

ABSTRACT

Disaster mitigation for hospitals and other health care facilities in Trinidad and Tobago.

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Disaster mitigation is a new concept in the construction industry in Trinidad. As such it is not implemented in entirety when new health care facilities are being constructed or existing ones are being refurbished.

The aim of this study was to determine the extent to which disaster mitigation activities could be used in standardised format in the public health sector in Trinidad and Tobago when constructing new health care facilities or refurbishing existing ones.

The objectives were achieved by interviews and discussions with architects, engineers, personnel involved in planning and maintenance of health care facilities.

It was reported by all personnel interviewed that disaster mitigation is fairly easy to implement when new health care facilities are being constructed. However, when retrofitting existing facilities most personnel expressed that it will be difficult to implement all the requirements of disaster mitigation. Others reported that it will incur such a high capital cost to implement that it may be more cost effective to demolish and reconstruct.

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Fig. 1 Location of Trinidad and Tobago in relation to other Caribbean Islands and South America.

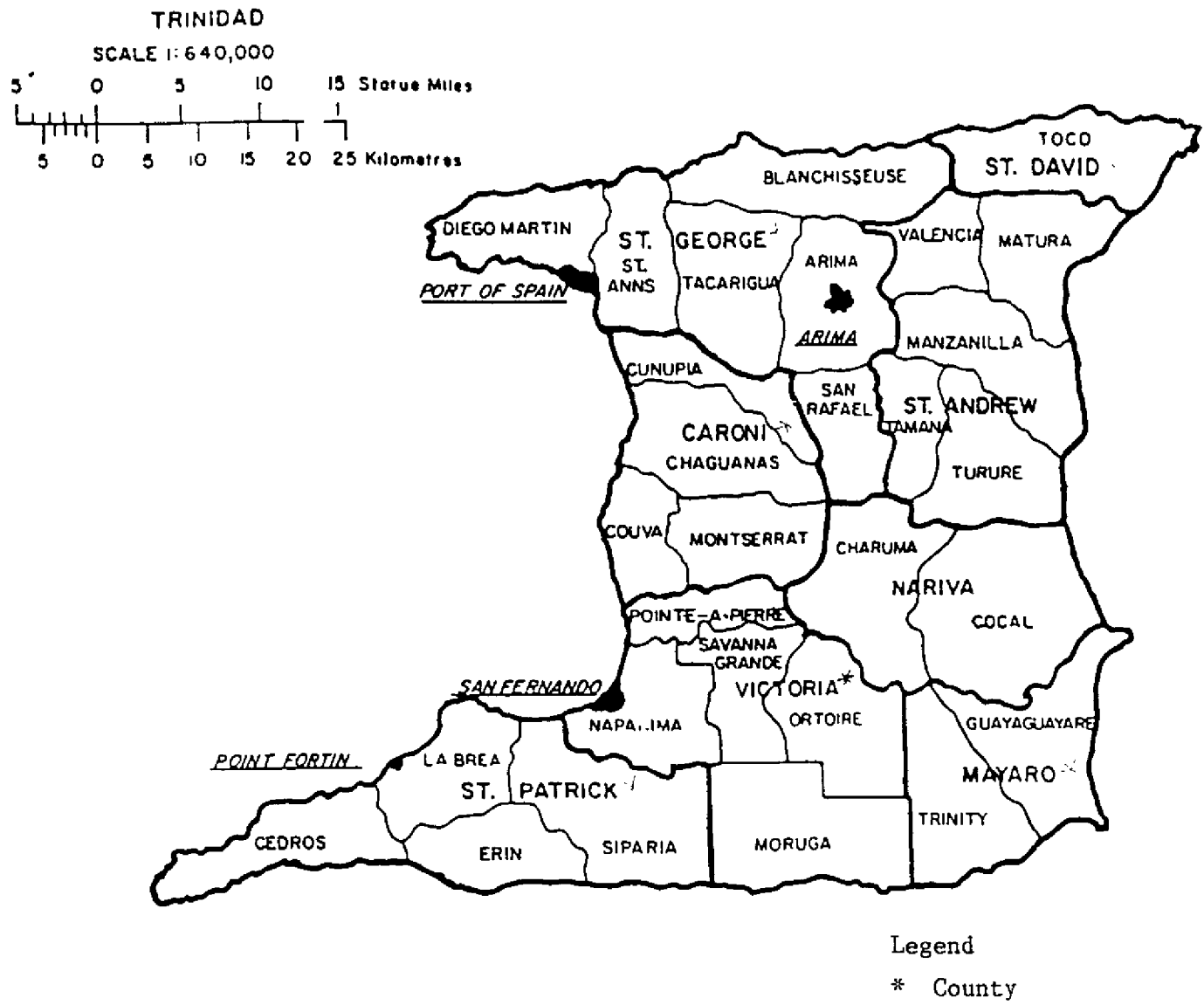
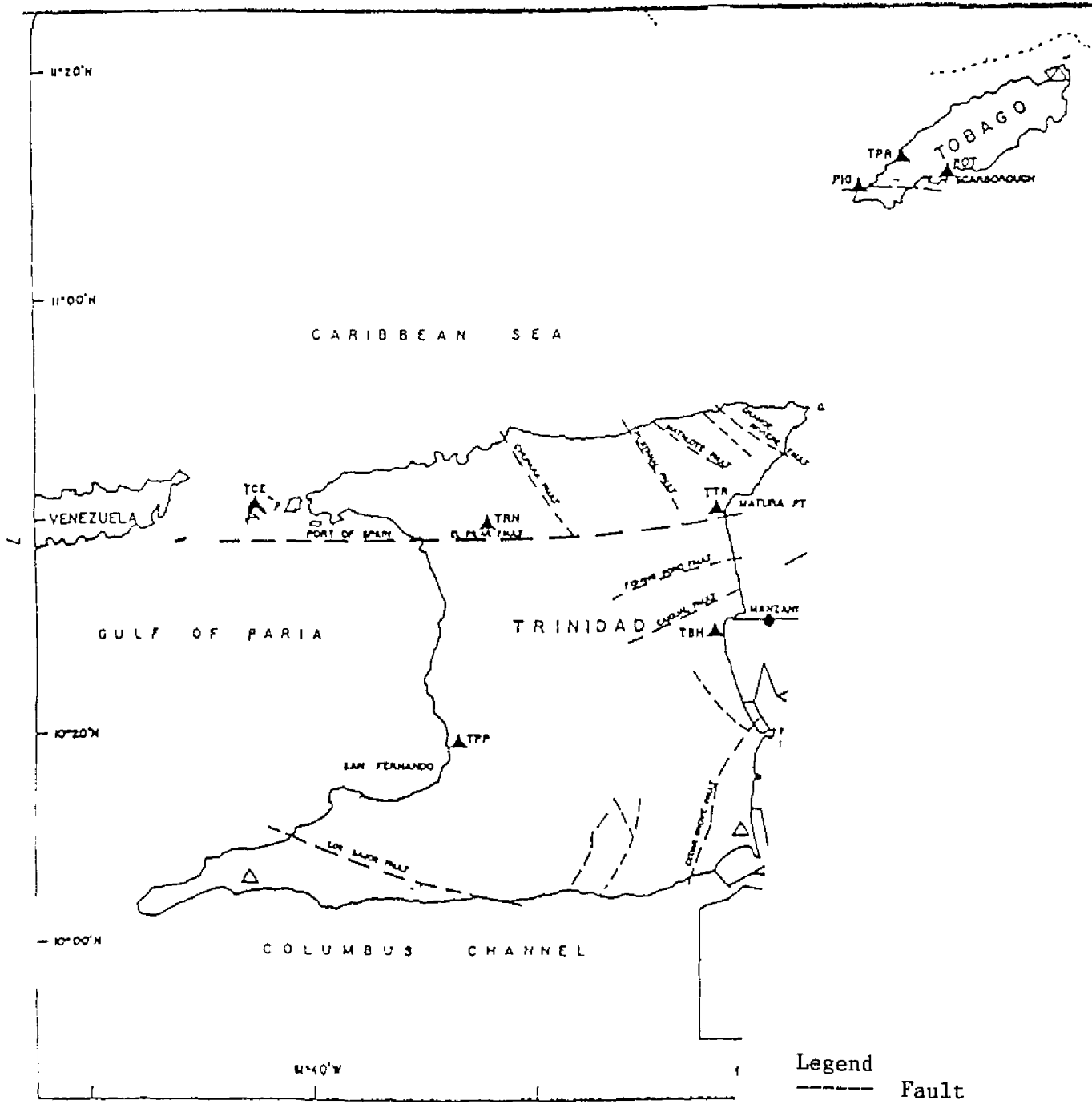


Fig. 2 Health Administrative areas of Trinidad by Counties



Source: Chin (1991)

Fig. 3 Earthquake fault lines in Trinidad and Tobago.

SECTION 1

INTRODUCTION

Natural disasters have in the past devastated many islands of the Caribbean. The experiences reported by the Pan American Health Organisation (PAHO, 1988) of hurricane Gilbert in Jamaica and the earthquake of Mexico in 1985 by Zeballos (1986) have accounted for mass casualties, loss of lives and extensive damage to health care infrastructure. It was found that the health care facilities were unable to respond to the needs of communities at a time when services were most needed by those who were injured.

The Caribbean region is primarily at risk for Natural Disasters caused by hurricanes, earthquakes and floods. The Republic of Trinidad and Tobago as indeed other islands of the Caribbean is in the disaster zone for these occurrences.

Disaster mitigation has been described by Chin (1991) as the first phase in the management of disasters. It is the type of activities which eliminate or reduce the effects of a hazard on the lives of people and their property.

BACKGROUND

Trinidad and Tobago is a twin island, situated off the East coast of Venezuela as shown in Fig 1. It lies 61 Degrees West Longitude and 10 Degrees North Latitude. Its main resources are oil, cement, sugar and steel with tourism playing an ever increasing role. It has a population of 1.2 million people of mixed races. There is a strong cultural heritage of the steel pan, tassa, calypso and carnival.

The health care system is administered through the Ministry of Health. The Health Administrative Areas are shown in Fig 2. The goal of the Ministry of Health (Min. of Health) is to protect and maintain the mental, social and physical well being of the people of Trinidad and Tobago (Min. of Health, 1992). This is achieved through promotive, preventive, curative and rehabilitative aspects of health care. The health care delivery service is based on a 3- tier system of primary, secondary and tertiary care.

One hundred and two (102) health centres offer ambulatory services at the primary level. Four primary care hospitals located in Princes Town, Couva, Mayaro and Arima are under the

jurisdiction of the County Medical Officer of Health who also have the responsibility for the delivery of the community health services. Three General Hospitals, three County Hospitals and the above primary hospitals provide secondary level care.

Tertiary care is provided by Port of Spain Hospital, San Fernando Hospital and Mount Hope Medical Complex. Three specialist hospitals, St. Ann's Psychiatric Hospital, Caura Chest Hospital and St. James Medical Complex also provide tertiary care.

It has been stated in the Plan for Administrative Reform (Min. of Health, 1992) that the highly centralized form of administration has made it difficult for the Ministry of Health to achieve its objectives. On March 20th, 1992 it was stated in Parliament that the operations of the Ministry of Health would be decentralized.

The administrative structure in the public health sector of Ministry of Health is being reorganised to improve the functioning of operational units within the policy framework of the Ministry of Health. It is hoped that these changes will positively impact on the growth and expansion of the private health sector leading to improvement in the delivery of health services.

RATIONALE

Trinidad and Tobago, as indeed other islands of the Caribbean, lies in the zone of earthquakes, hurricanes and floods which may result in natural disasters.

Health care facilities are expected to respond to the health needs of communities in the event of natural disasters. They should be suitably equipped to continue their provision of services if a disaster occurs.

There is a likelihood that many health care facilities in Trinidad and Tobago are at present vulnerable to seismic forces as a result of age, usage and levels of maintenance. When health care facilities are being constructed or refurbished disaster mitigation measures should be incorporated to reduce their vulnerability against multiple hazards. This may be achieved by adherence to certain mitigation guidelines which would help to reduce cost in the long term and loss of lives in the event of any natural disaster.

This is a descriptive study examining the level to which mitigation guidelines are followed when retrofitting or constructing health care facilities in Trinidad and Tobago.

It is hoped that the recommendations which will be presented can, if implemented help to improve the resistance of health care facilities in Trinidad and Tobago against seismic forces and other disasters. They can be shared with other islands of the Caribbean to assist in efforts to make health care facilities safer for staff and clients in the delivery of health care services.

AIM

The aim of this study is to determine the extent to which mitigation activities are incorporated into the structural design, construction and refurbishment of health care facilities in the public health sector of Trinidad and Tobago and explore its usefulness as a standardised format for project implementation.

OBJECTIVES

1. To explore the experiences of personnel involved in disaster mitigation for hospitals and other health care facilities.
2. To determine what mitigation measures are taken when constructing or retrofitting health care facilities in Trinidad and Tobago.

3. To determine what mitigation measures will be taken in the construction and retrofitting of health care facilities in Trinidad and Tobago in the future.
4. To discuss the use of standardised disaster mitigation guidelines for hospitals and other health care facilities when retrofitting and constructing these facilities in Trinidad and Tobago.

LITERATURE REVIEW

Disasters affecting Trinidad and Tobago have been minimal. PAHO (1992) reported that Hurricane Flora in 1963 caused extensive damage to Tobago resulting in an estimated cost of US \$625 millions. As recently as 1968 an earthquake measuring 6.9 (type VII) was recorded on the Reiter scale. This was severe enough to have caused extensive damage to buildings and property in Trinidad.

Cyclone.

Cyclones have been described by PAHO (1992) as categories of storms with low atmospheric pressure at the centre. They are formed when an organised system of revolving winds develops over Tropical waters.

On August 6th, 1993 Tropical Storm Bret presented a serious threat to the people of Trinidad and Tobago. The Ministry of Agriculture estimated that over TT \$4 million in crops were devastated by the floods. Infrastructural damage was estimated at more than \$979.000TT in cost to access roads and bridges (Brown, 1993).

Earthquake.

An earthquake is caused by the abrupt displacement of rock masses leading to a sudden motion or trembling of the ground (PAHO, 1992). The focus of an earthquake is described as the point where the motion starts, and the epicenter is the point directly above the focus.

Several earthquake fault lines as shown in Fig 3. pass through Trinidad and Tobago. Chin (1991) stated that a series of earthquakes occurred in Southern Tobago in 1982 and in the East coast of Trinidad in 1988. These have shown the vulnerability of the islands to disasters which can be attributed to the risk of earthquakes.

Design of health care facilities.

Health care facilities should be designed to resist hazards which can be caused by earthquakes, hurricanes and other man made disasters such as fires and civil disturbances if the

services provided at these facilities are expected to respond to the needs of the community they serve in the event of disasters.

The intrinsic nature of health care facilities is of such that their occupancy, complexity, dependency on utilities, use of critical supplies and hazardous items pose specific problems if they are not well equipped in the event of a disaster.

The factors which Chin (1991) pointed out that can affect the vulnerability of health care facilities were:

- Architectural configuration
- Structural configuration
- Foundation aspects
- History
- Other factors such as utility system, means of egress and disruption of post earthquake operations.

The experience of Jamaica following Hurricane Gilbert showed that many health care facilities were affected and services disrupted at a time when these facilities were expected to respond to the needs of the country (PAHO, 1988). It was recommended that the building code needed to be upgraded and standards rigorously enforced if losses of the magnitude experienced in Jamaica is to be avoided (PAHC, 1988).

In the earthquake of Mexico in Latin America entire structures collapsed resulting in mass casualties. It was reported that the most unsafe place to have been at that time was in a hospital (PAHO, 1992).

International Decade for Natural Disaster Reduction.

The decade of the 1990's has been designated the International Decade for Natural Disaster Reduction (IDNDR). In the Caribbean Region many activities continue to evolve in the form of meetings and seminars to find means of implementing strategies in disaster mitigation and prevention. The objective of IDNDR is to reduce or eliminate the loss of lives and property in the event of a disaster (McDonald, 1992).

The United Nations has designated the second Wednesday of each October during the Decade as the International Day for Natural Disaster Reduction. The theme this year is **Stop Disasters: Focus on Schools and Hospitals**. Disasters (1993) McDonald (1992) identified areas in which a range of possible actions can be taken by Government if sustainable development is to take place. In the health sector in Trinidad and Tobago development of a new system of administration is taking place in the form of decentralization. If this development is to be meaningful the following should be included:-

- The identification of high risk areas
- Land use management to rationalise investment

- Establishment/enforcement of adequate structural standards
- Policies
- Procedures for effective emergency management
- Sensitization of technical specialist involved in disaster management
- Strengthen the skills and training of essential services in emergency management
- Involve the private sector

IDNDR is expected to facilitate and accelerate national loss reduction and mitigation programmes in each island of the Caribbean. McDonald (1993) at a conference in Jamaica stated that IDNDR should reinforce the view that disasters are often the result of neglect of existing traditions, scientific knowledge, new technology and failure to act on reported experiences of international agencies.

Constructing and retrofitting health care facilities in Trinidad and Tobago.

Most hospitals in Trinidad and Tobago have been constructed over forty years and even with the best maintenance a certain level of depreciation is inevitable. Construction and refurbishment works undertaken on hospitals and other health care facilities under the Inter America Development Programme are listed in Appendix II.

The Government of Trinidad and Tobago has presently taken the initiative to refurbish and upgrade its health facilities. A development project with the National Insurance Property Development Company Limited (NIPDEC) focusing on refurbishment of health care facilities is estimated to cost \$69mTT. (NIPDEC,1993).

Another project funded by Republic Finance & Merchant Bank Ltd (FINCOR) and being executed by the Ministry of Works is estimated to cost \$54mTT and \$31mTT respectively. This second project targets the redevelopment of the San Fernando General Hospital and construction of the Arima Health Facility (Min of Health, 1993).

SECTION 2

METHODOLOGY

The objectives of this study were:

1. To explore the experiences of personnel involved in disaster mitigation for hospitals and other health care facilities.
2. To determine what mitigation measures are taken when constructing or retrofitting health care facilities in Trinidad and Tobago.
3. To determine what mitigation measures will be taken in the construction and retrofitting of health care facilities in Trinidad and Tobago in the future.
4. To discuss the use of standardised disaster mitigation guidelines for hospitals and other health care facilities when retrofitting and constructing these facilities in Trinidad and Tobago.

A series of discussions and structured interviews were conducted by the investigator to obtain data from personnel in organisations involved in the implementation of disaster mitigation measures in public the health sector.

Sample

A listing of agencies involved in disaster mitigation was prepared. The list was prioritized and edited based on time constraint. Architects, engineers, and administrators directly involved in disaster mitigation activities were selected. This introduced a possibility of bias, however, it represents the educated viewpoint of key state holders. Letters were written to the selected agencies asking for interviews. Appointments were followed up by telephone contact or in person.

Six agencies were used from which seventeen persons were interviewed. The size of the sample was determined by convenience and the constraint of time.

Interview Questionnaire

A list of questions was prepared to direct the discussion along the desired path to achieve the stated objectives and the format of structured interviews and discussions was used (Appendix I).

Self administered questionnaires were not used due to the constraint of time. It was also thought that this method of data collection would facilitate detailed discussion and the standard method of categorizing the answers was used with a score given for each answer.

The answers were categorized and a score on the following scale was given:

Positive = 1

Negative = 0,

Don't know and not applicable = 2.

Time Frame

The time for this study to be conducted was six weeks. This presented constraints which were overcome in the ways already stated.

Cost

The intangible cost in terms of time was high. Much time was spent in travelling to destinations between Port of Spain and San Fernando.

Time was spent waiting at the offices of the interviewee to be seen. In a few cases return visits were made.

Tangible cost was incurred in transportation, telephone calls and provision of materials with which to work.

Limitations

This study was limited by the fact that there is not much published material on the subject of disaster mitigation. Most of the data used in the literature review were based on published reports on the generalized topic of disaster and unpublished papers presented at conferences on disaster mitigation.

The methodology could have been strengthened by using a random sample of organisations and personnel who were involved in disaster mitigation. Due to the time constraint prioritization was done using personnel directly involved in disaster mitigation. This may have possibly introduced some bias.

The methodology for achieving the objectives had its short comings in that it was based on the assumption that personnel involved in disaster mitigation would be willing to co-operate for the purpose of the study.

On behalf of the agencies, the personnel who were contacted were very co-operative offering as long as two hours of their time and facilitating site visits and attendance at a meeting of the project team.

The site visits and attendance at project meetings were not included in the methodology but it was felt that they will give an insight into the mitigation measures that could be implemented and further strengthen the methodology.