THE UNIVERSITY OF THE WEST INDIES
AT ST. AUGUSTINE, TRINIDAD AND TOBAGO

A Research Paper

Submitted in partial requirements

for HUEC 3012

of

The University of the West Indies

Title: The prevalence of Physiological changes and Gastrointestinal Disorders among the elderly Geriatric population in Trinidad: Caregivers' role in Food Safety

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Year Submitted: 2009

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THE PREVALENCE OF PHYSIOLOGICAL CHANGES AND GASTROINTESTINAL DISORDERS AMONG THE ELDERLY GERIATRIC POPULATION IN TRINIDAD: CAREGIVERS' ROLE IN FOOD SAFETY

RESEARCH PAPER
Submitted for HUEC 3012
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2009

THE UNIVERSITY OF THE WEST INDIES

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Abstract

Physiological changes during the ageing process are inevitable. These changes are marked by the increased risk of contracting gastrointestinal (GI) disorders, especially when proper food handling and hygiene practices are compromised. The objectives of this study were to determine the prevalence of gastrointestinal disorders among the elderly; to identify the prevalence of common physiological changes that occur among the elderly; to examine the relationship between gender and gastrointestinal disorders in the elderly; and to evaluate the food handling practices of caregivers within the Geriatric Homes in Trinidad. A total of ninety six elderly subjects residing in Geriatric Homes in east, north, central and south Trinidad were studied. The study design was cross-sectional, and data was collected using questionnaires. The questionnaire was divided into two sections: section one, which was based on the physiological changes and gastrointestinal health of individuals; and section two, which was based on food preparation practices. Results show that the most prevalent physiological changes occurring among the elderly were decreased physical activity (75%), decreased muscle strength (72.9%), reduced food consumption (62.5%), and memory loss (54.2%). The most common gastrointestinal symptoms experienced were tiredness (44.8%), constipation (43.8%), upset stomach (31.3%), and abdominal pain (31.3%). Gender was not an influential factor for the onset of gastrointestinal disorders ($p>0.05$). Caregivers comply 100% with the cleaning and separating preparation practices; while 49.43% defrost foods on the counter top; 55.17% reheat foods until it feels hot; and 100% wash their hands throughout food preparation and during personal hygiene practices. Findings from this study confirm the occurrence of aging physiological changes and an increased onset of gastrointestinal symptoms among the elderly. Emerging from this study was the crucial role of the caregiver in elderly care and their immediate responsibility in ensuring that proper food handling practices are in compliance with the recommended standards.

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1.1 Background

"Ageing is a continuous process that begins at birth and ends with death, which gradually and irreversibly leads to the deterioration of our bodies, systems and mind." (http://www.monitoringris.org/documents/strat_reg/uneclac1.pdf)

Demographic trends

Elderly persons are defined by the United Nations as two groups: 'older persons' who are aged 60 years and older, and 'oldest old' who are aged 80 years and older (http://www.monitoringris.org/documents/tools_reg/uneclac1.pdf). Globally, one out of every ten persons is presently 60 years and older. This number is expected to rise to one in every five persons by the year 2050 (http://www.un.org/esa/socdev/ageing/popageing.html). Regionally, while persons aged 15 years and younger has been declining, the population aged 60 years and older has been increasing, and is expected to reach one fifth of the population early in the next century (Hospedales 2001). Locally, the elderly comprised an estimated 39,000 (3.5%) out of 1,272,000 persons in the Trinidad and Tobago population in the year 1950 (http://www.un.org/esa/population/publications/worldageing19502050/pdf/198trini.pdf). This figure has since rose to 105,841 (8.7%) out of 1,213,733 persons in the year 1990. In the year 2000, the number of elderly persons grew yet again to 119,300 (9%) out of 1,330,330, and in 2005, the elderly comprised 134,580 (9.6%) of the total population (CSO and CAREC 2005). Presently, the elderly account for 9% of the population. By the year 2025, it is projected that this number will reach 20% of the total population, and by 2050, it is expected to reach one third of the total population. The charts shown in Figure 1.1 depict these changing demographic trends (http://www.monitoringris.org/documents/strat_reg/uneclac1.pdf; http://www.ifa-fiv.org/attachments/127_Trinidad%20&%20Tobago%20Sumary%20Report.pdf).

Additionally, by the year 2025, the survival rate of persons aged 60 to 64 years is estimated to be 86.5%; 80.0% for persons aged 65 to 79 years; and 43.2% for persons aged 80 and over (http://www.un.org/esa/population/publications/worldageing19502050/pdf/198trini.pdf).

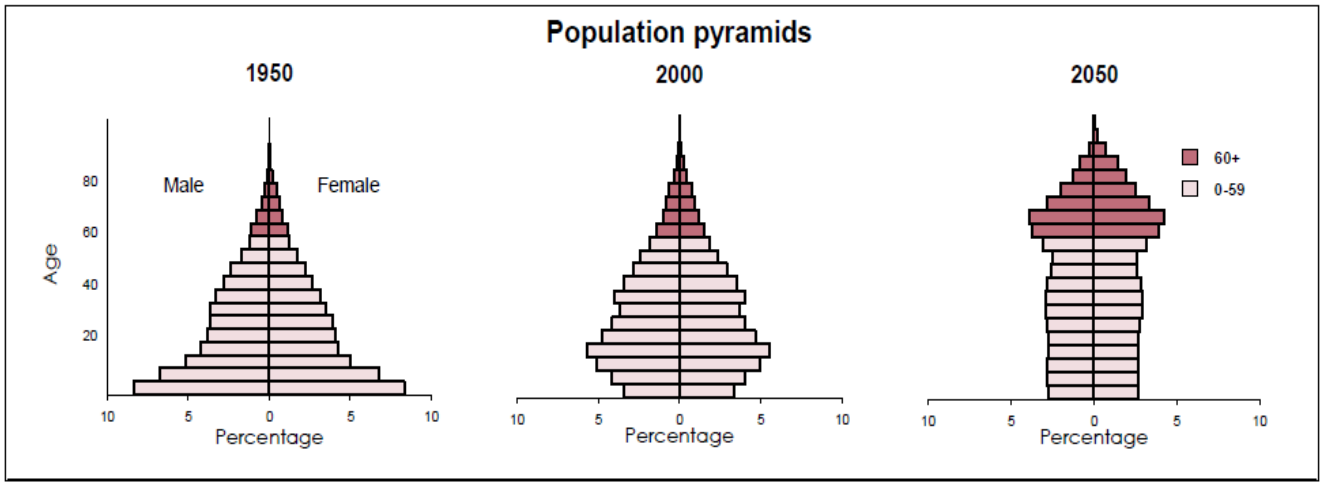

Figure 1.1: Charts of the population pyramids in Trinidad and Tobago for the period 1950 to 2050
(Source: Population Division, DESA, United Nations, 2000)

Physiological Changes with age

While biological changes that occur in youth are considered as developmental; adult aging, or senescence, is the time-related changes that eventually lead to disability and dysfunction. Aging is therefore a process that occurs over time, which leads to a decline in adaptability and functional impairment, and eventually death (Spirduso et al 2005). Aging is accompanied by physiological change within the various systems in the body (Arking 1998). As one ages, there is a diminishment in overall health and increase in morbidity and mortality; a multitude of which is caused by infectious disease, many being linked to the gastrointestinal (GI) tract. Mortality due to gastrointestinal infections is predicted to be up to 400 times higher in elderly compared to younger adults. This is because of the changes that take place in the gastrointestinal microflora as one ages, which might explain the increased severity of gastrointestinal infections with age (Tuohy et al 2004).

The gastrointestinal or digestive system comprises one continuous tube from the mouth to the rectum. Its main function is to digest and transform food into a form that can be used by the body's cells, and to provide for the absorption of nutrients and the excretion of wastes. The gastrointestinal system includes various constituents for different functions: the alimentary canal (consists of: mouth, pharynx and esophagus, stomach, small intestine, and large intestine), and accessory glands and organs (consists of: pancreas, and liver).

In disorders of the gastrointestinal system, people generally experience similar symptoms in spite of age. Nevertheless, as the body begins to age, the GI tract become stiffer and the muscle contractions within the GI tract decrease. This result in a slowing down of the peristaltic motion of the GI tract, and the glandular secretions tend to lessen. Because of the decrease in glandular secretions, the amount of saliva is decreased causing the mouth to become drier; and gastric secretions is reduced. In the small intestine, there is a decrease in size of the mucosal lining, resulting in a reduced rate of absorption; and the structure of the intestinal mucus is altered with an increased permeability of mucosal membranes- causing an increase in circulating antibodies to commensal gut bacteria (Tuohy et al. 2004). All layers of the large intestine are decreased, leading to a weakening of the intestinal wall and an accompanying increase in the risk of diverticulosis. Moreover, other diseases such as atherosclerosis and diabetes can affect the function of the GI system and lead to symptoms and complications. Many medications used by elderly persons can also cause side effects in the GI system. Changes may occur in the esophagus, stomach, small intestine, the pancreas, live, gallbladder, and the large intestine and rectum.
(http://www.healthinaging.org/aginginthenow/chapters_ch_trial.asp?ch=47#swallowing; Arking 1998; Shaheen 2006)

There is an increased risk for developing other symptoms when there are complications associated with the various digestive organs. Some of these symptoms include: difficulty

swallowing, stomach discomfort, diarrhea, vomiting, constipation, and headaches. Appetite and nutrition can also be affected, which may lead to fatigue and weight loss (http://www.healthinaging.org/aginginthеknow/chapters_ch_trial.asp?ch=47#swallowing). Other changes, such as vision impairment make it difficult for persons to notice any visible changes in a food which may serve as a warning for the food not fit for consumption, such as changes in colour, and molds on foods.

Food Safety

Poor nutrition and decreased food consumption, combined with normal age-related decreases in immune system functioning, may weaken older adults' ability to fight foodborne pathogens, resulting in foodborne illnesses (Buzby 2002). Ministry of Health (2005) Annual Statistical Report 2004-2005 has shown that the number of reported cases of food borne illnesses in Trinidad and Tobago stood at 480 (per 100,000 persons in the population) in 2002 and rose to 1,375 (per 100,000 persons in the population) in 2005.

In 2004, the number of elderly persons (both male and female aged 65 & over) who were admitted to public hospitals for diarrhea and gastroenteritis (for presumed infectious origin) totaled 111 (pg 85). This number increased to 132 in 2005 (pg 117). Diseases of the digestive system such as dental caries, diseases of the oral cavity, salivary glands and jaws, and gastritis totaled 702 cases in 2004 and rose to 1,464 cases in 2005 among the elderly population (aged 65 & over). This value ranked third when compared to the rest of the population, with 1,770 being in the age group 45-64, and 1,480 being in the age group 25-44 (Ministry of Health 2005). However, despite the elderly comprising the minor group in the population, at 9% (143,000 persons) (http://www.ifa-fiv.org/attachments/127_Trinidad%20&%20Tobago%20Sumary%20Report.pdf) of the population, this value is significant (pg 123), especially since the elderly are more likely to have severe complications resulting from these infections (Buzby 2002). It must also be stated that

these figures represent only reported cases within hospitals, and does not account for unreported or private hospital cases.

CAREC (Caribbean Epidemiology Centre) 2008 Surveillance Database indicates that the trend in foodborne illnesses has been increasing. The major increases occurred in 1985, 1991, 1993, 1996, 1998 and 2000, with most of the 42,973 cases of foodborne illness being reported from Trinidad and Tobago (38%), and an annual average of 633 reported cases (CAREC 2005).

"Foodborne diseases (FBD) result from the ingestion of contaminated foods and food products and include a broad group of illnesses caused by bacteria, viruses, parasites and chemical agents and toxins, which contaminate food at different points along the farm to table continuum" (World Health Organization 2009). Foodborne diseases can be either foodborne intoxication or foodborne infection. Foodborne intoxication is an illness that results from the consumption of a toxin produced by a microorganism growing in a food product. When such a product is ingested, the toxins are what cause illness, not the living organism. The symptoms of the illness such as nausea and vomiting, which often appear within a few hours of the food being ingested, reflect the type of toxin ingested. The source of the organism is usually a human carrier who has not followed adequate sanitation procedures such as hand washing before preparing the food. If the organism is inoculated into a food that can support its growth, and the food is left at room temperature for several hours, the bacteria can grow and produce the enterotoxin. . Unlike foodborne intoxication, foodborne infection requires the consumption of living organisms. The symptoms of the illness, which usually do not appear for at least one day after ingestion of the contaminated food, usually include diarrhea but vary according to the type of organism ingested (Nester et al. 1998; Jones 1992; de Vries 1997).

These foodborne diseases are most commonly caused by the bacteria *Campylobacter jejuni*, *Salmonella*, *Escherichia coli* O157:H7, *Shigella*, *Listeria monocytogenes*, *Stapphylococcus*

aureus, and by a group of viruses known as Norwalk-like viruses (Centers for Disease Control and Prevention 2005; CAREC 2007).

Because of the low prognosis for foodborne illnesses among the elderly when compared to the other groups in the population, coupled with the changing demographic trends, this has implications for the public health system, emphasizing the growing need for improved elderly care, with significant implementation of food safety measures.

1.2 Rational

Because of the increasingly ageing population in Trinidad and Tobago, a greater demand for improved long-term care of the elderly is crucial, with emphasis being placed on food safety. The health of older persons naturally deteriorates with increasing age, leading to high susceptibility for gastrointestinal disorders especially when food preparation steps do not follow the recommended standards. Little data is available with regards to food safety practices within local Geriatric care institutions, and the gastrointestinal health of the elderly persons residing in these institutions. Prominence is yet to be seen in addressing the food safety component of Geriatric care, such as proper food handling, preparation practices, and personal hygiene. It is important that sufficient resources be dedicated towards the overall health care of the elderly sector in this country.

1.3 Problem Statement

The purpose of this study is to determine the prevalence of aging physiological changes, and to evaluate the food safety and personal hygiene practices of caregivers, and its implications for gastrointestinal disorders in the elderly population in Trinidad in the hope that proper food safety and hygiene measures will be integrated into the elderly care institutions as both a corrective and preventative measure towards achieving an improved health.

Problem:

1. Poor food handling and hygiene practices may be a significant contributory factor in gastrointestinal disorders among the elderly.
2. Physiological changes that occur as one age puts the elderly at an increased risk for developing gastrointestinal disorders.

1.4 Objectives

General objective: To identify the prevalence of gastrointestinal disorders in the elderly population, so as to suggest solutions to alleviate this problem.

Specific objectives:

1. To determine the prevalence of common gastrointestinal disorders among the elderly.
2. To identify the prevalence of common physiological changes that occurs among the elderly.
3. To examine the relationship between gender and gastrointestinal disorders in the elderly.
4. To evaluate the food handling practices of caregivers in the Geriatric Homes.

1.5 Scope

The study took place during the period September to December 2009. The study group was elderly persons residing in Geriatric Homes in Trinidad.

1.5 Hypothesis

Null hypothesis: The gastrointestinal symptoms of elderly persons are independent of gender.

Alternative hypothesis: The gastrointestinal symptoms of elderly persons are associated with difference in gender.

Only significant findings were reported.

Chapter 2 : Literature Review

This review seeks to highlight issues that are pertinent to gastrointestinal disorders that are an outcome of the following contributory factors: physiological changes that occur as one ages, and food safety and hygiene practices among the foodservice workers in the Geriatric Homes. Studies on food safety practices in Geriatric Homes in Trinidad is either limited, or has never been evaluated, therefore the following is a thematic literature review based on studies done in the United States and United Kingdom.

A food safety recommendation in the United States involves the use of the 'Partnership for Food Safety Educations Fight Bac!' recommendation, which advises consumers to follow four steps: clean, separate, cook, and chill to keep food safe from harmful bacteria. Despite these attempts to encourage persons to practice safety while handling foods, little adherence is made. A study done in the United States, involving 99 voluntary participants, attempted to examine actual food handling practices by direct observation (video recording), and comparing with food safety practices recorded by consumers (questionnaire). It was found that the most commonly made unsafe practices were- failure to wash hands before, & during food preparation, insufficient cleaning of raw vegetables, improper storage of raw and cooked foods in the refrigerator, and either overcooking or undercooking foods (Anderson et al. 2005).

In a similar study by Abbot et al. (2007), the relationship between reported and actual (observed) food-handling behaviours was examined in young adults (aged 18-26) attending an American university. The study also used the 'Partnership for Food Safety Educations Fight Bac!' recommendation for keeping food safe, as the food safety reference for comparing results. A home kitchen observation checklist was used by trained home kitchen auditors to assess compliance of home food storage and rotation practices, sanitation and chemical storage, and general kitchen condition. A multi-part questionnaire was then used to examine food-handling

behaviours, beliefs, and knowledge. Results showed that less than half of the recommended safe food-handling practices were followed by participants (n=153), and only two-thirds of the food safety knowledge items were answered. This study highlighted the importance on increasing the knowledge on foodborne diseases and safe food-handling measures, especially among young adults since even though they are not considered to be 'at risk', they are involved in the present food service establishments and are also the future caregivers for populations at risk such as the elderly (Abbott et al. 2007).

Some studies have examined consumer attitudes and perceptions toward food safety. These studies have found that attitudes toward safe food preparation behaviours were more positive than negative. However, many attitudes recorded were not consistent with their actual behavior. One particular study looked at the influence of attitudes on food safety behaviour based on the belief that attitude determination towards food safety in the domestic kitchen is important for development of targeted food safety communication strategies. A questionnaire was administered to consumers (n = 100) representing a cross-section of the population of Cardiff, South Wales. Results showed that attitudes towards implementation of key food safety behaviours including cross contamination, cooking and storage were positive, however, attitudes towards other practices (Redmond and Griffith 2004).

In a similar study, it has also been found that consumers who have a positive perception of their own food handling practices deter risk-reducing behaviours. This study, carried out by Redmond and Griffith (2004) was aimed to determine consumer perceptions of personal risk of food poisoning and personal control and responsibility for microbial food safety during domestic food preparation. Consumers believe that they are invulnerable to hazards and are less likely to adopt health-promoting behaviours. Therefore, they need to firstly recognize and perceive that their current behavior endangers their health and needs to be changed; once they change their action, their risk will be reduced. Conversely, if consumers fail to assume personal responsibility for

food safety, they will have an increased potential for unsafe food handling practices, leading to an increased risk for food poisoning. Results indicated that personal risk of illness after consumption of self prepared food was considered to be low by 90% of respondents (n=100). However, the majority of respondents think that they have a greater responsibility and control for food safety (Redmond and Griffith 2004).

Proper food safety practices are most apparent when handling foods for persons who are most at risk for contracting foodborne illness: pregnant women, children, the immuno-compromised, and the elderly. The elderly have an increases susceptibility to morbidity and mortality from foodborne infections because of the age-related physiological changes that occur- such as within the gastrointestinal tract, there is less production of gastric acid and a decreased intestinal motility. Furthermore, the use of medications, chronic illnesses, vision problems, entry into Geriatric Homes, just to name a few, heightens their risk for contracting foodborne illness. Smith (1998) examined data from foodborne outbreaks associated with nursing homes, which indicated that the elderly are more likely to die from foodborne *Campylobacter*, *Clostridium perfringens*, *Escherichia coli* O157:H7, *Salmonella*, and *Staphylococcus aureus* infections than the general population.

A more detailed study conducted in the UK further confirms the increased risk that the elderly face when exposed to hazards in a private care setting. The study mainly looked at the monitoring system for residential care homes by environmental health departments by the use of surveys. Little information was provided on the sample size; however the food safety risk factors in the residential care homes were identified and results indicated that basic food hygiene practices are sometimes ignored, there was a lack of staff knowledge about food safety, and there was little documentation within the system to ensure that proper food safety procedures are standardized (Herne 1993).

Contaminated drinking water is also associated with gastrointestinal disease, with the elderly being at an increased risk. Schwartz et al (2000) examined the association between drinking water quality and gastrointestinal illness of elderly residents of Philadelphia over the period 1992-1993. Water quality was measured using water turbidity, which is a measure of the cloudiness of water, and is used to test for the risk of microbial contamination; with an increase in turbidity level being positively associated with a greater contamination level. Turbidity measurements were made every three hours at each of the three water treatment plants. These were averaged for each day in each plant and that plant specific measure was used for the analysis of admissions for GI illness of persons residing in the service area of each plant. The study found that gastrointestinal illness cases were associated with an increase in the turbidity level of the drinking water.

Few studies have been known to examine the increased risk that elderly persons are exposed to due to the physiological changes that accompany ageing, coupled with food mishandling practices and the effect of these two components on their gastrointestinal health. One such article explored the factors that contribute to the increased susceptibility to and severity of foodborne illnesses among older adults, and discussed the pathogens that are most likely to contribute to these illnesses. The most significant factors that were found to contribute to increased susceptibility and severity of foodborne pathogens among the elderly were: the aging immune system; chronic disease; nutritional status and physical activity; and risky food storage, handling, and consumption behaviours. Infected persons may experience one of more of an array of symptoms: diarrhea, nausea, vomiting, abdominal pain/cramps, and other gastrointestinal problems, just to name a few (Kendal et al. 2006).

Studies have shown thus far that regardless of the age or education level of participants, food safety practices are not in keeping with recommended standards. A number of studies have examined the relationship between food safety knowledge and perception, and actual behaviour

practiced in the kitchen. Research suggests that most food-handlers are not are not aware of safety recommendations; and for food handlers who are aware of safety recommendations, their practices do not correspond to the standard protocols. In this present study, there is yet an additional risk for elderly persons because of the new environment these persons are exposed to, different food handlers, resulting in exposure to a number of food safety risks (Anderson 2004; Abbot 2007; Redmond 2004).

Chapter 3 : Methodology

3.1 Target population

The study population was elderly persons in Trinidad, and the target population (n=96) was all elderly persons residing in the Geriatric Homes, including male and female, all ethnic groups, and all persons aged 60 years and over. Detailed demographic characteristics are shown in Table 3.1. The Geriatric Homes were located in east, north, central, and south Trinidad (refer to Table 3.2).

Table 3.1: Demographic characteristics of participants

Characteristic		**Frequency**	**Valid Percent**
Age			
Valid	70-74	24	25.5
	75-79	18	19.1
	80-84	15	16.0
	85-89	9	9.6
	65-69	8	8.5
	90-94	8	8.5
	60-64	7	7.4
	95-99	3	3.2
	>/= 100	2	2.1
	Total	94	100.0
Missing	System	2	
Total		96	
Education level			
Valid	completed primary school	29	30.2
	completed high school	28	29.2
	less than primary school	25	26.0
	never attended school	7	7.3
	completed Tech/Voc	5	5.2
	Graduated University	2	2.1
	Total	96	100.0
Ethnicity			
Valid	Afro-Trinidadian	63	65.6
	Indo-Trinidadian	30	31.3
	Caucasian	3	3.1
	Total	96	100.0
Gender			
Valid	Female	49	51.0
	Male	47	49.0
	Total	96	100.0

Elderly persons who were diagnosed with Alzheimer were excluded from the study.

3.2 Sampling theories

The Homes for Older persons in Trinidad and Tobago total 131. Initially, 10 homes were chosen in order to obtain the projected target sample size of 130 persons. However, because of the unanticipated high number of persons diagnosed with Alzheimer disease in most of the Homes, it was decided that a reduced projected target sample size of 80 would be sufficient to achieve variability in data. Time and other constraints involved were also considered during the data collection process, therefore the number of homes visited in the final sample was 16 (12% of Geriatric Homes in Trinidad and Tobago). The list of Geriatric Homes was obtained from the local directory and online sources.
(http://www.svdptt.org/institutions.htm;
http://www.caribbeanonlineyellowpages.com/listings_1/1_category_H_6318.html;
http://www.tntisland.com/nursinghome.html; and
http://www.caribbeanonlineyellowpages.com/listings_1/1_category_N_752.html)

Simple random sampling was first used. A sample frame consisting of 37 homes was prepared, which excluded Geriatric Homes located in the following areas because of remoteness: Diego Martin, Sangre Grande, Santa Cruz. A total of 10 Homes were firstly randomly selected from this list. Homes were contacted by phone, during which time the researcher was introduced, the institution responsible, and an overview on the purpose of the study. A request was then made to enable the researcher to visit the Home to interview the elderly persons.

Problems arose while contacting some of these homes: no one answered the phone, the phones were not in service, or there was difficulty in obtaining approval. These phone numbers were called back and if no answer was obtained within a period of 1 week, another home was selected from the list. The sample frame was further grouped based on location (east, north, central, and

south) in order to obtain a better cross section of the population and to get a greater variability in the data. Cluster sampling was then used. A flow chart of this process is shown in Figure 3.1. Despite the categorization, there was still difficulty in contacting some Homes, therefore the same process of calling back continued over a two-week period until a total of 29 Homes were contacted, 13 of which confirmed to be out of reach, hence the final number of homes visited was 16 (out of a valid sample size of 25 Geriatric Homes). This can be broken down as follows: east- 4 Homes out of a valid 8; north- 5 Homes out of a valid 7; central- 2 Homes out of a valid 3; south- 5 Homes out of a valid 7. The list visited is shown in Table 3.2. The map of Trinidad (Appendix 7.2) shows the main areas that were visited.

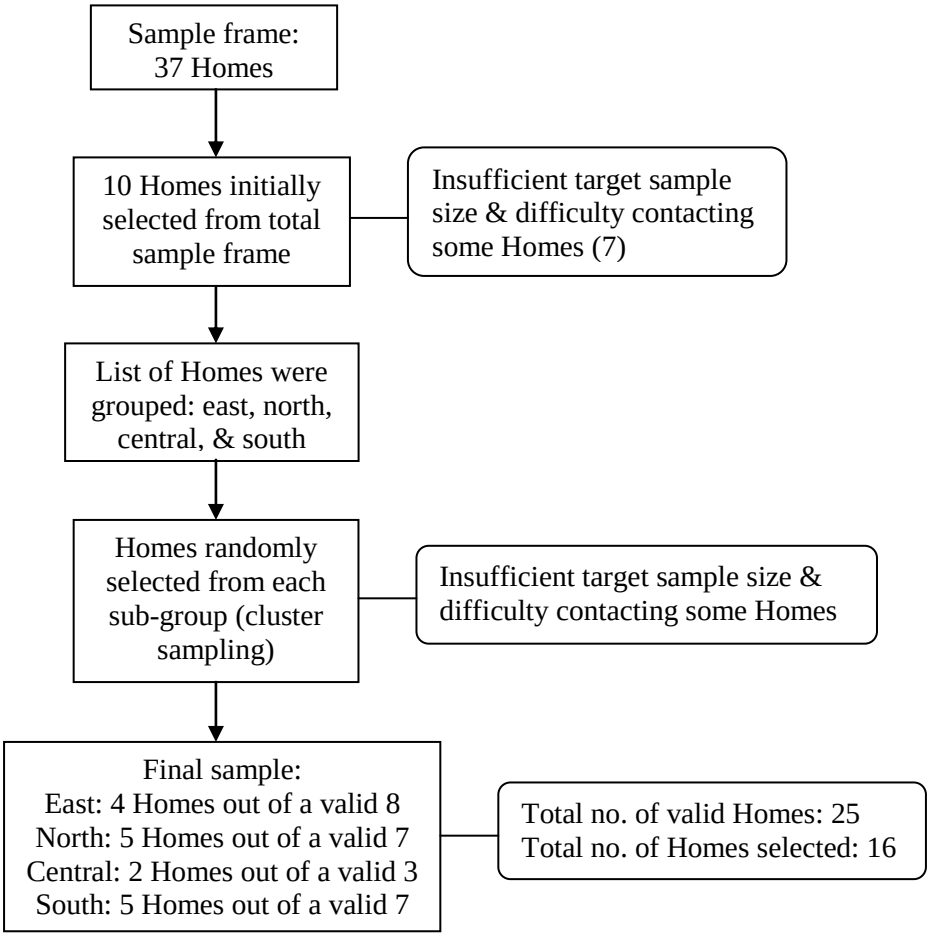

Figure 3.1: Flow chart showing how the final sample size was obtained

Table 3.2: Names and location of all the Geriatric Homes used in the study

NAME	LOCATION
Geriatric Homes in North Trinidad	
All Saints Church Gordon Home for Senior Citizens	98 Woodford Street, Newtown
St. Andrew's Home for Women	Belmont Circular Rd., Belmont
SVP Geriatric Home	Saddle Rd, San Juan
Heph-Zi-Bah's Glory	70 Tenth St Barataria
Dee's Nursing Home	21 Cornelio Street, Woodbrook
Geriatric Homes in East Trinidad	
Datta Home for the Aged	Torrecilla Gardens, Arima
Yvonne's Paradise	11 Samnah Road, Tacarigua
Yvonne's Paradise	23 Mausica Rd, D'abadie
Joyday Home for the Age	Knowles St, Curepe
Geriatric Homes in Central Trinidad	
Buena Vista Nursing Home	Maingor Ville, Claxton Bay
La Vida Specialist Care	67 Pierre Road, Charlieville
Geriatric Homes in South Trinidad	
St. Vincent de Paul Home for Men & Women	Independence Avenue, San Fernando
Professional Care	10A Princess St, San Fernando
Helena Charles Home for Senior Citizens	La Brea
Senior Citizens Assoc. Ltd.	Techier Village, Point Fortin
Siparia Senior Citizens Homes	Park St, Siparia

3.3 Data collection procedures and instruments

The study design was cross sectional using surveys. Interview-administered questionnaires were the primary data collection method used. Data was collected between the period of 29th October and 8th November 2009. Questionnaires were distributed among the following locations in Trinidad: randomly selected Homes in the east, north, central, and south.

The questionnaire (shown in Appendix 7.1) was developed using previous studies and books that were related to the research topics: food safety, gastrointestinal physiology, and physiological changes with age. Advice from experts in the field was used to approve the questions. The questionnaire was structured and comprised two sections: the first section was made up of 12 questions in which the elderly persons answered, while the second section was made up of 13 questions which required the response from someone who prepares the meals or caregiver. Section one of the questionnaire was sub-divided into questions that were based on: demographics, current health status, physiological changes, the effects of food on health, and

gastrointestinal symptoms. Section two of the questionnaire was centered on food preparation practices and was further sub-divided into questions that were based on the following practices: storage, cleaning and separating, defrosting and chilling, cooking or reheating, and personal practices and hygiene. All questions were closed-ended.

Difficulties in administering the questionnaire were anticipated, such as literacy problems and sensitive issues, especially because of the nature of the group of persons under study. Because of these concerns, the questions were designed as short and simple as possible, to prevent them from getting exhausted and frustrated, and the questionnaire was also anonymous. Some questions were deliberately removed because it was thought to be mentally challenging, and the way in which some questions were asked differed for some persons, so that further explanation was sometimes required.

The average time taken to interview each person was 10 minutes. The interview was structured and the planned visits to these Homes were either around 10 in the morning or 2 in the afternoon, so that their meal times will not be affected. When persons to be interviewed were approached, an introduction was given, which included the researcher's name and purpose of the interview. Despite the formality of the questionnaire, most questions were asked in an open-ended, unstructured manner in order to initiate a discussion, to get persons to be open, and to eliminate the rigid structure of the questionnaire. This was all in an attempt to make the interview seem more like a normal conversation, and to get individuals to comply and to be as honest as possible. The interviewee was thanked at the end of the interview session.

3.4 Data analysis

Data was analyzed using the statistical software package SPSS version 12.0. Data was presented as frequency distributions on tables, bar graphs and pie charts. Pearson chi-squared was

performed on gender variables to gastrointestinal symptoms, and confidence interval was set at 95% with a significance level of 5%.

The Geriatric Home in Point Fortin (n=9) was excluded from the analysis of the Food Preparation Practices section (section two) of the questionnaire. This is because section two of the questionnaire was also administered to these elderly persons, given that they prepare their food for themselves. Thus this would have caused great variability and inconsistency in the results.

Chapter 4 : Results and Discussion

4.1 Current Health Status

Table 4.1: Current health status (Question 5)

AILMENT		Frequency	Valid Percent
Hypertension			
Valid	no	58	60.4
	yes	38	39.6
	Total	96	100.0
Diabetes			
Valid	no	65	67.7
	yes	31	32.3
	Total	96	100.0
Heart disease			
Valid	no	83	86.5
	yes	13	13.5
	Total	96	100.0
Gastrointestinal disorder			
Valid	no	89	92.7
	yes	7	7.3
	Total	96	100.0
Other			
Valid	no	56	58.3
	yes	40	41.7
	Total	96	100.0
None of the above			
Valid	no	74	77.1
	yes	22	22.9
	Total	96	100.0

Table 4.1 shows that a high percentage (77.1%) of participants experience one or more ailment, while only 22.9% of participants report free from any disease state. The highest, at 41.7% was attributed to 'other' sickness, while from the given list, 39.6% of persons were diagnosed with hypertension, followed by diabetes at 32.3%, then heart disease (13.5%). Gastrointestinal disorders were the lowest, at 7.3%. With 77.1% of participants being diagnosed with at least one ailment highlights the fact that there is an increased vulnerability to infections due to a weaker immune system associated with aging and disease. This is consistent with findings reported by Bow 1998 and Gerba 1996, which states that diseases, such as diabetes mellitus, can promote pathogenic infection through persistent hyperglycemia and loss of microcirculation efficiency. (Dinh 2005; Umpierrez 2003 and Maldonado 2004)

Table 4.2: Intake of drugs/laxatives from the past 5 years. (Question 6)

Intake of drugs/laxatives	Valid		
	No	Yes	Total
Frequency	37	59	96
Valid Percent	38.5	61.5	100.0

The intake of drugs/laxatives is linked to the current health status of persons, with more than half of persons (61.5%) reporting that they take some type of medication as shown in Table 4.2. The use of medications is associated with physiological changes and gastrointestinal disorders that persons may have not normally experienced. Bow (1998) found that especially with current health status on the decline, the elderly are usually required to take medication to treat the disease. These sudden modifications may induce physiological changes and gastrointestinal disorders within the elderly.

4.2 Physiological Changes

Table 4.3: Physiological changes that has occurred over the past 5 years (Question 7)

PHYSIOLOGICAL CHANGE	Valid		
	No	Yes	Total
Change in food/fluid intake			
Frequency	92	4	96
Valid Percent	95.8	4.2	100.0
Reduced consumption of food			
Frequency	36	60	96
Valid Percent	37.5	62.5	100.0
Decreased physical activity			
Frequency	24	72	96
Valid Percent	25	75	100.0
Decreased muscle strength			
Frequency	26	70	96
Valid Percent	27.1	72.9	100.0
Irregular/decreased bowel movements			
Frequency	54	42	96
Valid Percent	56.3	43.8	100.0
Difficulty swallowing			
Frequency	84	12	96
Valid Percent	87.5	12.5	100.0
Memory loss			
Frequency	44	52	96
Valid Percent	45.8	54.2	100.0
Changes in the taste &/smell of foods			
Frequency	62	34	96
Valid Percent	64.6	35.4	100.0
Changes in eyesight			
Frequency	72	24	96
Valid Percent	75.0	25.0	100.0
Other changes			
Frequency	90	6	96
Valid Percent	93.8	6.3	100.0
No change			
Frequency	94	2	96
Valid Percent	97.9	2.1	100.0

Table 4.3 shows that the physiological changes occurring the most commonly among participants is decreased physical activity (75%), followed by decreased muscle strength (72.9%). 62.5% of persons have reduced their consumption of food, 54.2% of persons have been experience memory loss and 43.8% of persons experience irregular or decreased bowel movements. These findings confirm the occurrence of physiological changes with age. As Morley (2001) pointed out, there is a physiological decline in food intake as one age and is known as the anorexia of ageing (Daily dietary fat and total food energy intake 1994). McGandy et al (1966) and Patrick et al (1986) both found that physical activity declines with age. This finding is backed by a study done by Anderson and Prior (2007), which looked at the structural changes that take place with age and found that decreased muscle strength can be attributed to the lost of lean body mass. Where, reduced muscle mass includes skeletal muscle, smooth muscle and muscle that affects vital organ function. Along with a reduced muscle mass, there is a decline in total energy expenditure (and therefore physical activity level) (Black et al 1996), reduced body water, and an increase in body fat. Memory loss is also linked to the ageing Small (1999). The older age group displayed a relative decline in memory performance with time. Although the exact prevalence is uncertain, most agree that memory decline occurs in more than 40% of individuals older than 60 years (Hanninen et al 1996).

4.3 Effects of Food on Health/Gastrointestinal symptoms

Table 4.4: Persons who avoid consuming certain foods based on past experience (Question 8)

		Frequency	Valid Percent
Valid	no	75	78.1
	yes	21	21.9
	Total	96	100.0

Table 4.4 shows that 21.9% of persons avoid eating foods based on past experience or problems. These changes may be due to the physiological changes that occur with age, including changes

within the gastrointestinal system that may have caused an unwanted response by the body, or other unknown reasons.

Table 4.5: Persons with food allergies (Question 9)

		Frequency	Valid Percent
Valid	no	92	95.8
	yes	4	4.2
	Total	96	100.0

Table 4.5 shows that only 4.2% of persons experience food allergies. Food allergies are most times caused by a reaction to a protein. This may lead to clinical symptoms such as diarrhea (Barrett 2006).

Table 4.6: Allergy foods or foods avoided based on past experience (Question 10)

FOOD	Valid				Total
	No	Yes	[1]Not applicable	Total	
Shellfish					
Frequency	21	2	73	23	96
Valid Percent	91.3	8.7	76.0	100.0	100.0
Fish					
Frequency	21	2	73	23	96
Valid Percent	91.3	8.7	76.0	100.0	100.0
Egg					
Frequency	22	1	73	23	96
Valid Percent	95.7	4.3	76.0	100.0	100.0
Milk					
Frequency	20	3	73	23	96
Valid Percent	87.0	13.0	76.0	100.0	100.0
Peanuts					
Frequency	22	1	73	23	96
Valid Percent	95.7	4.3	76.0	100.0	100.0
Wheat					
Frequency	23	0	73	23	96
Valid Percent	100.0	0	76.0	100.0	100.0
Hotdogs/sausages					
Frequency	23	0	73	23	96
Valid Percent	100.0	0	76.0	100.0	100.0
Spreads					
Frequency	23	0	73	23	96
Valid Percent	100.0	0	76.0	100.0	100.0
Salads					
Frequency	23	0	73	23	96
Valid Percent	100.0	0	76.0	100.0	100.0
Juice					
Frequency	21	2	73	23	96
Valid Percent	91.3	8.7	76.0	100.0	100.0

Table 4.6: Allergy foods or foods avoided based on past experience (Question 10) *continued*

FOOD	Valid				Total
	No	Yes	[1]Not applicable	Total	
Chicken/Beef/Pork					
Frequency	20	3	73	23	96
Valid Percent	87.0	13.0	76.0	100.0	100.0
Other					
Frequency	6	17	73	23	96
Valid Percent	26.1	73.9	76.0	100.0	100.0

[1]**Not applicable** values indicates that there was not a 'yes' response for either Question 7 or Question 8.

Table 4.6 indicates the foods that persons avoid consuming based on either past experience or problems, or foods in which they are allergic. The majority of these foods were attributed to 'other', accounting for 73.9% of respondents, followed by milk and chicken/beef/pork, both at 13% of respondents. It is of a high concern that persons might consume foods that may cause an adverse reaction. According to Helferich and Winter (2000), for those individuals who have food allergies or food sensitivities, especially with this group under study, this can be an increasingly life-threatening experience. The foods that elderly persons avoid are really the responsibility of the caregiver to ensure that these foods are not included in their meals.

Table 4.7: Gastrointestinal symptoms over the past 6 months (Question 11)

SYMPTOM	Valid		
	No	Yes	Total
Stomach discomfort/upset stomach			
Frequency	66	30	96
Valid Percent	68.8	31.3	100.0
Abdominal pain			
Frequency	66	30	96
Valid Percent	68.8	31.3	100.0
Diarrhea			
Frequency	75	21	96
Valid Percent	78.1	21.9	100.0
Diarrhea with blood			
Frequency	96	0	96
Valid Percent	100.0	0	100.0
Constipation			
Frequency	54	42	96
Valid Percent	56.3	43.8	100.0
Fecal incontinence			
Frequency	96	0	96
Valid Percent	100.0	0	100.0
Vomiting			
Frequency	81	15	96
Valid Percent	84.4	15.6	100.0
Nausea			
Frequency	96	0	96
Valid Percent	100.0	0	100.0

Table 4.7: Gastrointestinal symptoms over the past 6 months (Question 11) *continued*

SYMPTOM	Valid		
	No	Yes	Total
Chill and fever			
Frequency	78	18	96
Valid Percent	81.3	18.8	100.0
Headaches			
Frequency	65	31	96
Valid Percent	67.7	32.3	100.0
Tiredness			
Frequency	53	43	96
Valid Percent	55.2	44.8	100.0
Blurred vision			
Frequency	73	23	96
Valid Percent	76.0	24.0	100.0
Other			
Frequency	94	2	96
Valid Percent	97.9	2.1	100.0
None of the above			
Frequency	80	16	96
Valid Percent	83.3	16.7	100.0

Table 4.7 shows that the most common gastrointestinal symptoms experienced are tiredness (44.8%); followed by constipation, which was slightly lower at 43.8%, and then upset stomach and abdominal pain, both at 31.3%. Diarrhea was at 21.9%. A study by Avlund (2003) measured tiredness in daily activities among elderly subjects between the ages 75 to 85. Results showed an association between having sustained tiredness or development of tiredness from age 75 to 80, which may be a sign of functional decline. The high prevalence of constipation may be associated with increasing age, according to Robson et al. (2000) which may be a result of the aging process. The study by Robson et al. (2000) found that 7% of elderly nursing home residents had developed constipation, and the factors associated with its development included race, decreased fluid intake, and the presence of allergies. Another study by Bosshard (2004) pointed out that constipation is a common problem in elderly persons, with prevalence ranging from 15% to 20% in the community-dwelling elderly population and up to 50% in some studies of nursing home residents. In these patients, constipation results from a combination of risk factors, such as reduced fibre and fluid intake, decreased physical activity resulting from chronic diseases and multiple medications. Talley (1992) examined elderly persons for abdominal pain, chronic constipation, and diarrhea (n = 152), which concluded that complaints consistent with functional gastrointestinal disorders are common in the elderly. Despite diarrhea being on the

lower end of the scale for this study, data has shown that diarrhea occurs commonly in older people (Holt (n.d)). Everhart (1989) also confirmed the prevalence of self-reported constipation, diarrhea, infrequent defecation (three or fewer bowel movements per week), and frequent defecation (two or more bowel movements per day) with increase in age.

Table 4.8: Additional symptoms over the past 6 months (Question 12)

SYMPTOM	Valid		
	No	Yes	Total
Dry cough			
Frequency	59	37	96
Valid Percent	61.5	38.5	100.0
Droopy eyelids			
Frequency	71	25	96
Valid Percent	74.0	26.0	100.0
Dry mouth			
Frequency	53	43	96
Valid Percent	55.2	44.8	100.0
Difficulty with speech			
Frequency	85	11	96
Valid Percent	88.5	11.5	100.0
Difficulty swallowing			
Frequency	94	2	96
Valid Percent	97.9	2.1	100.0
Dehydration; chills			
Frequency	96	0	96
Valid Percent	100.0	0	100.0
Muscle pain			
Frequency	77	19	96
Valid Percent	80.2	19.8	100.0
Skin infections			
Frequency	80	16	96
Valid Percent	83.3	16.7	100.0
Other			
Frequency	94	2	96
Valid Percent	97.9	2.1	100.0
None of the above			
Frequency	71	25	96
Valid Percent	74.0	26.0	100.0

Table 4.8 shows that 44.8% of persons experience dry mouth. This may be attributed to the changing physiology of the GI tract (Tuohy et al. 2004; (http://www.healthinaging.org/aginginthenow/chapters_ch_trial.asp?ch=47#swallowing).

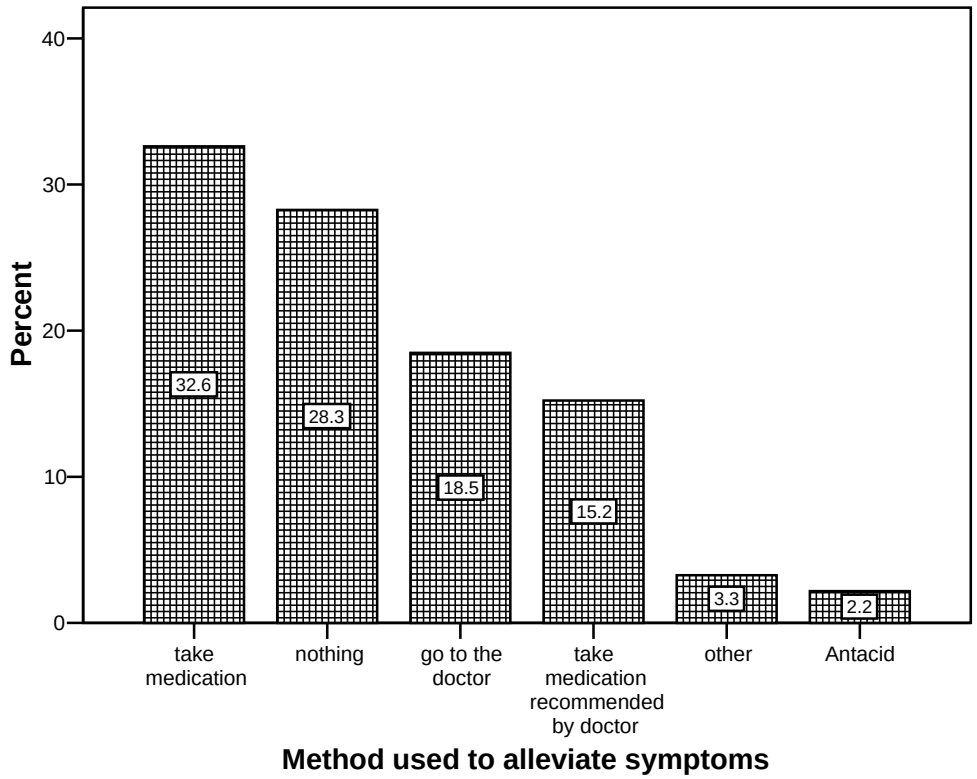

Figure 4.1: Approach to symptoms alleviation (Question 13)

Figure 4.1 shows the most common methods used to alleviate gastrointestinal symptoms. An alarming percentage of persons either take their own medication (32.6%), or do nothing (28.3%). Only 18.5% of persons go to the doctor or take medication (15.2%) recommended by the doctor. This finding is also consistent with the study by Talley (1992), who observed that regardless of the gastrointestinal symptoms of elderly persons, this is a poor predictor of presentation for medical care.

4.4 Relationship between gender and gastrointestinal symptoms

Table 4.9: Relationship between gender and gastrointestinal symptoms

			upset stomach		abdominal pain		diarrhea		diarrhea with blood	constipation		fecal incontinence	vomiting		nausea	Total
			no	yes	no	yes	no	yes	no	no	yes	no	no	yes	no	
gender	Female	Count	31	18	32	17	37	12	49	25	24	49	42	7	49	49
		% within gender	63.3%	36.7%	65.3%	34.7%	75.5%	24.5%	100.0%	51.0%	49.0%	100.0%	85.7%	14.3%	100.0%	100.0%
	Male	Count	35	12	34	13	38	9	47	29	18	47	39	8	47	47
		% within gender	74.5%	25.5%	72.3%	27.7%	80.9%	19.1%	100.0%	61.7%	38.3%	100.0%	83.0%	17.0%	100.0%	100.0%
Total		Count	66	30	66	30	75	21	96	54	42	96	81	15	96	96
		% within gender	68.8%	31.3%	68.8%	31.3%	78.1%	21.9%		56.3%	43.8%	100.0%	84.4%	15.6%	100.0%	100.0%
Pearson Chi-Square			.236		.457		.527		a	.292		a	.712		a	

a No statistics are computed because 'diarrhea with blood', 'fecal incontinence' and 'nausea' is a constant.

Table 4.9 continued

			chill & fever		headaches		tiredness		blurred vision		other		Total
			no	yes	no	yes	no	yes	no	yes	no	yes	
gender	Female	Count	40	9	30	19	26	23	37	12	47	2	49
		% within gender	81.6%	18.4%	61.2%	38.8%	53.1%	46.9%	75.5%	24.5%	95.9%	4.1%	100.0%
	Male	Count	38	9	35	12	27	20	36	11	47	0	47
		% within gender	80.9%	19.1%	74.5%	25.5%	57.4%	42.6%	76.6%	23.4%	100.0%	.0%	100.0%
Total		Count	78	18	65	31	53	43	73	23	94	2	96
		% within gender	81.3%	18.8%	67.7%	32.3%	55.2%	44.8%	76.0%	24.0%	97.9%	2.1%	100.0%
Pearson Chi-Square			.922		.165		.666		.901		.162		

Table 4.9 shows that the pearson chi-squared value was greater than 0.05; hence the null hypothesis is accepted.

4.5 Food Preparation Practices

Table 4.10: Person responsible for food preparation (Question 14)

		Frequency	Valid Percent
Valid	Caregiver	87	90.6
	Myself	9	9.4
	Total	96	100.0

Table 4.10 shows that the majority of elderly persons depend on their caregiver to prepare their meals (90.6%), while only 9.4% of persons (Point Fortin residents) prepared their meals on their own.

N.B. The Point Fortin sample (9) has been excluded from analysis of the following sub-sections in order to ensure consistency in the study. Therefore n=87.

4.4.1 Storage

Table 4.11: Storage location of foods (Question 15)

Storage Location		Frequency	Valid Percent
Stock room			
Valid	no	48	55.2
	yes	39	44.8
	Total	87	100.0
Excluded	System	9	9.4
Total		96	
Cupboards			
Valid	no	46	52.9
	yes	41	47.1
	Total	87	100.0
Excluded	System	9	9.4
Total		96	
Shelves			
Valid	no	75	86.2
	yes	12	13.8
	Total	87	100.0
Excluded	System	9	9.4
Total		96	
Refrigerator			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	
Room			
Valid	no	87	100.0
Excluded	System	9	9.4
	Total	96	
Other			
Valid	no	87	100.0
Excluded	System	9	9.4
Total		96	

Table 4.11 gives an overview of the various storage locations used for all foods. Foods that require refrigeration is store in the refrigerator (100%), followed by foods stored in cupboards (47.1%), and foods stored in a stock room (44.8%).

Table 4.12: Handling of leftover foods (Question 16)

		Frequency	Valid Percent
Refrigerate immediately after cooking			
Valid	no	87	100.0
Excluded	System	9	9.4
Total		96	
Refrigerate 2 hours after cooking			
Valid	no	87	100.0
Excluded	System	9	9.4
Total		96	
Cool then refrigerate			
Valid	no	49	56.3
	yes	38	43.7
	Total	87	100.0
Excluded	System	9	9.4
Total		96	
Remain on counter few hrs			
Valid	no	87	100.0
Excluded	System	9	9.4
Total		96	
Store in shallow containers <2" deep			
Valid	no	79	90.8
	yes	8	9.2
	Total	87	100.0
Excluded	System	9	9.4
Total		96	
Use within 3 days after storing in refrigerator			
Valid	no	50	57.5
	yes	37	42.5
	Total	87	100.0
Excluded		9	9.4
Total		96	
Place in the refrigerator uncovered			
Valid	no	87	100.0
Excluded	System	9	9.4
Total		96	
Leftover food is not stored/Discarded			
Valid	yes	49	56.3
	no	38	43.7
	Total	87	100.0
Excluded		9	9.4
Total		96	

Table 4.12 shows that leftover foods are not stored/discarded by the majority (56.3%). Less that half (43.7%) indicated that the foods are cooled before refrigerating, and a slightly lower amount stating that once leftover foods are kept, it is used within 3 days after storing in the refrigerator (42.5%). Cooling foods before storing in the refrigerator is not a malpractice, provided that these foods are not kept within the danger zone for more than two hours. Ideally, hot foods should be held at 140°F, and cold foods held at 40°F. Additionally, leftover foods must be used within 3 days. However, because of the high risk persons for which meals are prepared, re-use of leftover foods should be kept to the minimum because of the possibility of microbial contamination. Nevertheless, these practices correspond to the USDA recommendations for safe food handling.

4.4.2 Cleaning and Separating

Table 4.13: Cleaning and separating preparation practices (Question 17)

Preparation practice		Frequency	Valid Percent
Ensure raw meats separated from vegetables and cooked foods			
Valid	yes	87	90.6
Excluded	System	9	9.4
Total		96	100.0
Separate cutting boards for meat, vegetables, and breads			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	
Wash fruits and vegetables with water before use			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	
Wash utensils and clean counter tops before food preparation			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	
Use clean utensils when handling cooked foods			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	

Table 4.13: Cleaning and separating preparation practices (Question 17) *continued*

Use separate hand and dish towels			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	

Table 4.13 shows the food preparation practices. Interestingly, 100% of caregivers reported complying with all the practices. This means that they are in compliance with the USDA recommendations for ensuring that foods and utensils are properly cleaned before cooking, and that raw meats and vegetables or fruits are always separated while preparing foods.

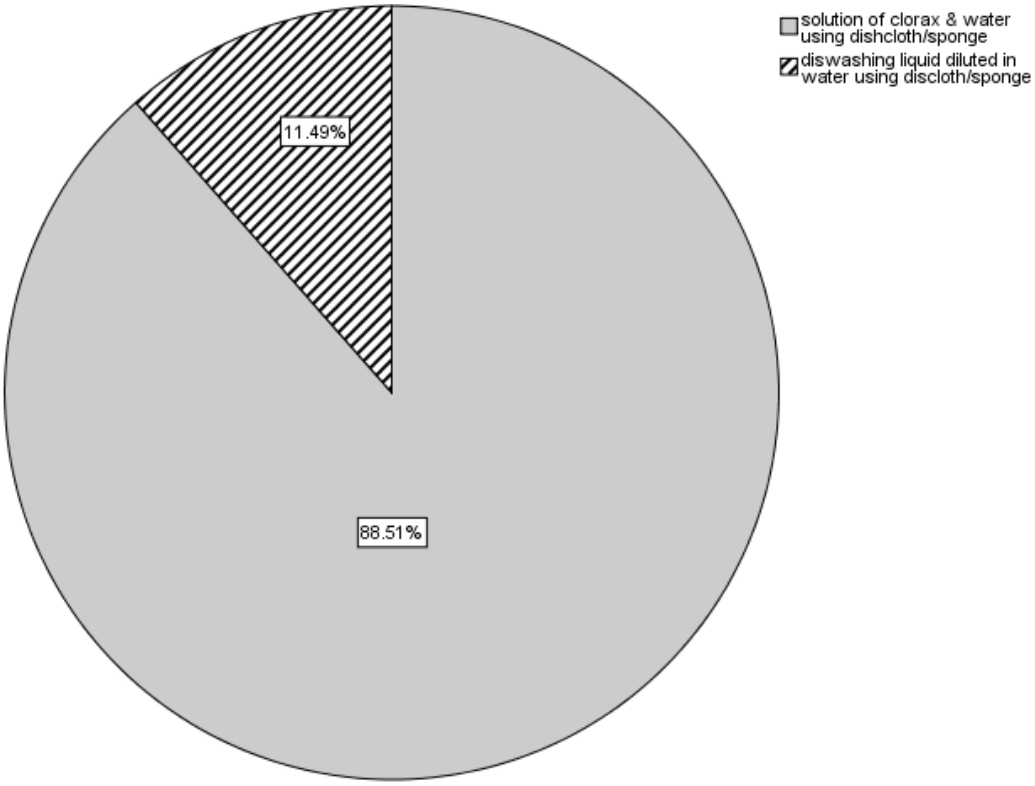

Figure 4.2: Medium used to clean countertops/refrigerator/stove (Question 18)

Figure 4.2 shows that the majority of persons (88.51%) use a solution of clorax and water to clean kitchen surfaces, while only 11.49% use dishwashing liquid. Clorax is an accepted sanitizing agent according to the USDA recommendations. Surfaces should be sanitized with a solution of 1 teaspoon chlorine bleach per quart of water (USDA Food Safety and Inspection Service 1997).

4.4.3 Defrosting and Chilling

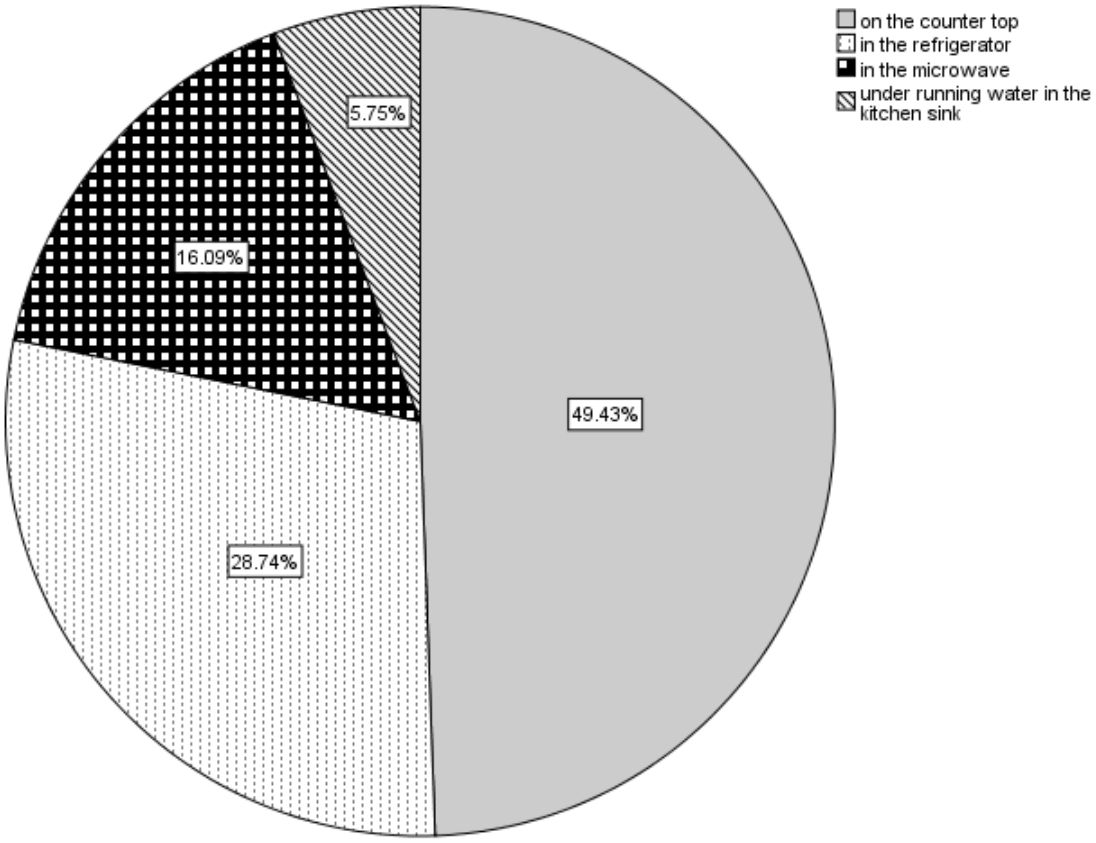

Figure 4.3: Methods used to defrost frozen foods (Question 19)

Figure 4.3 illustrates that slightly less than half of persons (49.43%) defrost their foods on the counter top, followed by 28.74% in the refrigerator. Defrosting foods on the counter top means that the food will be at room temperature and within the danger zone (41 to 140°F). This increases the risk of food contamination or microbial multiplication (Boodhu et al. 2008). The recommended procedures for defrosting foods are: in refrigerated units at temperatures of no more than 7°C (45°F); under potable running water at 21°C (70°F) or below, followed immediately by cooking; in a microwave oven only when food will be cooked immediately afterwards and as part of the regular cooking process (NRA 2002; FSIS 1998).

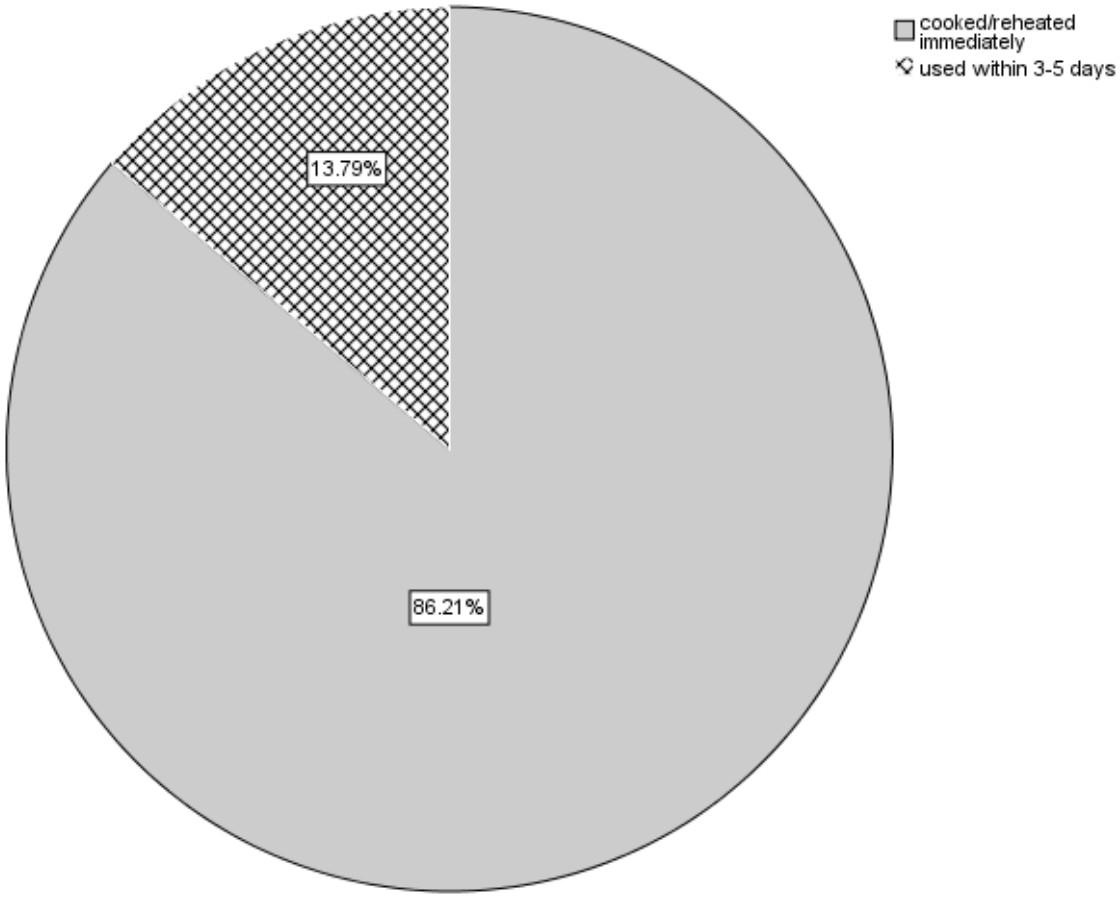

Figure 4.4: Foods that are thawed (Question 20)

As shown in Figure 4.4, the majority of respondents (86.21%) cook foods immediately after it is thawed, while 13.79% refrigerate the foods and use it within 3-5 days. Both of these methods are accepted. However, refrigerating foods that have been thawed is accepted provided that the recommended practice for defrosting foods is used (USDA 2006).

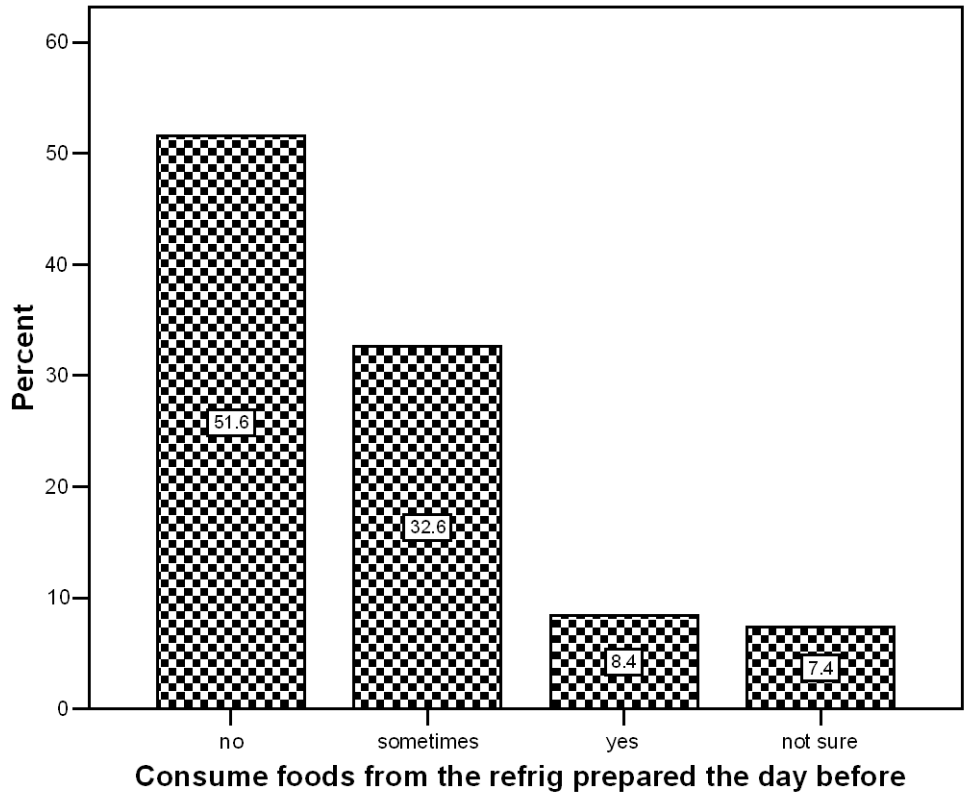

Figure 4.5: Consumption of foods that has been prepared the day before (Question 21)

Foods that have been prepared the day before is not given to the elderly persons, as stated by the majority (54%) shown in the bar chart (Figure 4.5). Only 5.7% certainly use leftover foods the next day, while 32.2% use leftover foods sometimes. These practices are accepted. However, in order for these foods to be safe to eat, it must be used within 3 days and reheated to an internal temperature of 165 °F (USDA 2006).

4.4.4 Cooking or Reheating

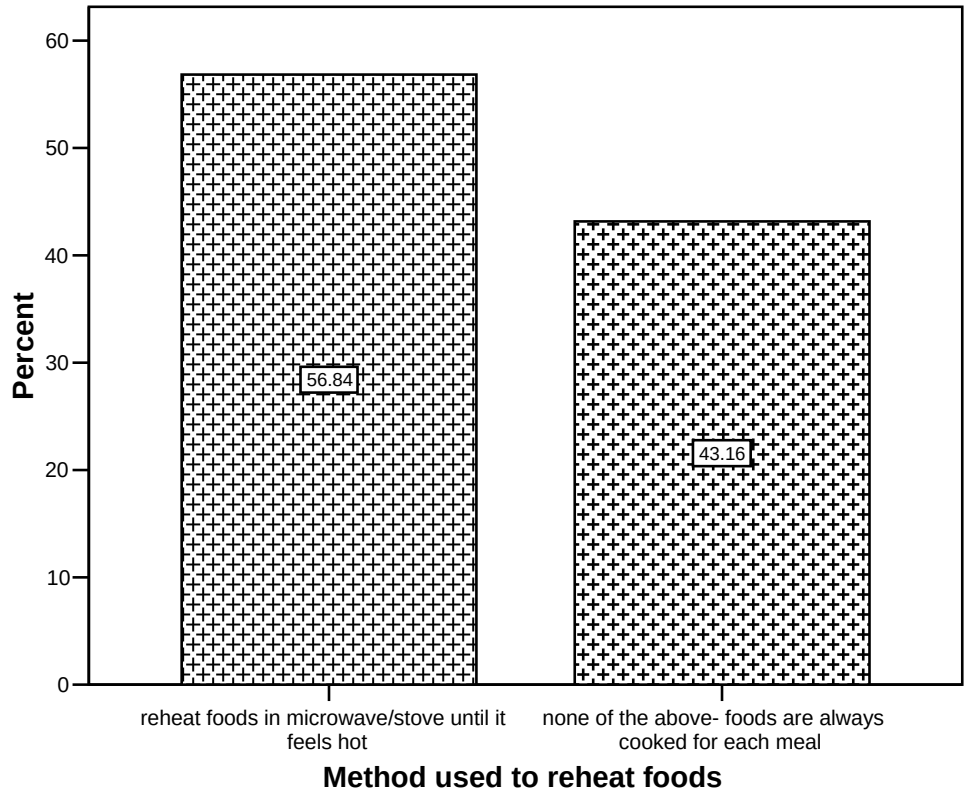

Figure 4.6: Methods used to reheat foods (Question 22)

According to the USDA Food Safety and Inspection Service (1997), foods should be reheated until it reaches an internal temperature of 165°F. This recommendation is not practiced by all of the caregivers. Instead, as shown in Figure 4.6, most (55.17%) rely on reheating foods until it feels hot, which not necessarily destroys the bacteria since the temperature is not known. Nevertheless, 44.83% of persons reported cooking foods for each meal and never use leftover foods.

4.4.5 Personal Practices and Hygiene

Table 4.14: Foods that looks or smell strange (Question 23)

		Frequency	Valid Percent
Valid	discard it	87	100.0
Excluded	System	9	9.4
Total		96	

Any foods having a strange look or smell is discarded by 100% of persons as shown in Table 4.14, which is in keeping with the recommendation to throw foods away whenever in doubt. (Matthews 1999)

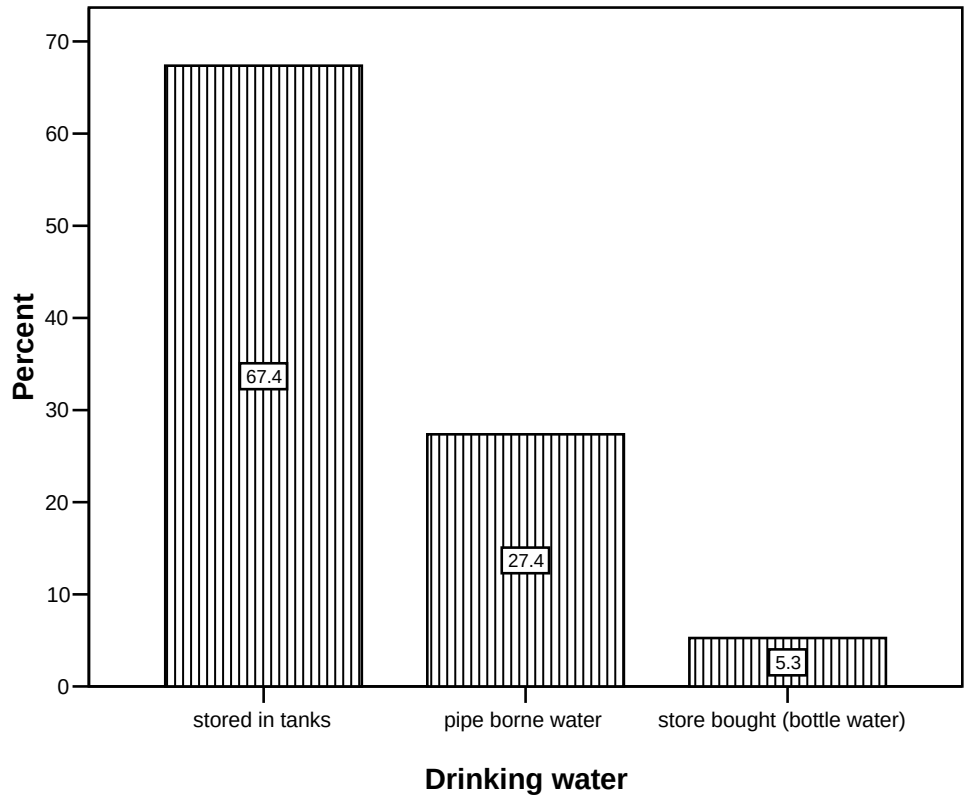

Figure 4.7: Drinking water (Question 24)

Drinking water is obtained from most persons by tank storage (64.4%) as indicated in Figure 4.7. A wide variety of bacterial pathogens are capable of contaminating water, where outbreaks of waterborne diseases caused by the contamination of drinking water systems with the feces of infected animals or people happen from time to time, and there is an increased risk of infection within the elderly (De Leon et al. 2003).

Table 4.15: Hand washing practices (Question 25)

		Frequency	Valid Percent
Immediately before & during food prep			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	
When changing tasks			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	
After handling soiled utensil			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	
After touching hands/face/mouth/hair			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	
After using the toilet			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	
after touching door handles/other non-food items			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	
After coughing or sneezing			
Valid	no	11	12.6
	yes	75	87.4
	Total	87	100.0
Excluded	System	9	9.4
Total		96	
None of the above			
Valid	no	87	100.0
Excluded	System	9	9.4
Total		96	

Table 4.15 shows the instances at which persons wash their hands. 100% of individuals claim to wash their hands after performing each of the steps in the list, which is in agreement with the USDA recommendations of washing hands before and after handling foods. The only exception

was that 12.6% of respondents indicated they don't necessarily wash their hands after coughing or sneezing. This practice should be avoided since bacteria from one person can contaminate the foods.

Table 4.16: Method used to wash hands (Question 26)

		Frequency	Valid Percent
Wash hands quickly with water			
Valid	no	87	100.0
Excluded	System	9	9.4
Total		96	
Wash hands for 20 sec using water			
Valid	no	87	100.0
Excluded	System	9	9.4
Total		96	
Wash hands quickly using soap and water			
Valid	no	87	100.0
Excluded	System	9	9.4
Rub hands for 20 sec using soap then rinse w water			
Valid	no	87	100.0
Excluded	System	9	9.4
Total		96	
Wash hands until soap is completely washed off			
Valid	yes	87	100.0
Excluded	System	9	9.4
Total		96	

Table 4.16 describes how persons wash their hands, with 100% of persons reporting that their hands are washed with water until the soap is completely washed off. Hand washing recommendations require that hands are washed with water and soap for 20 seconds (USDA 2006).

Chapter 5 : Conclusion

Results indicate that the most prevalent physiological changes occurring within the elderly are decreased physical activity, along with decreased muscle strength; while the most prevailing gastrointestinal symptoms were tiredness and constipation. Nearly all the food preparation practices 'reported' by the majority caregivers were in keeping with recommended standards, with the exception of defrosting and reheating methods. Data from most previous studies are also based on subjective evidence. Research methods that rely on self-reported data show that there is often a substantial difference between what people say they do and what they actually do (Anderson et al. 2005).

These outcomes have implications for the long-term health care of the elderly especially with the increasingly ageing population, so that caregivers are required to maintain and improve where necessary, their food handling practices. These are significant areas for further development of policies for the elderly, especially on hazard identification and treatment of gastrointestinal symptoms caused by foodborne bacteria. These systems, once implemented, will help in the sustenance of high-quality life of elderly persons.

Based on findings of the research, recommendations for caregivers can include institutionalized training on proper elderly care, and improvements in food preparation and hygiene practices. Recommendations can also be made for the elderly on coping with physiological change, emphasis on personal hygiene, and being able to identify gastrointestinal symptoms so that there will be appropriate intervention. Furthermore, taken as a whole, the entire system should be strengthened. The government can get involved in the design of programmes to meet the targeted needs of the elderly population (http://www.monitoringris.org/documents/strat_reg/uneclac1.pdf). A monitoring and evaluation system for the Geriatric Homes can include: risk assessment and upgrade of the current situation

to the accepted recommended standards for the elderly overall health care; specialized training for caregivers; and collaboration with relevant agencies to perform routine tests on samples of meals prepared to test for foodborne bacteria (http://www.monitoringris.org/documents/tools_reg/uneclac1.pdf).

A number of limitations were identified in the study, most of which were beyond the control of the researcher. These include, but are not limited to:

1. Sensitive issues dealt with in the research, which may have made participants reluctant to give an accurate response.
2. High respondent burden when answering questions or misunderstanding of selected questions.
3. High burden on the interviewer- time consuming and high patience required.
4. High number of Alzheimer patients in the majority of Geriatric Homes. The cognitive impairment of these persons makes it a difficult to conduct assessments of any type, and was thus excluded from this study.
5. Only 'reported' behaviour was accounted for in the Food Preparation section, which may have not necessarily represented 'actual' food safety behaviours.
6. Small sample size (n=96), making it difficult to apply findings to the elderly population.
7. Confounding variables were not taken into consideration: family history of disease/genetic predisposition for diseases, types of foods eaten/diet quality, smoking, and physical injury.
8. Causal association was difficult to infer.

Chapter 6 : References

Abbot J.M., Byrd-Bredbenner et al. 2007. 'Comparison of food safety handling behavior self-reported'. *European Journal of Clinical Nutrition*. 63:572-579.

Anderson J.B., T.A. Shuster et al. 2005. 'A camera's view of food safety handling behavior self-reported'. *J Am Diet Assoc.* 104:186-191.

Anderson J.E. and S. Prior. 2007. Nutrition and Aging. Food and Nutrition Series. 9(322).

Arking R. 1998. Human aging. In Biology of aging: observations and principles. 2nd ed. Sinauer Associates, Inc: Sunderland, Massachusetts USA.

Avlund K., A.N. Pedersen, and M. Schorll. 2003. 'Functional Decline From Age 80 to 85: Influence of Preceding Changes in Tiredness in Daily Activities'. *Psychosomatic Medicine.* 65:771–777.

Barrett K.E. 2006. Intestinal Mucosal Immunology and Ecology. In Gastrointestinal Physiology. McGraw-Hill: New York, Chicago, San Francisco.

Basics for food handling. 2006. United States Department of Agriculture (USDA) Food Safety and Inspection Service. Accessed 30 Sep 2009 from http://www.fsis.usda.gov/PDF/Basics_for_Safe_Food_Handling.pdf.

Black A.E., W.A. Coward, et al. 1996. 'Human energy expenditure in affluent societies: an analysis of 574 doubly labelled water measurements'. *Eur J Clin Nutr*. 50: 72–92.

Bookdhu A., N. Badrie, and J. Sookdhan. 2008. 'Consumers' perceptions and awareness of safe food preparation practices at homes in Trinidad, West Indies'. *International Journal of Consumer Studies.* 32:41–48.

Bosshard W., R. Dreher et al. 2004. 'The Treatment of Chronic Constipation in Elderly People: An Update'. *Drugs and Aging*. 21(14):911-930.

Bow E.J. 1998. 'Infection risk and cancer chemotherapy: the impact of the chemotherapeutic regimen in patients with lymphoma and solid tissue malignancies'. *J Antimicrob Chemother.* 41(Suppl D):1–5.

Browne A. Welcome Remarks by the Minister of Social Development at the Public Open Forum on Ageing, City Hall, Port-of-Spain. Breaking News. Accessed 30 Sep 2009 from http://news.bn.gs/article.php?story=20080410110209415&mode=print.

Buzby J. C. 2002. 'Older Adults at Risk of Complications From Microbial Foodborne Illness'. *Food Review*. 25 (2).

CAREC Annual Report 2007. 2007. Caribbean Epidemiology Centre (CAREC). Accessed 17 Oct 2009 from http://www.carec.org/pdf/2007-Annual-Report/ANNUAL_REPORT_2007.pdf.

Cheung B.M.H., K.C.G. Jeng, and Y.J. Lauc. 1999. 'Screening for Diseases in Elderly Persons: The Correlation between Physical Checkup Findings and Chief Complaints'. *Gerontology*. 45:283–288.

Class notes. 2009. HUEC 2015: Food Quality and Safety.

Daily dietary fat and total food energy intake. 1994. Third National Health and Nutrition Examination Survey, phase I, 1988–1991. MMWR Morb Mortal Wkly Rep. 43:116–125.

De Leon et al. 2003. Global handbook on food and water safety. Charles C Thomas Publisher Ltd: Springfield, Illinois, USA.

De Vries J. (ed). 1997. Food safety and toxicity. CRC Press: New York.

Dinh T. and A. Veves. 2005. 'Microcirculation of the diabetic foot'. *Curr Pharm Des*. 11:2301–9.

Disorders of the digestive system. 2005. The AGS Foundation for health in aging. Accessed 17 Oct 2009 from http://www.healthinaging.org/agingintheknow/chapters_ch_trial.asp?ch=47#swallowing.

Everhart J.E., et al. 1989. 'A longitudinal survey of self-reported bowel habits in the United States'. *SpringerLink*. 34(8): 1153-1162.

Foodborne Illness. 2005. Centers for Disease Control and Prevention. Accessed 16 Sep 2009 from http://www.cdc.gov/ncidod/dbmd/diseaseinfo/foodborneinfections_g.htm#consumersprotect.

Food-borne illnesses. 2005. Accessed 17 Oct 2009 from http://www.carec.org/pdf/mobidityreview/8.%20Food-borne.pdf.

FSIS. 1998. USDA Urges Consumers to Use Food Thermometer When Cooking Ground Beef Patties. United States Department of Agriculture and Food Inspection Service, Washington, DC. Accessed 30 April 2005 from http://www.fsis.usda.gov/oa/news/1997/thermopr.htm.

Gerba C.P., J.B. Rose, and C.N. Haas. 1996. 'Sensitive populations: who is at greatest risk?'. *Int J Food Microbiol* 30:113–23.

Hanninen T., K. Koivisto, K.J. Reinikainen, et al. 1996. 'Prevalence of ageing-associated cognitive decline in an elderly population'. *Age Ageing*. 25:201-205.

Helferich W. and C.K. Winter. (eds). 2000. Food Toxicology. CRC Press: Boca Raton, Florida.

Herne S. 1993. 'Food safety monitoring: elderly in private care'. *British Food Journal*. 95(8).

Holt P. (n.d.). 'Diarrhea and Malabsorption in the elderly'. *Gastroenterology Clinics of North America*. 30(2):427-444.

Homes for the Aged. 2007. Society of St. Vincent de Paul Trinidad and Tobago. Accessed 11 Sep 2009 from http://www.svdptt.org/institutions.htm.

Hospedales C. J. 2001. Overview of Health in the Region. Caribbean Epidemiology Centre (CAREC). Accessed 17 Oct 2009 from http://www.carec.org/overview_health.htm.

Jones J.M. 1992. Food safety. 2nd ed. Eagan Press: St. Paul, Minnesota, USA.

Kendall P.A, V.V. Hillers, and L.C. Medeiros. 2006. 'Food safety guidelines for older adults' (invited article). *Aging and Infectious Disease*. 42:1298–304.

Maldonado A., et al. 2004. 'Pre-exposure to high glucose augments lipopolysaccharide-stimulated matrix metalloproteinase-1 expression by human U937 histiocytes'. *J Periodontal Res.* 39: 415–23.

Matthews, D.D. 1999. Food Safety Source Book. Ominigraphics, Detroit, MI.

McGandy R.B., C.H. Barrows, et al. 1966. 'Nutrient intakes and energy expenditure in men of different ages'. *J Gerontol*. 21:581-7.

Ministry of Health Annual Statistical Report 2004-2005. 2005. Ministry of Health Trinidad and Tobago. Accessed 30 Sep 2009 from http://www.health.gov.tt/downloads/DownloadItem.aspx?id=48.

NRA. 2002. ServSafe Essentials. National Restaurant Association, Educational Foundation, Washington, DC.

Nester E.W. et al. 1998. Microbiology of food and beverages. In Microbiology: a human perspective 2nd ed. McGraw-Hill: Boston, New York.

Patrick J.M., E.J. Bassey, et al. 1986. 'Objective measurements of customary physical activity in elderly men and women before and after retirement'. *Q J Exp Physiol*.71:47-58.

Population ageing in the Caribbean- longevity and quality of life. 2004. Monitoring the Regional Implementation Strategy. Accessed 30 Sep 2009 from http://www.monitoringris.org/documents/tools_reg/uneclac1.pdf.

Population ageing in the Caribbean: an inventory of policies, programmes, and future challenges. 2004. Economic Commission for Latin America and the Caribbean. Accessed 30 Sep 2009 from http://www.monitoringris.org/documents/strat_reg/uneclac1.pdf.

Population distribution by age group and sex, 1990-2005 estimates. 2005. Central Statistical Office (CSO) and Caribbean Epidemiology Centre (CAREC). Accessed 17 Oct 2009 from http://www.carec.org/data/2004-caribbean-population-distribution-pyramids/population/trinidad-tobago.pdf.

Redmond E. C. and C.J. Griffith. 2004. 'Consumer attitudes and perceptions towards microbial food safety in the domestic kitchen.' *Journal of Food Safety*. 24:169-194.

Redmond E. C. and C.J. Griffith. 2004. 'Consumer perceptions of food safety risk, control and responsibility'. *Appetite*. 43:309-313.

Robson K.M., D.K. Kiely and T. Lembo. 2000. 'Development of constipation in nursing home residents'. *SpringerLink*. 43(7):940-943.

Schwartz J., R. Levin, and R. Goldstein 2000. 'Drinking water turbidity and gastrointestinal illness in the elderly of Philadelphia'. *J Epidemiol Community Health.* 54:45–51.

Shaheen N.J. 2006. Effects of Aging. The Merck Manual of Medical Information- 2nd edition. Accessed 17 Oct 2009 from http://www.merck.com/mmhe/print/sec09/ch118/ch118j.html.

Small S.A. 1999. 'Selective decline in memory function among healthy elderly'. *Neurology*. 52:1392.

Smith J. L. 1998. 'Foodborne illness in the elderly'. *Journal of Food Protection*. 61 (9): 1229-39.

Spirduso W. W., K. L. Francis, and P. G. MacRae. 2005. Quantity and Quality of Life. In *Physical Dimensions of Aging*. 2nd ed. Human Kinetics: Champaigne, IL, United States.

Talley N.J., et al. 1992. 'Prevalence of gastrointestinal symptoms in the elderly: a population-based study'.
Gastroenterology. 102(3):895-901.

The ageing of the world's population. United Nations Programme on Ageing. (n.d.). Accessed 30 Sep 2009 from http://www.un.org/esa/socdev/ageing/popageing.html.

The Government of the republic of T&T delegate to the international federation: 9th global conference on ageing. 2008. International Federation on Ageing. Accessed 30 Sep 2009 from http://www.ifa-fiv.org/attachments/127_Trinidad%20&%20Tobago%20Sumary%20Report.pdf.

Trinidad and Tobago Computer Society. 2007. Map of Trinidad. Accessed 03 Dec 2009 from http://ttcs.wordpress.com/2007/11/23/more-street-map-information-for-trinidad-added-to-google-maps/.

Trinidad and Tobago Nursing Homes. 2009. Tnt Island. Accessed 11 Sep 2009 from http://www.tntisland.com/nursinghome.html.

Trinidad Homes Elderly People. 2009. Caribbean Online Yellow Pages Accessed 11 Sep 2009 from http://www.caribbeanonlineyellowpages.com/listings_1/1_category_H_6318.html.

Trinidad Nursing Homes. 2009. Online Yellow Pages Accessed 11 Sep 2009 from http://www.caribbeanonlineyellowpages.com/listings_1/1_category_N_752.html.

Tuohy K. M. et al. 2004. Improving gut health in the elderly. In Functional foods, ageing and degenerative diseases. CRC Press: Boca Raton, Boston, New York, Washington, D.C.; Woodhead Publishing Limited: Cambridge England.

Umpierrez G.E, A.E. Kitabchi 2003. 'Diabetic ketoacidosis: risk factors and management strategies'. *Treat Endocrinol.* 2:95–108.

USDA Food Safety and Inspection Service. 1997. Seniors Need Wisdom on Food Safety.

WHO Initiative to Estimate the Global Burden of Foodborne Diseases. 2009. World Health Organization. Acccessed 17 Oct 2009 from http://www.who.int/foodsafety/foodborne_disease/FERG2_report.pdf.

World Population Ageing 1950-2050, Trinidad and Tobago. (n.d.). Population Division, DESA, United Nations. Accessed 30 Sep 2009 from http://www.un.org/esa/population/publications/worldageing19502050/pdf/198trini.pdf.

Chapter 7 : Appendices

7.1 Questionnaire

DEMOGRAPHIC

1. **Age:**
   - ☐ 60-64
   - ☐ 65-69
   - ☐ 70-74
   - ☐ 75-79
   - ☐ 80-84
   - ☐ 85-89
   - ☐ 90-94
   - ☐ 95-99
   - ☐ ≥ 100

2. **Level of education completed**
   - ☐ Never attended school
   - ☐ Less than primary school
   - ☐ Completed primary school
   - ☐ Completed high school
   - ☐ Completed Tech./Voc
   - ☐ Graduated University

3. **Ethnicity**
   - ☐ Afro-Trinidadian
   - ☐ Indo-Trinidadian
   - ☐ Caucasian
   - ☐ Chinese
   - ☐ Mixed

   Other_____

4. **Gender**
   - ☐ Female ☐ Male

CURRENT HEALTH STATUS

5. **Have you been diagnosed with any of the following? *[Select all that apply]***
   - ☐ Hypertension
   - ☐ Diabetes
   - ☐ Heart disease
   - ☐ Gastrointestinal disorder

   Other_____
   - ☐ None of the above

6. **Have you been taking any drugs/laxatives from the past 5 years?**
   - ☐ Yes ☐ No

PHYSIOLOGICAL CHANGES

7. **Have you noticed a change in the following from the past 5 years? *[Select all that apply]***
   - ☐ Change in food/fluid intake
   - ☐ Reduced consumption of food
   - ☐ Decreased physical activity
   - ☐ Decreased muscle strength
   - ☐ Irregular/decreased bowel movements
   - ☐ Difficulty swallowing
   - ☐ Memory loss
   - ☐ Changes in the taste &/smell of foods
   - ☐ Changes in eyesight (wear glasses? :)

   Other_____
   - ☐ No change

EFFECTS OF FOOD ON HEALTH/GI SYMPTOMS

8. **Do you AVOID eating certain foods on your own based on PAST experience/ problems?**
   - ☐ Yes ☐ No

9. **Do you have any food allergies?**
   - ☐ Yes ☐ No

10. **If 'yes' to Q7 or Q8, what are these FOODS?** ***[Select all that apply]***
    - ☐ Shellfish
    - ☐ Fish
    - ☐ Egg
    - ☐ Milk
    - ☐ Peanuts
    - ☐ Wheat
    - ☐ Hotdogs/sausages
    - ☐ Spreads (e.g. cream cheese)
    - ☐ Salads
    - ☐ Juice (_____)
    - ☐ Chicken/Beef/Pork

    Other _____

11. **Have you experienced any of the following SYMPTOMS over the past 6 months? /If 'yes' to Q7 or Q8- what were these SYMPTOMS? *[Select all that apply]***
    - ☐ Stomach discomfort/upset stomach
    - ☐ Abdominal pain
    - ☐ Diarrhea
    - ☐ Diarrhea with blood
    - ☐ Constipation
    - ☐ Fecal incontinence (loss of regular bowel control)
    - ☐ Vomiting
    - ☐ Nausea (feeling to vomit)
    - ☐ Chill and Fever
    - ☐ Headaches
    - ☐ Tiredness
    - ☐ Blurred vision

    Other_____
    - ☐ None ofthe above

12. **Any other symptoms? *[Select all that apply]***
    - ☐ Dry cough
    - ☐ Droopy eyelids
    - ☐ Dry mouth
    - ☐ Difficulty with speech
    - ☐ Difficulty swallowing
    - ☐ Dehydration; chills
    - ☐ Muscle pain
    - ☐ Skin infections

    Other_____
    - ☐ None of the above

13. What do you do when you experience these symptoms?

- Take medication
- Go to the doctor
- Take medication recommended by doctor
- Antacid

Other_____

- Nothing

FOOD PREPARATION PRACTICES

14. How is your food prepared?

- Caregiver
- Myself
- Pre-prepared

Other_____

Storage

15. How are foods stored? *[Select all that apply]*

- Stock room
- In cupboards
- On shelves
- In the refrigerator
- In my room

Other_____

16. What do you do with leftover foods? *[Select all that apply]*

	Place it in the refrigerator immediately after cooking.
	Place it in refrigerator 2 hrs after cooking.
	Allow it to cool and then place it in the refrigerator.
	Let it remain in the oven/counter top for a few hours before placing it in the refrigerator.
	Stored in shallow containers less than 2 inches deep.
	Used within 3 days after storing in the fridge
	Place it in the refrigerator uncovered.
	Leftover food is not stored/Discarded

Cleaning & Separating

17. Do you practice the following when preparing food?: *[Select all that apply]*

	Ensure that raw meats are separated from fruits/vegetables & cooked foods.
	Separate cutting boards are used for meats, vegetables, & breads.
	Wash fruits & vegetables with water before use.
	Wash utensils and clean counter tops before going on to another food preparation.
	Use clean utensils when handling cooked foods.
	Use separate hand and dish towels.

18. What do you use to CLEAN your counter tops/refrigerator/can opener/stove?

	Dishwashing liquid diluted in water, using a dishcloth/sponge
	A solution of clorax/bleach and water, using a dishcloth/sponge
	Disinfectant
	Baking soda

Defrosting & Chilling

19. How are frozen foods thawed/defrosted MOST OF THE TIMES?

- on thecounter top
- in the refrigerator
- in the microwave
- under running water in the kitchen sink
- using hot water in the kitchen sink

20. What is done after foods are thawed from the refrigerator?

- Cooked/reheated immediately
- Refrozen
- Used within 3-5 days
- Consumed without reheating/cooking
- None of the above

21. Do you consume foods from the refrigerator that has been prepared the day before?

- Yes
- No
- Sometimes
- Not sure

Cooking or Reheating

22. How do you reheat your food?

□	Reheat foods in the microwave for 1 minute.
□	Reheat foods in the microwave/stove until it feels hot.
□	Reheat foods in the microwave/stove until it reaches an internal temperature of 165° C.
□	Reheat foods in the microwave/stove to a warm temperature
□	Foods are not reheated

Personal practices & hygiene

23. What do you do with foods that look or smell strange?

□ Discard it
□ Reheat it then consume
□ Consume without reheating
Other_____

24. Where do you obtain your drinking water?

□ Store bought (bottle water)
□ Pipe borne water
□ Filtered water
□ Stored in tanks

25. During food preparation, when do you wash your hands? *[Select all that apply]*

□	Immediately before & during food preparation
□	When changing tasks, such as changing or switching from raw meats to vegetables.
□	After handling soiled utensils
□	After touching hands/face/mouth/hair
□	After using the toilet
□	After touching door handles/other non-food items
□	After coughing or sneezing
□	None of the above

26. How do you wash your hands?

	Yes	***Sometimes***	***No***
Wash my hands quickly with water	□	□	□
Wash my hands for 20 seconds using water	□	□	□
Wash my hands quickly using soap and water	□	□	□
Rub my hands for 20 seconds using soap and then rinse with water	□	□	□
Wash my hands until the soap is completely washed off	□	□	□

7.2 Map of Trinidad

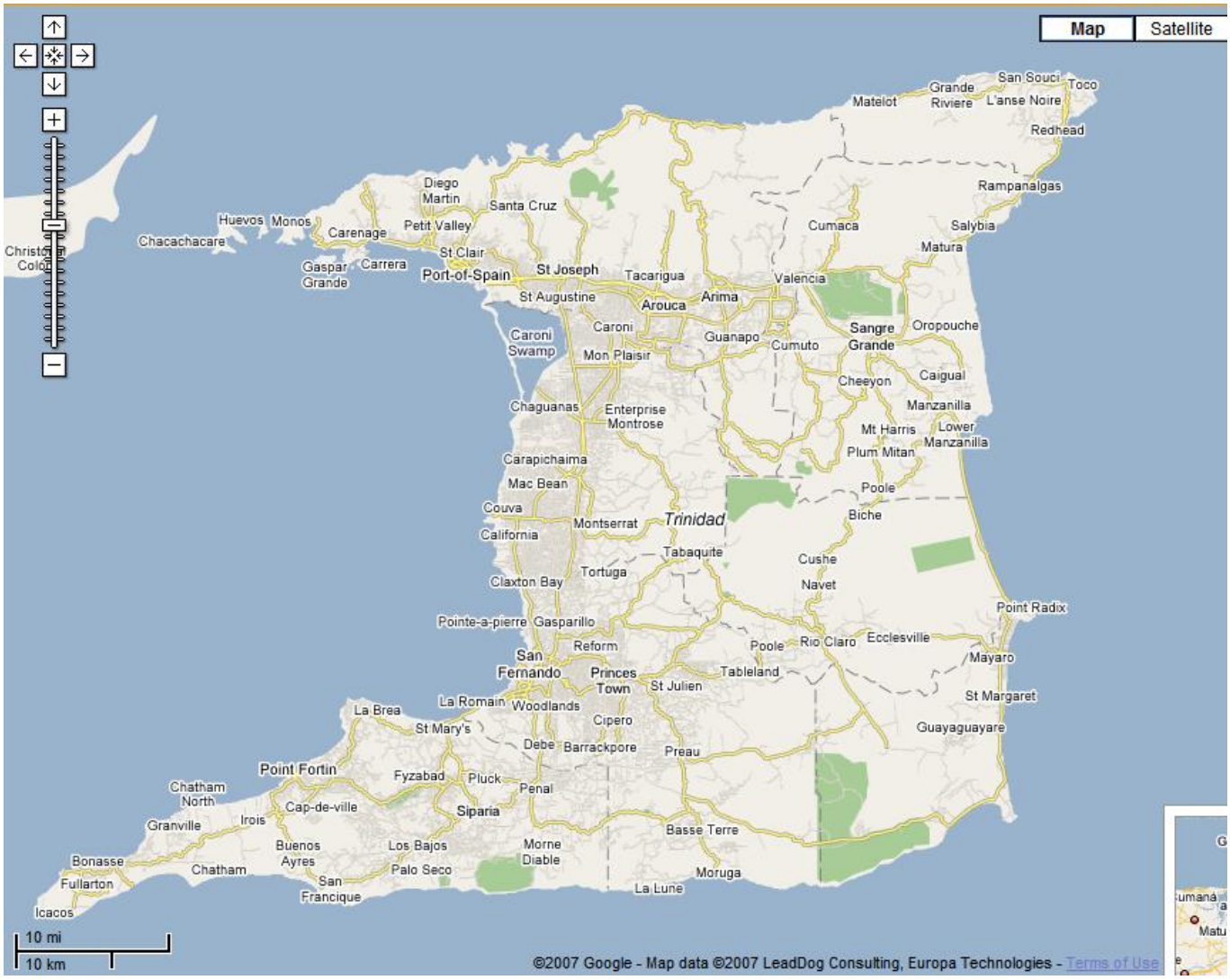

Figure 7.1: Map of Trinidad
(Source: Trinidad and Tobago Computer Society)