG Basic level was tested in a multicultural setting of Grade 5 students at a two-day workshop entitled, 'Disaster Awareness among Primary School Children: Students and Parents' from 11 to 12 September 2007 at the Ona Glinton Primary School, TCI. This was a collaborative effort between the Ministry of Disaster Management and the Ministry of Education in the TCI, the Social Engineering Laboratory (SEL) at Gunma University, Japan and the Department of Geography/Geology at the University of the West Indies, Jamaica, as part of a Caribbean regional effort to promote disaster awareness.

A Total of 76 students participated in the workshop, comprising 53 Anglophone and 23 non-Anglophone. Students were randomly selected and their distribution in the sample reflects the ethnic profile of the school as well as the communities from which the students originated. The aim of the workshop was first to ascertain current levels of disaster awareness and secondly to educate children from


**Fig. 2.** Location of the Turks and Caicos Islands.

mixed cultural backgrounds about effective emergency management strategies. The DAG was also intended to evaluate whether or not non-English speakers would score differently on the game from Anglophone students. The rationale is that if there were no significant differences between the scores of the two groups this would be an indication that the DAG tool was effective in allowing equity of access to the information content of the game by both groups. The DAG tool included presentations on local hazards and the relevant disaster management contexts, a board game with related question cards and score sheet, used to evaluate levels of awareness prior to and after exposure to the game, and a before and after workshop questionnaire survey.

Post test of knowledge-acquisition immediately after exposure to new information is generally characterized by a vast improvement on the pre-test results but since retention of new knowledge is a critical measure of the effectiveness of an intervention, longer-term post-testing must be considered in the design criteria for this method of evaluation (Rockwell and Kohn, 1989). It is in recognition of this tendency that the DAG makes provision for retesting of participants at the Basic level of the game at the grade immediately above that at which they were first tested, in order to ascertain if knowledge gain was retained or if previous scores gained reverted to pre provision of disaster information.

### 3.1. Multiculturalism in the TCI

The Turks and Caicos Islands (TCI) is a small British Dependency covering 430 square kilometres and is situated at approximately 21 degrees latitude and 71 degrees longitude (**Fig. 2**). With a national population of only 11,620 people, the TCI is unable to fulfil much of its human resource demand for educators, medical practitioners etc, from local sources and as a result, relies heavily on the active recruitment of skilled and unskilled migrant workers to fulfil these needs. The TCI is also deficient in physical resources such as agricultural land and fresh water supply. In spite of these deficiencies, the country has maintained a standard of living that surpasses many of the neighbouring Caribbean islands, owing to vibrant

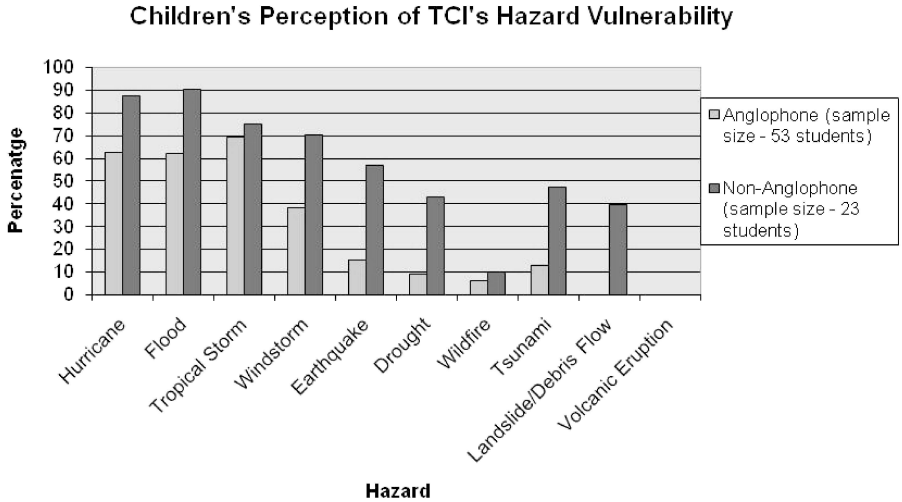


**Fig. 3.** Hazard Awareness of Anglophone and non-Anglophone Students in the TCI.

tourism and offshore banking industries. In essence, the relative prosperity of the TCI has served as a pull factor for migrants throughout the Caribbean region and other countries outside the region (Clerveaux, 2005). Currently, the migrant population of the TCI accounts for approximately 65 percent of the 33,202 people living in these islands (Clerveaux, 2005). English is the official language of the TCI but Spanish and French are commonly spoken owing to the influx of migrants from neighbouring Dominican Republic and Haiti. Since it is the responsibility of the national government of the TCI to facilitate the safety of visitors and migrants alike, and in light of the ever-increasing numbers of visitors and migrants, there is extreme urgency for the formulation and implementation of measures that will ensure the safety of all during an emergency. As such, the need for strategies and techniques that will comprehensively inform residents about the importance of disaster management within the context of the multi-cultural and multilanguage mix is critical. Warning and evacuation information are most critical in that regard, as ineffectiveness in their communication can make the difference between life and death during emergencies. The application of the DAG in the TCI attempts to address the need for a mechanism that can be used to educate residents about disaster/hazard risk information and reinforces the need to plan and implement appropriate mitigation measures.

### 3.2. Application of the DAG to the TCI

The school in which the DAG was tested is a microcosm of the multicultural landscape of the TCI. In that regard, students of non-Anglophone ethnicity accounted for just over 30 percent of the class that was sampled. Special observations were made of non-Anglophone students during the DAG process so as to establish whether the design considerations were appropriate for a multicultural setting. The analysis herein is discussed in terms of children's natural hazard awareness, their risk perceptions and their household level of preparedness.

### 3.3. Overview

There are two opposing schools of thought related to the use of educational resources by migrants. On one hand, migrants, especially children, are perceived as placing tremendous strain on educational resources in host countries, especially as this relates to slowing the pace of learning overall. The opposing view is that migrant children are not a liability to the education system of host countries since they generally have higher aspirations and therefore perform better than their native counterparts (Clerveaux, 2005). In the TCI the prevailing view is that non-Anglophone children tend to hold back the progress of syllabi owing to poor language acquisition skills. In other words, in traditional modes of learning, non-Anglophone children are at a disadvantage in terms of their capacity to assimilate information. However, as a non-traditional teaching technique the DAG demonstrated that this issue could be resolved. The scores of the multicultural groups sampled showed that the performance of non-Anglophone students were on par with their Anglophone counterparts. The fact that no significant disparity in scores occurred, is an indication that the DAG technique had satisfactorily fulfilled the design criterion of eliminating dominant-language bias in access to disaster-related information. In that regard, the Game allowed effective and equitable comprehension, assimilation and application of the information, irrespective of the language background of participants.

### 3.4. Pre-Test Stage: Effectiveness of DAG as a Measurement Tool

This stage is intended to evaluate the existing level of disaster awareness among the target population using a questionnaire survey, and the DAG board game along with its score and answer sheet, prior to the provision of any formal disaster education.

#### 3.4.1. Children's Natural Hazard Awareness

The level of hazard awareness among children is influenced by the extent of their hazard and disaster educa-

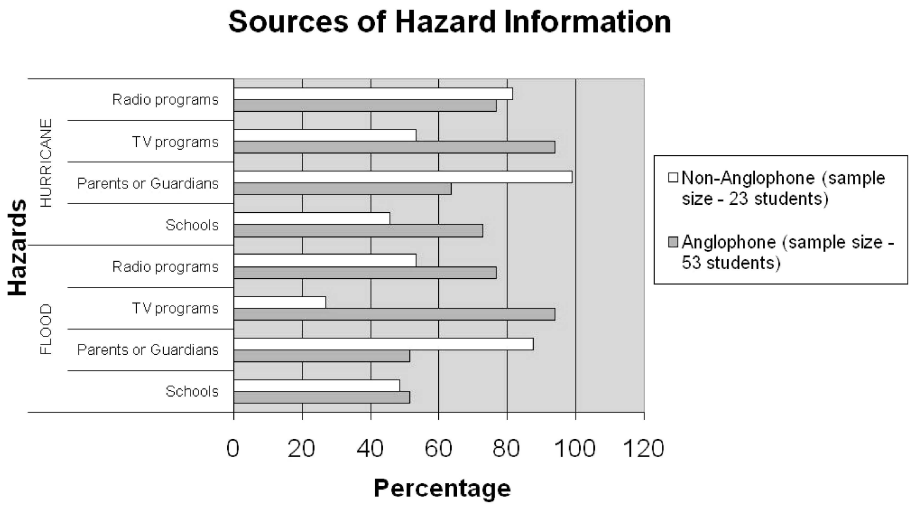


**Fig. 4.** Main sources of Hazard Information for Anglophone and non-Anglophone Students in the TCI.

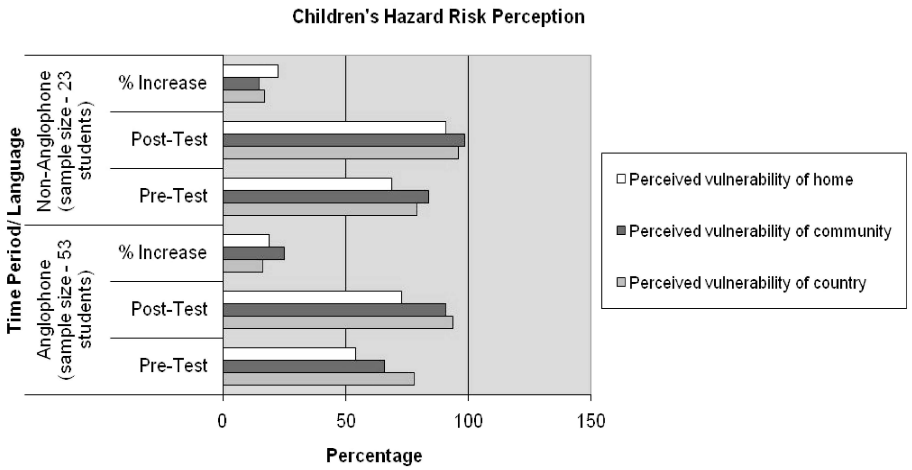


**Fig. 5.** Anglophone and non-Anglophone Children's Risk Perception.

tion as well as their level of exposure especially within the context of their household. During the DAG exercise the level of awareness among children was assessed by asking participants to identify hazards that have or are likely to impact their communities. In all cases non-Anglophone children demonstrated a higher level of awareness of hazards that are likely to impact their communities then Anglophone children (**Fig. 3**). A number of explanations can be proffered for this tendency. First, the parents of non-Anglophone students were usually from larger islands such as Haiti and the Dominican Republic, which have been repeatedly ravaged by the impact of multiple hazards. The experiences of these events would have been passed on to their children in dramatic stories, thus allowing for higher levels of awareness among these non-Anglophone children. Secondly, in many non-Anglophone migrant communities parents consistently access the media of their countries of origin. Disaster events occurring in these countries which are usually more vulnerable then the TCI would have been conveyed to these children. While oral communication with parents played a significant role in terms of hazard education for non-Anglophone children, the media featured more in the hazard education of Anglophone children (**Fig. 4**). Dissemination of disaster information can only be considered effective if the information that is designed for vulnerable populations reaches its target audience. The application of the DAG in the TCI not only served to evaluate comparative levels of awareness among Anglophone and non-Anglophone students but in addition, identified an effective knowledge transfer technique for the communication of disaster information.

### 3.4.2. Children's Risk Perceptions

There is a view that a major factor impeding disaster management in a mixed cultural society is the negative risk perception of migrants. This is particularly true where such perceptions are fatalistic or informed by myths. The risk perception of sampled children was assessed in terms of perceived vulnerability of their country, community and homes (**Fig. 5**). It is recognized that this assessment of risk perception is somewhat simplistic but given the age and level of education of the sample a more complex approach to the assessment would be deemed inappropriate. The DAG results showed similar scores for

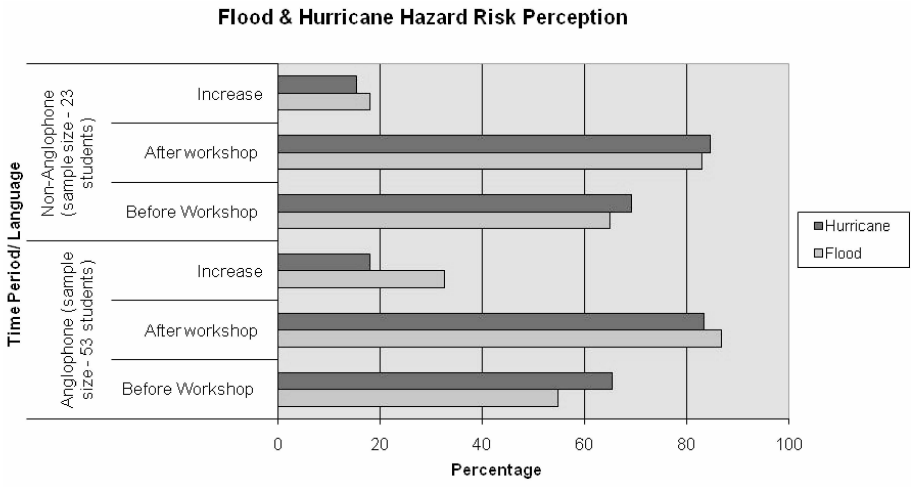


**Fig. 6.** Comparison of Children's Risk Perception Before and After the Workshop.

non-Anglophone and Anglophone students. Both group of students underestimated the level of risk posed by hazards to the TCI. These results are in stark contrast to those related to levels of awareness. A possible explanation is that many of these children have either been born in or moved to the TCI from an early age and as such, their hazard risk perceptions would have been influenced by similar experiences and information as children who were born in the TCI. In this case the DAG not only served to evaluate the risk perceptions of a multicultural group of students but also educated them about the risk status of their environment.

### 3.4.3. Children's Level of Preparedness

Since children are not always directly responsible for preparing for the impact of hazards an evaluation of their level of preparedness is intended to reflect their existing household preparedness. The DAG results showed high levels of preparedness among Anglophone as well as non-Anglophone children. If these results are regarded as reliable then it would be difficult to explain the continued high levels of impacts from prevailing hazards: hurricanes and floods. One possible explanation is that the respondents provided misinformation. In that regard, the DAG as an evaluation tool requires improvement related to exploration of the specifics of children's hazard preparedness. For instance, when children responded that they are aware of the measures required to reduce the impacts of floods and hurricanes on their households, the specifics of this knowledge requires investigation. The challenge is in devising means of garnering such information without frustrating the responses of these young children. It is noteworthy that while most of the children stated that they know how to prepare for floods and hurricanes, less than 75% of them have ever participated in emergency drills at home, at school or in their community. Most of the sampled children were able to list some of the items that should be placed in an emergency bag. The fact that the vast majority were unfamiliar with emergency preparedness measures such as, cutting down overhanging trees, removing fruits that could become missiles during storms, or elevating furniture and unplugging electrical items before a flood, is an indication of the possible misinformation related to their level of preparedness.

## 3.5. Post-Test Stage: Effectiveness of DAG in Promoting Hazard Awareness

The post-test assessment of the DAG is intended to measure the effectiveness of this technique in enhancing the disaster awareness knowledge-base of targeted students. In that regard, the pre-test process was followed by a post-test exercise in which students were again subjected to an identical questionnaire survey, playing of the board-game and evaluation of score-sheets. Changes in levels of awareness were assessed using the same criteria as those of the pre-test and are discussed in the ensuing sections.

### 3.5.1. Children's Risk Perception

A notable increase in risk perception was observed for both Anglophone and non-Anglophone sample students for both floods and hurricanes (**Fig. 6**). In the case of flooding, the risk awareness of the Anglophone sample increased by an average of 32.6 percent, while that of the non-Anglophone sample increased by approximately 18 percent. The smaller increase in risk awareness for the non-Anglophone sample is a reflection of higher levels of their existing flood awareness in the pre-test evaluation. That level of awareness is a function of greater exposure to flood events when compared with the Anglophone sample. The analysis of post-test data for the Anglophone students indicate that the most significant increase in flood risk awareness related to the vulnerability of communities reflecting lower levels of exposure to and experience with flooding in the communities from which the students originated. In the case of non-Anglophones, the most significant increase related to the perceived vulnerability of homes because, although students have a high level of exposure to flooding, the site-specific location of their

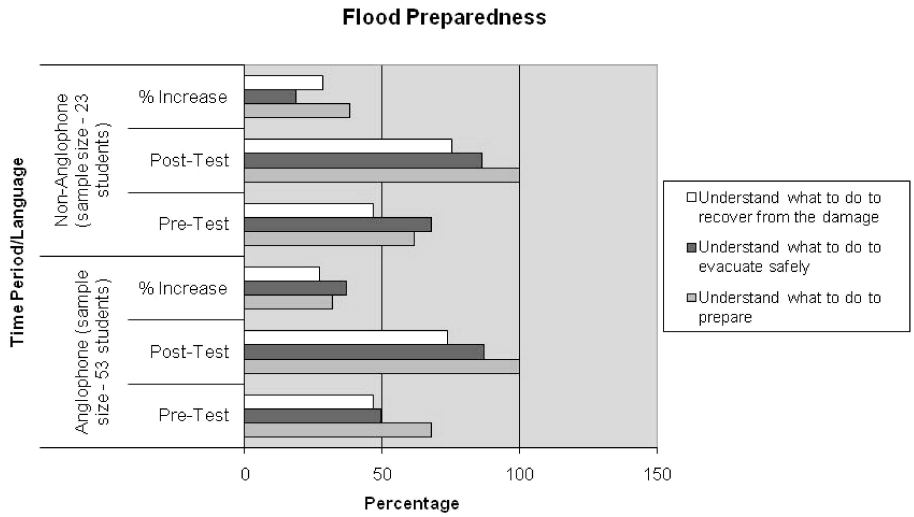


**Fig. 7.** Comparison of Children's Flood Preparedness Before and After the Workshop.

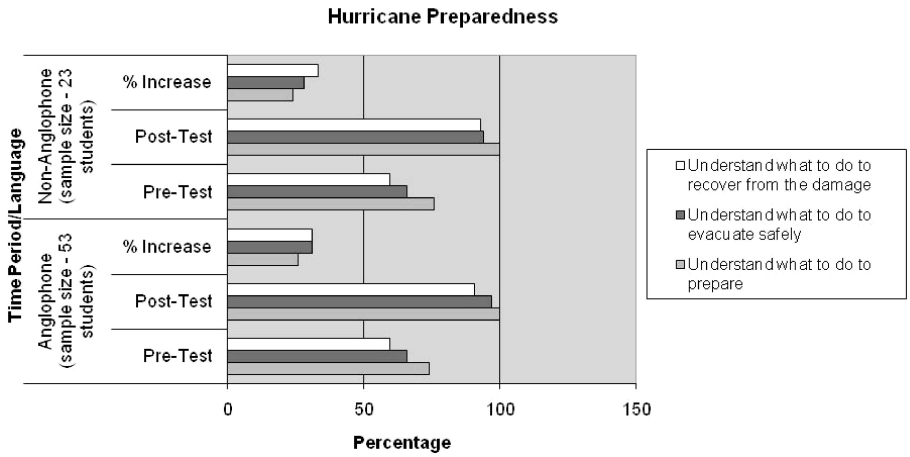


**Fig. 8.** Comparison of Children's Hurricane Preparedness Before and After the Workshop.

homes makes direct impact from flooding unlikely except in extreme high magnitude events.

In the case of hurricanes, the increase in risk perceptions following exposure to the DAG was generally lower than for flooding. In the case of Anglophone students, hurricane risk perception increased by approximately 18 percent while for non-Anglophone, the increase was 15.4 percent. The main explanation is that existing levels of hurricane awareness before exposure to the DAG was significantly high for both samples. The similarity of the increase for Anglophone and non-Anglophone reflects universality in the character and dissemination process of hurricane information throughout the Caribbean and especially within the context of the Caribbean Disaster Emergency Response Agency (CDERA) participating states to which the TCI, Haiti, Dominican Republic and other countries belong or of which they are observers. Information on hurricanes is the most developed and most accessible of all information on hazards affecting the Caribbean region. In that regard, students in the Caribbean would be exposed to similar hurricane-related information.

### 3.5.2. Children's Knowledge of Hazard Preparedness

As in the case of risk awareness, there was a significant increase in children's knowledge of preparedness measures in relations to floods (**Fig. 7**) and hurricanes (**Fig. 8**) for both samples. In the case of flooding, knowledge of preparedness measures among Anglophone students increased by an average of approximately 32 percent while among non-Anglophone students the increase was nearly 38 percent. In relation to hurricanes, preparedness knowledge increased by 26 percent and 24 percent for Anglophone and non-Anglophone, respectively. Explanations for the difference in increase between the two locations are similar to those for risk awareness. The increase in preparedness knowledge was manifested in the children's ability to list items that should be included in an emergency evacuation kit as well as how these can be used during an emergency. In addition, children demonstrated a better understanding of hazards and their impacts and a more comprehensive knowledge of steps that can be taken to mitigate the effects of hazards after exposure to the DAG.

Exposure to the DAG also assisted students in iden-

tifying ways in which they can assist their parents with disaster preparedness activities. Most were able to compile check-lists to remind their parents of preparations required to mitigate the impact of specific emergencies. Evacuation knowledge also increased with exposure to the DAG, although more so for the Anglophone than non-Anglophone students. This is primarily because of a higher incidence of pre-test evacuation knowledge among non-Anglophone students. Most of the non-Anglophone students in the sample would have had repeated exposure to evacuation exercises during flooding and hurricanes, given the location of their homes near swamps or areas that are very susceptible to flooding. The location and the type of structure of homes of Anglophone children would have hindered the development of this knowledge in these children. It is for similar reasons that recovery knowledge was higher for students in TCI.

It is worth [illegible]ration that while there are countless examples in the risk communication literature, of non-dominant language and literacy as barriers to effective and equitable risk communication, the results of the DAG suggests little disparity between Anglophone and non-Anglophone children with regard to their capacity to access and assimilate disaster-related information. As indicated earlier, the design criteria of the DAG is partly accountable for this absence of disparity. However, beyond the design criteria is the possibility that children of non-Anglophone parents might have been initiated into the school system at the same time as Anglophones. As such, their English language skill might have developed at a similar rate as the Anglophones, thus reducing potential disadvantages. However, because the English skills acquired in school are usually not reinforced at home as parents continue to speak their native language the level of reduction in disadvantages is uncertain unless of course, the children have become perfectly bi-lingual.

## 4. Conclusion

The promotion of disaster awareness as a risk reduction strategy in disaster management is widely acknowledged. Under normal circumstances effectively promoting hazard and disaster awareness in any society is a complicated and sometimes difficult process. This difficulty stems from internal social variations related to people's socioeconomic status, level of education, capacity to comprehend and assimilate disaster information, age and a host of other factors. In such scenarios disaster managers are challenged with the responsibility of providing relevant disaster information in a format that allows equity in access to and comprehension of such information.

Multiculturalism adds a new dimension to this challenge as disaster managers in multicultural societies must tailor their information to the needs of all people irrespective of language, culture or ethnicity. The social landscape of the Caribbean region is becoming increasingly multicultural and this process is expected to gain momentum as the Caribbean Single Market and Economy becomes a reality. Caribbean disaster managers will need to design techniques for the transfer of disaster information to multicultural and multilanguage groups while at the same time addressing the equity issues. Application of the DAG in the TCI demonstrates that the technique is effective in addressing the multicultural challenges that will be increasingly faced by Caribbean disaster managers. In addition, the technique is useful in identifying gaps in disaster education and by extension provides an informed basis for the prioritization of disaster education interventions.

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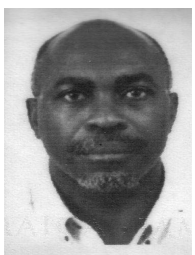

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