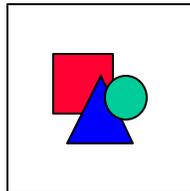


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**ANALYSIS BY GENDER OF DIETARY BEHAVIOR  
AND OF EXERCISE IN THE CARIBBEAN**

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# **ANALYSIS BY GENDER OF DIETARY BEHAVIOR AND OF EXERCISE IN THE CARIBBEAN**

## **SUMMARY**

This study aims to establish guidelines for effective health and nutrition promotion interventions in the subregion. Male and female responses will be compared at each stage. The study will utilize three of the core constructs of the trans-theoretical model: the stages of change (the central organizing construct); decisional balance; and self-efficacy in examining fruit and vegetable consumption and exercise participation among adults over 18 years old. Four Caribbean countries will be studied: Belize, Jamaica, Trinidad & Tobago and St. Kitts & Nevis. The project will be coordinated and administered by the Caribbean Food & Nutrition Institute (CFNI).

Differences in assessed intakes and exercise behaviors, and psychosocial determinants between stages of change for each behavior will be examined. Qualitative and quantitative methods will be used to achieve the objectives. The qualitative component will involve a series of focus group discussions in each country. A questionnaire will be also administered in each country to a random sample of adults. Several regional institutions will participate in the planning, execution and evaluation of this study.

## **INTRODUCTION**

There is heightened concern within the Caribbean regarding the need to implement comprehensive health promotion programs aimed at the prevention and control of chronic diseases (1). Heart disease, hypertension, diabetes and cancer are currently the major conditions affecting the health of adults in the Caribbean and impose a significant burden in terms of long-term illness, disability and death (2).

The significance of these conditions is reflected in prevalence rates. Diabetes-related deaths in 1994 had increased 147% over the 1980 level and represented the third leading cause of loss of years of potential life among women and tenth among men (3). The English-speaking Caribbean has the highest mortality from this cause in all the subregions of the Americas.

With the reduction of preventable deaths, especially under 15 years, the relative importance of mortality in older age groups has increased and, as a result, chronic non-communicable diseases have become more prominent in mortality profiles.

But little research has been done in utilizing theoretical models to maximize strategies for behavioral intervention. This study proposes to establish the determinants of effective health promotion strategies in the Caribbean context. Of great concern is the increasing prevalence of diabetes and the resultant effect on health care costs and individual well being and productivity (3).

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The increasing trend in obesity is considered to be a major contributory factor in chronic disease prevalence in the region. The rising obesity levels, particularly among women, is attributed to changes in traditional diets and the adoption of relatively more sedentary lifestyles. In some countries more than half of adult women and more than a quarter of males are reported to be obese (4). Data from Barbados highlight the importance of obesity as a risk factor in chronic diseases (5).

There is scientific consensus that dietary change interventions are a necessary component of health promotion programs to prevent cardiovascular diseases and cancer (6). A decrease in total fat intake has been consistently recommended for the reduction of chronic disease risk (6,7). A recent review of the scientific evidence of the causal links between food, nutrition and cancer estimated that between 30% and 40% of all cases of cancer are preventable by feasible and appropriate diets, especially the consumption of substantial and varied amounts of fruits and vegetables, and by physical activity and maintenance of appropriate body weight (7). Studies also suggest a protective effect from fruits and vegetables that may be attributable to multiple factors including a variety of antioxidants and anticarcinogenic compounds (8-10).

These scientific findings have prompted a re-examination of the food, nutrition and health situation in the contemporary Caribbean. Recommendations to reduce chronic disease risk call for change in behavioral risk factors, such as diet, (by reducing intake of meat and meat products and increasing fruit and vegetable consumption), physical inactivity and smoking (11).

Current trends in compliance with disease prevention guidelines remain uncertain due to a dearth of research on lifestyle behaviors and the impact of intervention efforts. Data on physical activity levels in Jamaica and Trinidad & Tobago indicate that individuals may be experiencing difficulty in initiating and sustaining desired exercise behavior. A national study recently conducted in Jamaica revealed that only 21.6% of the sample participated in planned exercise (12). In Trinidad, participation rates were even lower, with 16.6% of men and 5.9% of women reporting that they were taking regular exercise (13).

Low rates of compliance with dietary and exercise recommendations are also reported in the USA and Europe, in spite of widespread publicity and educational programs (14-16). It is increasingly recognized that studying the processes of developing and maintaining healthy habits is as important as the health effects of these habits. Greater attention is being given to the understanding of factors underlying the process of behavior change in the planning of health promotion interventions. Consequently there is considerable interest in the application of health behavior theories to inform the selection of psychosocial factors and strategies, that facilitate behavior change.

## **RATIONALE**

There is little research in the English-speaking Caribbean that examines the application of health behavior theories in the selection, design and evaluation of health promotion interventions. Additionally,

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cultural differences in beliefs and attitudes often restrict the applicability of theoretical models. TTM, however, has demonstrated its applicability in health promotion across a diversity of populations and cultures. We therefore propose to use this model to examine prospects for behavioral interventions in the Caribbean context.

Rather than relying on final outcomes as a primary change indicator, as is often the case, measuring movement through the stages is a novel and potentially useful method of determining program impact. It is against that background that this study aims to help diminish the usual frustrations experienced by over-stressed, resource-starved Caribbean nutrition communicators. It seeks to provide nutrition educators with the information to match interventions according to people's current situation, rather than to expect participants to come into action-oriented programs for which they are neither motivated nor prepared.

However, some specific output indicators will comprise:

1. Population profiles including socio-economic and demographic variables (age, ethnicity, gender, education, marital status, and occupation); health status; media preference and habits in relation to diet and physical activity.
2. Population matrix based on similar studies elsewhere (17-25), incorporating data in the above profile, which facilitates the tracking of movement across stages and providing feedback for improving the interventions.

It is proposed that these will be used to effectively analyze and assess existing and potential internal behavior dynamics and environmental barriers and supports. This assessment will then be used to target and package behavior change messages and strategies.

## **THEORETICAL FRAMEWORK**

Studies using the model to analyze dietary behavior have found that the stages correlate with assessed dietary intakes of fat, fiber and fruits and vegetables. These studies showed a decrease in fat consumption and increases in fruit/vegetable or fiber intakes as stages progressed (17, 26-28). Stage correlations with levels of exercise adherence have also been found (29). The relative importance of psychosocial determinants like attitudes, social influences, and self-efficacy expectations has been found to differ across stages. For example, social support, and self-efficacy were more positive among subjects in the action and maintenance stages for increasing fruit and vegetable intakes than among subjects in earlier stages (18). Perceived barrier scores, however, were highest in the pre-contemplation stage. Such a crossover of attitudinal variables across stages has been shown to be quite typical for other health behaviors, including exercise participation (18).

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The trans-theoretical framework also identifies processes of change relevant to the different stages. Prochaska and colleagues have demonstrated commonalities among stages and processes of change across a number of problem behaviors including diet (26). An assumption of the model is that people use different processes in different stages and, therefore, benefit most from stage-tailored interventions that emphasize the appropriate change processes and influence decisional balance and self-efficacy, to move them from the early stages to action and maintenance (30).

The growing scientific confirmation of the utility of the Trans-theoretical Model is leading to an expansion of its role in the field of health promotion (31).

It is important in attempting a study of this nature to note the commanding presence and power of the mass media in contemporary societies, and their influence in the behavior choices of the populations concerned. This is especially so given the western lifestyles that have become increasingly media saturated. In assessing and targeting existing and potential environmental supports and constraints, therefore, an analysis will be made of the media's role in shaping the perceptions, concerns and attitude regarding diet, exercise and obesity and using the information gleaned to assist in locating the various population segments under study within the various change stages.

Many different theories of human behavior and behavior change have been used to understand, explain and predict health behavior. However, no one explanation captures the scope of change necessary to achieve even one of the dietary guidelines. Indeed, it has been suggested that rather than one "grand theory" a set of theories aimed at specific populations and circumstances may be more useful (32). The Trans-theoretical Model (TTM) of Behavior Change, also known as the 'Stages of Change Model', developed by Prochaska and DiClemente, emerged from a comparative analysis of leading theories of psychotherapy and educational (trans-theoretical) both to describe a systematic progression of changes (stages) and to explain the associated behaviors necessary to achieve change. The model construct, developed during their work with psychotherapy and addictive behaviors such as smoking and alcohol, was subsequently shown to have application to a wide range of health promoting practices including dietary and exercise behaviors (26,33).

TTM is based on the premise that behavior change is a process, not an event, and individuals have varying levels of motivation, or readiness to change. The model construes change as a process involving progress through a series of six stages. While the stages are sequential, individuals do not necessarily progress through the stages in linear fashion, but rather may relapse and repeat. This progression through stages has been described as a spiral. The five basic stages include: *pre-contemplation* (unaware or not thinking about making changes), *contemplation* (seriously thinking about changing, but no commitment to action), *preparation* (intend to take action in near future and may have taken some inconsistent action in the recent past), *action* (modify behavior, experiences or

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environment to overcome problem, behavior change relatively recent) and *maintenance* [work to prevent relapse, maintain behavior change over a "long" time] (17).

## **HYPOTHESES**

Against that background, therefore, the study hypothesizes that

1. There is a significant difference in readiness for behavior change between men and women in the Caribbean.
2. Obese adults are significantly more inclined to change behavior regarding healthy eating and exercise behavior than non-obese adults.

## **RESEARCH OBJECTIVES**

### ***GENERAL***

To establish guidelines for the application of theory-based health promotion strategies in the development of interventions for the promotion of healthy diet and exercise behaviors.

### ***SPECIFIC***

1. To assess and compare the various stages of readiness between male and female adults for increasing intakes of fruits and vegetables; and for adopting regular physical activity.
2. To examine the relationship between stage of change for fruit and vegetable consumption with psychosocial factors (self-efficacy, pros and cons of changing, and social support) and between obese and non-obese adults.
3. To examine the relationship between stage of change for adopting regular physical activity with psychosocial factors and between obese and non-obese adults.
4. To examine media influence on perceptions/attitude regarding purchasing and consumption habits (food, diet supplements, exercise aids) and activity level.

## **METHODS**

### ***STUDY DESIGN***

Both qualitative and quantitative research methods will be employed in tracking the various stages of readiness for the recommended behaviors under study. Information will be gathered in two phases: (1) focus group study; (2) cross sectional survey.

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**PHASE 1: QUALITATIVE RESEARCH USING FOCUS GROUP DISCUSSIONS**

A series of 8-10 focus group discussions will be held in each country depending on disaggregation factors in order to:

- (a) probe in-depth responses from the population under study;
- (b) help develop the questionnaire instrument for the cross-sectional study;
- (c) help identify barriers and benefits to behavior change.

The composition of the groups will be based on socio-economic, gender, age, area and ethnicity characteristics. Because, as indicated above, obesity is more prevalent among women, slightly more women's groups will be chosen.

Focus groups will be comprised of an estimated 8 to 10 persons each. Estimated composition will be as outlined in Table 1 and participants will be recruited using a screener addressing the variables. Each session will last for approximately one-and-one-half (1 1/2) to two (2) hours, and be audio tape-recorded. Note-takers will also be trained and employed to make session notes.

A topic guide (see outline below) will be designed to guide discussions. This instrument will represent the basic framework according to which issues will be reviewed, but specific topics and details addressed will vary between groups. Sessions will also variably comprise use of other participatory methods to elicit responses relating to perceptions, attitudes, values, behaviours e.g. *content analyses, diagramming, ranking, trends analyses*.

**Table 1. Estimated focus group composition for each country**

		<i>Focus Group #'s</i>									
		1	2	3	4	5	6	7	8	9	10
<b>A.</b>	<b>Sex</b>										
	Female	x	X	x	x	x		x			
	Male						x		x	x	x
<b>B.</b>	<b>Location</b>										
	City	x	X	x	x	x	x				
	Other main town / rural							x	x	x	x
<b>C.</b>	<b>SES</b>										
	ABC1	x			x		x			x	
	C2DE		X	x		x			x		x
<b>D.</b>	<b>Age (years)</b>										
	18-29	x	X					x		x	
	30-44			x	x		x		x	x	
	45-59						x				x
	60 +					x					x
<b>E.</b>	<b>Ethnicity</b>										
	African / Creoles										
	Indian / Mestizo										
	Other										
<b>F.</b>	<b>Obesity stage</b>										
	Moderate	x		x		x	x	x	x	x	x
	Advanced		x		x	x			x	x	x

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## ***DATA MANAGEMENT & ANALYSES***

Collected data will be partially transcribed to facilitate reporting, questionnaire development, and that for future intervention programmes. This process will be ongoing throughout the conduct of sessions. Attempts will be made wherever possible, to have transcriptions done by nationals and completed in-country, taking into consideration factors relating e.g. to *dialect*.

Data analyses will utilize transcriptions, note-takers' and moderator's notes. Analyses will be objectives-based, constructed relative to key variables viz. *country of origin, sex, geographic location, socio-economic status, age, ethnicity, and stage of obesity.*

### ***Examples of issues to be examined for variables***

- |                                   |   |
|-----------------------------------|---|
| <b><i>Country of origin</i></b>   | <ul style="list-style-type: none"> <li>o Cultural beliefs</li> <li>o Media practices / coverage / usage patterns</li> <li>o (cultural) food consumption patterns</li> <li>o (cultural) norms &amp; acceptance of body types / images etc.</li> </ul>  |
| <b><i>Sex</i></b>                 | <ul style="list-style-type: none"> <li>o Within- and between-sex differences in e.g. <ul style="list-style-type: none"> <li>o attitudes, perceptions, practices, values</li> <li>o perceptions of actual, and ideal body-types</li> <li>o interest in, and readiness to change diet and lifestyle</li> <li>o interest in, and access to relevant information</li> </ul> </li> </ul> |
| <b><i>Geographic location</i></b> | <ul style="list-style-type: none"> <li>o Access to and use of available food types</li> <li>o Normal food consumption patterns</li> </ul>   |
| <b><i>SES</i></b>                 | <ul style="list-style-type: none"> <li>o Within- and between SES differences in interest in, and consumption of, different food types</li> </ul>  |
| <b><i>Age</i></b>                 | <ul style="list-style-type: none"> <li>o Factors influencing attitudes, values, beliefs, practices at different ages</li> </ul>   |

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- o Relative influence of peer groups
  - o Estimates of self-efficacy and related factors
  - o Groups providing social support, and perceived impact
  - Ethnicity***
    - o Normal patterns of food consumption relative to other ethnic groups within-country
  - Obesity stage***
    - o Relative interest in perceived impact of diet and lifestyle change, based on stage of obesity
    - o Relative perceptions of peers e.g. pressure, influence

## ***UTILITY***

Examples of the benefits to questionnaire development of earlier focus group discussions, include the following:-

- explore the range of issues perceived to be important by the target groups;
- explore framework within which relevant issues assessed/(analyzed) by target groups;
- provide key questions to be included in the instrument;
- explore design/comprehension issues related to e.g. concepts, words, phrases;
- determine best response categories for key questions;
- identify sensitive issues/areas e.g. with need for more careful design administration, and/or additional probing.

Focus groups will also provide an in-depth analysis and report of relevant issues.

## **PHASE 2 – CROSS-SECTIONAL SURVEY**

A household-based cross-sectional survey will be carried out in each of the four countries among adults aged 18 and over. Selection of individuals will be done using a two-staged sampling design. First, a stratified random sample of Enumeration Districts (ED), the primary sampling units, will

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be selected, using area as the stratification factor. Enumeration districts are stratified by urban/rural areas in the four countries. At the second stage, households will be selected either using the systematic random procedure or simple random selection of households from each selected ED. This will be based on the availability of list frames of households in each country. Trinidad and Tobago for example, could use simple random selection of households since a list frame of households per ED is available. One person per household will be randomly selected for interview.

### ***OPERATIONAL DEFINITION***

Face to face interviews will be conducted among household members using a structured questionnaire. Descriptions of the survey items and scales follow:

- Demographic Characteristics which includes age, ethnicity, gender, education, marital status, occupation , employment. These will function as some of the independent variables
- Obesity status: weights and heights will be measured for calculation of the BMI. The recent WHO classification of BMI will be used to determine overweight and obesity. Waist and hip measurements will also be taken, to calculate the waist/hip ratio. The WHO cut-off points for male and females will be used in this study.
- Chronic Disease Status: Information on obesity and a diagnosis of diabetes, hypertension, heart disease or cancer. This will be based on diagnosis made by a health practitioner.
- Fruit and Vegetable Intake: A short validated food frequency instrument will be used as the core measure of fruit and vegetable consumption. This instrument will be adapted from previous ones used by CFNI. The questionnaire will ask how often the respondents ate different types of fruits, vegetables and 100% juices during the past month. Eight response options will be given: 3 or more times/day; 2/day; 1/day; 5-6/week; 3-4/week; 1-2/week; 1-3/month, and rarely/never. Intakes will be assessed by calculating frequency of consumption of each item. Then, these will be added to determine total daily servings for each category.
- Exercise Behavior: Information will be sought on exercise participation (type, frequency, duration and intensity to be specified). The measure will be a modification of the Godin Leisure –Time Exercise Questionnaire. (34) This questionnaire has been validated elsewhere and found to generally correlate moderately with other measures of physical activity. On this instrument, participants will be asked to report type, frequency and duration of vigorous and moderate physical activities during the previous week. An exercise score will be calculated by multiplying each reported exercise session by its metabolic (MET) value and summing the result.

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- **Media Influence:** Three survey items will ask about respondents' interest in obtaining information on diet and exercise; their sources of information on the two topics and their rating of the three most influential sources.
  - **Stage of Change:** Stage of readiness to increase the consumption of fruits and vegetables will be measured using a series of four questions developed for research projects targeting adults in the US (28). Based on the responses to the items, respondents will then be categorized as being in one of the following stages based on the transtheoretical model:
    - (1) Pre-contemplation (not thinking about increasing fruit and vegetables intake),
    - (2) Contemplation (thinking about increasing fruit and vegetable intake within the next 6 months),
    - (3) Preparation (planning to change fruit and vegetable intake within next 30 days coupled with some approximate behavior),
    - (4) Action (eating 5 servings of fruit and vegetables per day for 6 or less months),
    - (5) Maintenance (eating 5 servings of fruit and vegetables for more than 6 months).
  - Stage of readiness to adopt regular exercise patterns is another dependent variable to be studied. Stage of exercise adoption will be assessed using a five-item ordered categorical scale that is theoretically based on the transtheoretical model. Among adult samples, the ordered-categorical measurements approach has evolved as the preferred stage of exercise assessment technique (27,35). On this scale, the precontemplation through maintenance items will, respectively, state: "At present, I do not exercise and I do not intend to start in the next 6 months"; " At present, I do not exercise but I have been thinking about starting within the next 6 months"; "At present, I exercise but not regularly, but I am planning to start to do so in the next month (30 days)"; "At present, I exercise regularly, but I have only been doing so within the last 6 months"; " At present, I exercise regularly and have been doing so for longer than 6 months" Subjects will be asked to choose the one statement that best describes their current exercise habits. "Regular exercise" in this study will be defined as "at least ½ hour on 3 or more days a week"
  - **Self Efficacy:** Self efficacy for increasing fruit and vegetable intake and exercise participation will be assessed separately. In each case, the subjects will be asked to evaluate their degree of confidence in their ability to practice the specific behavior in three situations: positive social situations that reflect a positive feeling plus a social aspect; negative/affective situations, and difficult situations that refer to situations where performing the behavior might be inconvenient. The items used to measure self-efficacy are adapted from studies reporting acceptable reliabilities and modified to ensure relevance to a Caribbean sample.(36-38). Responses will be measured on a five-point Likert scale with assigned values of 1=Not confident through 5=totally confident. Values for 10 items will be summed to create a self-efficacy score for increasing fruit and vegetable consumption, which may range from 10 to 50. Values for 8 items will be summed to create a self-efficacy score for exercise participation, which may range from 8 to 40. Higher scores will indicate a higher level of behavior-specific self-efficacy.

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- **Decisional balance:** The decisional balance section will include items that represent the pros (positive perceptions) and cons (perceived barriers/avoidance) of each target behavior. Subjects will be asked to rate how much they agree or disagree with the statements using a five-point Likert scale (1=Strongly disagree through 5=Strongly Agree). The decisional balance for fruit and vegetable consumption will include five items representing positive perceptions and five, representing avoidance. The decisional balance for exercise will include eight items representing positive perceptions and eight, representing avoidance. The items used to measure decisional balance are selected on the basis of theory(18,33) or adapted from studies reporting acceptable reliabilities and modified to ensure relevance to a Caribbean sample(39-41). Values for the items will be summed to create the pros and cons scores, respectively, for each behavior. The higher the score, the higher the perceived benefits or perceived barriers.
  - **Social Support:** Subjects will be asked how frequently family and friends provided the type of support described in 7 items related to increasing fruit and vegetable intakes, and exercise participation, respectively. Items were adapted from previous studies (42) A 4-point response scale will be used with assigned values of 1=Never through 4=often. Values for the items will be summed to create a social support score for each target behavior. The range in each case will be from 7 to 28, higher values representing greater social support.

The questionnaire will be revised based on the findings of Phase 1 (focus group discussions) of the study. During the pre-testing of the instrument, the test-retest reliability of the self-report measures will be established by administering the questionnaire to a sub-sample of 20 persons and repeating the interviews 1 week later.

## **UNIVERSE OF THE STUDY, SAMPLE SELECTION AND SIZE, UNIT OF ANALYSIS AND OBSERVATION, SELECTION CRITERIA**

### ***STUDY SITES***

The study will be conducted in four countries: Belize, Jamaica, Trinidad & Tobago, and St Kitts and Nevis.

Belize, the largest of the four countries, is the only English-speaking country in Central America and is similar to Caribbean countries in culture, politics and economy. Its population is made up of a number of ethnic groups, with the Mestizo (Spanish and indigenous peoples) and the Creoles (African and European) being the predominant groups, representing approximately 70% of the population. Jamaica, located in the northern Caribbean, is the largest of the English-speaking Caribbean islands while St Kitts, a small island of 176.2 sq. km occupies the northern part of the Leeward Islands chain. In both St. Kitts and Jamaica, the population is predominantly of African descent. The twin-island state of Trinidad & Tobago is situated at the southern end of the Caribbean chain of islands; its population

consists of almost equal proportions of African and Indian descent, approximately 40% each with the remaining 20% made up mainly of persons of mixed ethnicity.

Selected demographic and socioeconomic indicators related to women health and development for the countries are given in Table 2. The information indicates that the potential respondents will have more than likely completed secondary education. The indicators also point to varying socio-economic conditions, which, together with the cultural influences of ethnicity in the four countries, define the particular contexts in which the everyday behaviors that affect health take place.

**Table 2 - Selected Demographic and Socioeconomic Indicators Related to Gender, Health and Development in Countries Selected for Proposed Study.**

Country	Population	Female life expectancy at birth in years (1990-1995)	Gross Nat. Product per capita in US\$ (1993)	Human Dev. Index Ranking	Female second school enroll. As % of male enroll. (1990)	Labor force % female >15 yrs (1994)	Female headed households (%)
Belize	222,000	75.0	2,450	29	...	35	(25)
Jamaica	2,527,600	75.8	1,440	88	113	68	45
Trinidad & Tobago	1,259,971	74.0	3,850	39	102	34	25
St. Kitts	43,530	69.0	4,410	37	...	...	45

### ***POPULATION AND SAMPLE SIZE***

The target population for the study is all adults aged 18 years and over within each of the 4 countries. The size of the sample will vary by country.

Sample size is calculated based on the formula:  $n = t^2 \times p(1-p)/d^2$

Where: t= level of probability that the true percentage or prevalence is within the chosen value of "d" =1.96

p= estimate of the percentage of parameter under study

d= level of precision required of results ( $\pm 4\%$  used in this calculation).

Studies show that planned exercise is practiced by 22% of Jamaicans and 12% of Trinidadians; A national health survey carried out in Trinidad and Tobago found that 15.1% of persons in low socio-economic groups and 22% of those in high socio-economic groups are consuming green vegetables; Recent studies among the Jamaican population found 10% and 25% of males and female respectively presenting with BMI values  $>30$ . Among Trinidadians 20% and 40% of men and women are obese. Based on calculations using these parameter estimates, the largest sample calculation was selected and adjustments made.

The results of this calculation estimates a sample size based on the selection of a simple random sample. Therefore adjustments must be made to account for clustering, stratification, and further disaggregation during analysis. The design effect (which will account for some amount of clustering) was thus calculated using the formula:  $1+(n_2-1)p$ , with  $n_2$  =number of households to be selected from each ED (15 was used in this calculation) and  $p$ = the proportion of variation due to EDs

Based on available data on exercise patterns, number of persons in Kingston Metropolitan Area, other towns and rural areas among Jamaicans,  $p$  was determined and the design effect calculated to be between 1.5 and 3. A 25% non-response rate is also estimated and used in the final sample determination. Costing and recruitment of interviewers are also considered

Final samples are as follows:

Country	EPI-Info sample size * design effect * non-response	Total Households to be visited	Total responses expected
Jamaica	$504*3*1.25$	1900	1512
Trinidad and Tobago	$576*2*1.25$	1450	1152
Belize	$576*1.5*1.25$	1100	864
St Kitts/Nevis	$576*1.5*1.25$	1100	864

### ***SAMPLE STRATEGY AND SELECTION***

In each country assistance in selection of the sample is being sought through the statistical unit of the planning department. Within each country, sample will be selected based on the following procedure:

Stage 1: Selection of a stratified random sample of enumeration districts (ED) stratified according to urban/rural areas. Enumeration districts are small geographic divisions grouped for the main purpose of data collection during census taking. The size of each ED is determined primarily by the number of households, about 100-150, with urban EDs containing a larger

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number of households compared to the rural ED. The number of EDs will be selected proportionate to size of the population of each strata. Thus for example, 126 EDs will be selected in Jamaica, proportionate to the population size of the Kingston Metropolitan area (33.75%), other towns (22.5%) and rural areas (43.75%). In Trinidad, 97 EDs will be selected and 74 in Belize and St Kitts/Nevis.

Stage 2: Households within each ED will be systematically selected. Fifteen (15) households will be selected from each ED. Using maps provided by the statistical departments, communities will be identified and the number of households estimated per ED. On the other hand, if a sample frame of households already exists for EDs those will be used. A starting point will be determined randomly and thereafter, every *n*th household, depending on the number of households within the ED, will be selected. If no one is present at home, the next house in the original order will be selected. An apartment building will be treated as several households. One person per household will be interviewed.

### ***SELECTION CRITERIA***

Only individuals who are 18 years and older will be selected for participation in the study. The following persons will be excluded from the study:— pregnant women, and bed-ridden persons with chronic disabilities.

### ***DATA COLLECTION PROCEDURES,***

Prior to interviews, investigations will be made to determine the appropriate point of contact for gaining access into each community. The assistance of community leaders, the Ministry of Health or other appropriate group or persons will be sought.

Interviewers will be provided with maps of the communities, with starting points specified. Appropriate introductions will be made to any eligible household member. If dwellings contain more than one household, they will be listed, and random selections made.

The person selected for interview will be 18 years old or older and is the last person to celebrate a birthday in the household. If that person refuses to be interviewed, the interviewer will proceed to the next household in the prescribed sequence. Return visits will be made if the respondent is unavailable at the time or not at home.

Face to face interviews will be carried out among individuals within the homes by trained interviewers. Specific instructions pertaining to the questions will be placed on questionnaires for interviewers to follow. Otherwise, the interviewer guide will contain detailed instructions and will be

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used for referral by the interviewer. Interviews will be conducted individually and privately in or around the household.

Following each interview, individuals will be weighed and measured. Measurements will be recorded on the questionnaire in the space provided. Standard weights will be given to each interviewer to check scales regularly for accuracy. Interviews and measurement should take about 40 minutes per person.

Non response and empty homes will be noted. Reasons for non-response will be solicited.

### ***TRAINING***

Intensive training will be done in each country using the same guidelines and same training officers. Any variation in each country will be noted. Interviewers will be recruited and trained in 5-day workshops. The following will be covered:

- using maps to locate houses
- gaining access to communities
- conducting interviews and recording information on each section of the questionnaire
- decisions regarding revisits to households and number of revisits
- intensive training in the 5 areas of behaviour change
- measuring heights and weights
- handling foreseeable difficult interview situations
- pre-testing questionnaire

### ***DATA COLLECTION INSTRUMENTS***

The survey will utilize a multi-sectioned questionnaire (see appendix2) containing mostly structured questions, on: demographic information, a focused fruit, vegetable and fat food frequency; chronic disease status; exercise patterns; self-efficacy rating; support rating; Stage of readiness;

The sections on stage of readiness, self-efficacy, support rating will be developed by adapting previously used questionnaires.

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Scales (bathroom) and tape measures will be provided by the survey for each interviewer for measuring weights, heights, hip and waist measurements. A pre-determined weight will be carried and used to check scales frequently for continued accuracy.

### ***PRE TESTING***

Pre-testing of the instrument will be done among approximately 100 persons not participating in the survey. The wording of the questions will be checked along with possible response categories, the appropriateness of questions and the possibility of including more specific questions. The mean length of the interviews will be recorded.

### ***DATA QUALITY CONTROL***

The survey will provide 1 field supervisor for every 5-10 interviewers. Field supervisors will be readily reached by the interviewers in order to answer and clarify questions and situations in the field. Supervisors should periodically visit interviewers while collecting data to ensure accuracy, adherence to procedures, and a reduction in interviewer bias. At the end of each week, completed questionnaires will be checked by supervisors for completeness and accuracy. Problems will be sorted out in the field. Checked questionnaires will be brought to a central office for storage in preparation for any necessary pre-coding and data entry.

### ***DATA ANALYSIS***

The SPSS statistical software (Ver 8.0) will be used for data entry and analysis. The main outcome variables are stage of change for fruits and vegetables, and stage of change for exercise participation which will be computed based on pre-determined criteria. These are categorical variables with 5 categories. Following descriptive statistical analyses for the outcome variables, associations with demographic variables, disease status, obesity status, and attitudinal factors will be performed by country, using chi-squared statistics.

Univariate and multivariate analysis of variance will be conducted on fruit/vegetable intake, exercise frequency, pros, cons and self-efficacy.

Linear regression analyses with fruit and vegetable intake and hours/week spent exercising as the outcome variables will be compared with psychosocial variables, BMI, W/H ratio, knowledge. Multiple regression models will be built to determine the effect on the outcome.

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