STEPS ARUBA 2006: Risky Living

An analysis of the risk factors underlying the main chronic diseases in Aruba

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Preface

The STEPS Aruba 2006 survey was conducted from October to December 2006 with the principal aim of monitoring behavioral risk factors for chronic non-communicable diseases on Aruba. For the purpose of this survey, the '*WHO STEPwise approach to chronic disease risk factor surveillance*' was adopted. STEPS Aruba 2006 was a successful inter-departmental cooperation between the Department of Public Health of Aruba (represented by the Unit of Epidemiology and the National Laboratory) and the Central Bureau of Statistics Aruba. Technical assistance was provided by the Netherlands Interdisciplinary Demographic Institute (NIDI).

In this second publication of the results of STEPS Aruba 2006, the common modifiable and non-modifiable risk factors underlying the major chronic diseases will be discussed. More publications will follow with in depth analyses on intermediate risk factors and national and international comparisons on other important health topics.

We thank the research team for their efforts in making the STEPS Aruba 2006 survey into a success, and especially Mrs. Desiree Helder, PhD., for writing this report, and Mrs. Marjolene van der Biezen-Marques, BSc, for her technical assistance.

Drs. Ing. M. Balkestein
Wnd. Directeur Centraal Bureau voor de Statistiek

Highlights

In this second publication of the results of STEPS Aruba 2006, common modifiable and non-modifiable risk factors underlying the major chronic diseases are discussed. The current publication follows a Data Book published in September 2007 where basic tables were presented on a number of topics investigated during STEPS Aruba 2006.

Modifiable risk factors investigated were: unhealthy diet, physical inactivity, alcohol misuse, and tobacco use. Overall, the results revealed remarkably high levels of risk factors in those interviewed, including well below recommended consumption of fruits and vegetables, and physical inactivity. In addition, the alcohol consumption of the majority of individuals who reported having used alcohol in the month prior to the survey could be categorized as binge drinking, with all the high risks involved for public health, and well-being. Where tobacco use was concerned, the results revealed that some 12 percent of individuals interviewed smoked daily, however, only one percent of individuals reported being exposed to second-hand smoking at home or at their workplace.

Non-modifiable risk factors included: age, gender, and heredity. The results showed that as age progressed, individuals tended to have healthier diets, in the sense that the consumption of fruits and vegetables increased, and the frequency of consumption of snacks, meals not prepared at home, and soft drinks, decreased. However, as age increased, individuals were less physically active, and reported suffering significantly more often from raised blood pressure, and raised cholesterol. Where gender was concerned, the results showed that men were significantly at higher risk given that they had a less healthy diet, and they consumed significantly more alcohol and used significantly more often tobacco on a daily basis. On the other hand, women reported significantly more often suffering from a number of chronic health conditions, such as migraine, cancer, allergy, varicose vein, psychological problems, etcetera, than men. Where the role of heredity in the prevalence of chronic conditions was concerned, the results indicated that where high blood pressure and cancer were concerned, there was a significant relationship between the chronic disease condition of individuals interviewed and that of their immediate relatives.

Summarizing, in total, sixty percent of those interviewed could be categorized as being at raised risk of developing chronic non-communicable diseases. Groups at particular high risk were: men between 25 and 44 years of age, women not currently employed, individuals between 45 and 64 years of age, and individuals born on Aruba. These groups should be kept in mind when planning intervention programmes directed at the prevention and/or control of chronic non-communicable diseases. For a detailed description of the methodology used and the results of the statistical analyses performed, you are invited to read the report.

INTRODUCTION

- The chronic disease situation worldwide
- The chronic disease situation in Aruba
- Risk factor surveillance
- The World Health Organization model

Chapter 1

Chapter 1. Introduction

1.1 The chronic disease situation worldwide

Chronic diseases are diseases of long duration and generally slow progression (World Health Organization (WHO). The term “non-communicable diseases” is used to make the distinction from “communicable” or infectious diseases. In this paper the term “chronic non-communicable disease” will be used to denote a long-lasting or recurrent disease that is serious in nature and, if not properly managed or controlled, can leave residual disabilities that can have a profound impact on the quality of life of people suffering from them.

Chronic non-communicable diseases are the major causes of death worldwide. According to the WHO, chronic diseases accounted in 2005 for 35 million deaths worldwide, double the number of people who died from all infectious diseases, maternal and perinatal conditions, and nutritional deficiencies combined (WHO, 2005). By 2030, noncommunicable conditions will cause over three quarters of all deaths worldwide (WHO, 2008).

Cardiovascular diseases are the leading causes of death, responsible for 30 percent of all deaths, cancer and chronic respiratory diseases being other leading causes of death. The WHO estimates that some 45 percent of deaths from chronic non-communicable diseases occur in people younger than 70 years.

Chronic non-communicable diseases are also the leading causes of disease burden worldwide, causing half of the overall burden of disease. Cardiovascular diseases are the leading contributors to global burden of disease (WHO, 2005). Overall, the burden of disease rates are similar in men and women, and increase with age. WHO figures show that the burden of disease is greatest in adults aged 30 to 59 years, and that 86 percent of the burden of disease occur in people under 70 years.

In addition, chronic non-communicable diseases cause a huge socio-economic burden on individuals, their families, health systems and societies. Chronic diseases reduce the quantity and productivity of labor and medical expenses often surpass the available budget. A substantial amount of national income is lost yearly as a consequence of the impact of chronic diseases. In large countries, such as the Russian Federation, India, and the United Kingdom, the economic losses run in the billions of dollars each year.

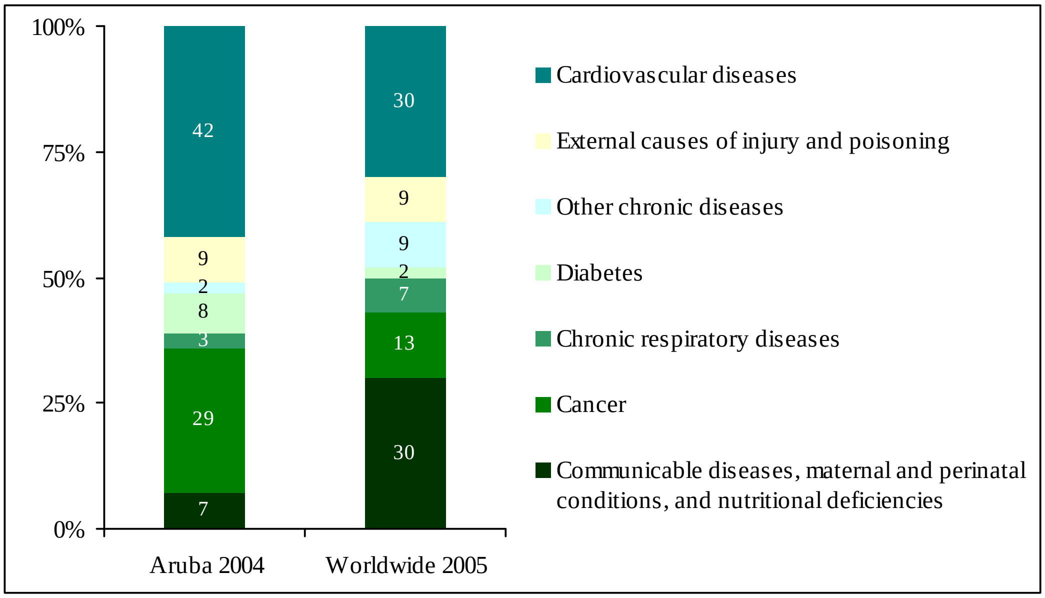
Finally, non-communicable chronic diseases put an enormous strain on the quality of life of individuals and families and on the social support systems of communities. Although more difficult to measure, the impact of this latter type of burden on individuals, families, and communities is of no less importance than the socio-economic burden mentioned earlier.

* Disease burden is measured as the disability adjusted life year (DALY), which combines the number of life years of healthy life lost to premature death with time spent in less than full health. One DALY is one “lost” healthy year of life (WHO, 2005).

1.2 The chronic disease situation in Aruba

According to figures from the Department of Public Health of Aruba, chronic diseases accounted in 2004 for approximately 84% of deaths (Statistical Yearbook, CBS, 2005). Given good sanitary conditions, accessible health care, and ample supply of food, communicable diseases together with maternal and perinatal conditions and nutritional deficiencies accounted in 2004 for only 7 percent of deaths (see Figure 1).

Figure 1: Causes of death in Aruba and worldwide

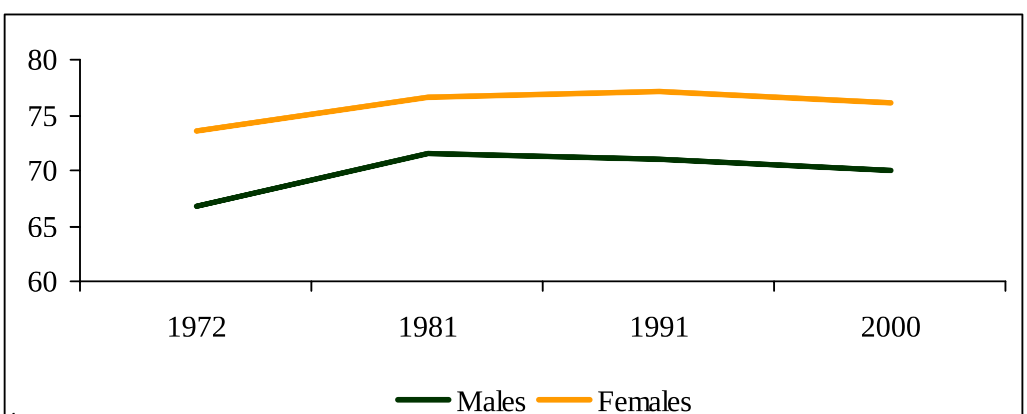


Source: Worldwide 2005: WHO, 2005; Aruba 2004: Statistical Yearbook, CBS 2005

Health surveys held on Aruba over the past fifteen years indicate that the chronic disease situation in Aruba has been getting steadily more worrisome over the years. The number of individuals suffering from chronic diseases has been on a steady rise as has been the number of individuals engaging in risky behaviors that underlie the major chronic diseases, including unhealthy diet, physical inactivity and tobacco use.

In addition, as opposed to the rest of the world, where life expectancy at birth has improved steadily, rising 7 to 9 years since 1970 (Magnusson, 2007), life expectancy in Aruba improved with just 3 years since 1972 and has even declined with a whole year for both men and women between 1991 and 2001 (see Figure 2).

Figure 2: Life expectancy a birth of the population of Aruba by age and sex, 1972-2000



Source: Statistical Yearbook, Central Bureau of Statistics

1.3 Risk factor surveillance

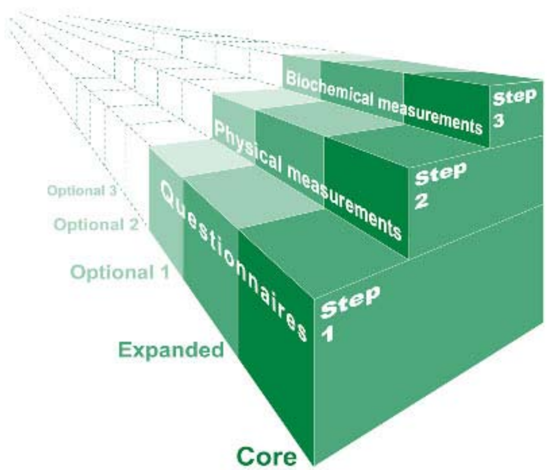
In the light of the worrisome developments in the chronic disease situation in Aruba, the government decided to set up a surveillance system for chronic non-communicable diseases. As a first step in setting up such a surveillance system, a health survey was conducted to update the information on the prevalence of chronic non-communicable diseases and their underlying risk factors.

Benefits of the STEPS methodology
▪ STEPS is being used internationally ▪ STEPS offers ample possibilities for data comparison on an international level ▪ STEPS was developed by international experts in the field of health behavior ▪ Generally accepted WHO concepts and definitions are used ▪ Documentations are standardized ▪ WHO- support team is available

For this purpose, the STEPS methodology (short for STEP-wise approach to chronic disease risk factor surveillance) developed by the WHO was adopted.

STEPS is a sequential process that starts with gathering key information on risk factors with a questionnaire (STEP 1), then continues with the physical measurements (STEP 2) and the collection of blood samples for biochemical analysis (STEP 3). Within each STEP, there are three levels of data collection: the core, expanded and optional levels. Figure 3 illustrates the concept of the STEPS instrument as depicted by the WHO.

Figure 3: STEP-wise approach to chronic disease risk factor surveillance



The STEPS instrument is a standardized way of collecting data on eight major behavioral and biological risk factors that have the greatest impact on chronic disease mortality and morbidity and are modifiable through effective prevention:

- Tobacco use
- Harmful alcohol consumption
- Unhealthy diet (low fruit and vegetable consumption)
- Physical inactivity
- Overweight and obesity
- Raised blood pressure
- Raised blood glucose
- Abnormal blood lipids and its subset “raised total cholesterol”

To execute the STEPS Aruba survey, a partnership was established between the Department of Public Health, the Central Bureau of Statistics and the National Laboratory. The Department of Public Health and the Central Bureau of Statistics coordinated the fieldwork and the data collection in the health centers, while the National Laboratory was responsible for the analysis of the blood and urine samples. All three organizations contributed financially and logistically to the successful execution of the survey. Technical assistance was provided by the Netherlands Interdisciplinary Demographic Institute (NIDI).

In this second publication of the results of the STEPS Aruba 2006 Health Survey, the common modifiable and non-modifiable risk factors underlying the major chronic non-communicable diseases will be discussed by means of a model proposed by the WHO to describe the causes of chronic diseases.

1.4 The World Health Organization model

The WHO proposes a model describing the causes of chronic diseases (WHO, 2005, p.50; see Figure 4 on page 7). The underlying determinants of chronic diseases are described as being globalization, urbanization and population ageing. According to the WHO, globalization has both positive and negative effects on health. On the one hand, globalization in the sense of openness of borders to ideas, people, commerce and financial capital offers the opportunity for countries to introduce modern technologies to guide and support health care systems. On the other hand, globalization goes hand in hand with the trend of populations changing their traditional consumption patterns and consuming diets high in total energy, fats, salt and sugar.

In the same manner, urbanization exposes individuals to new products and technologies which can be beneficial to their health and well-being, whereas on the other hand it exposes them to marketing of unhealthy goods. In addition, urbanization is related to reduced physical activity (e.g. motorized transport) and less physically active types of employment due to mechanized equipment and labor-saving devices that replace physically arduous tasks.

Population ageing is another major worldwide problem. The WHO estimates that the number of people aged 70 years or more will increases from 269 million in 2000 to 1 billion in 2050, an increase of 372 percent. Ageing is an important factor in the development of chronic diseases, in the sense that the impact of risk factors increases over the life course as the modifiable risk factors accumulate. Most chronic diseases will manifest themselves in the later stages of life (see Figure 5).

Figure 5: Risk accumulation

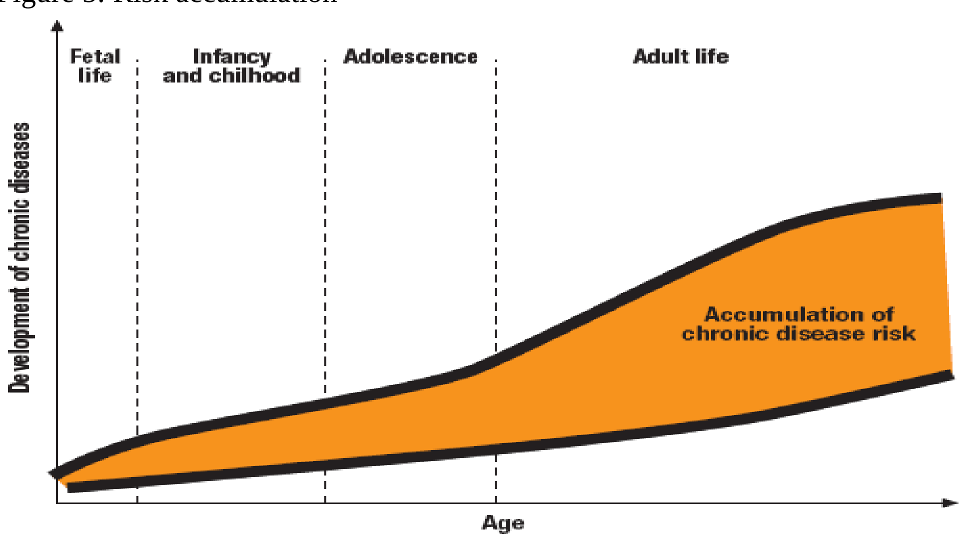
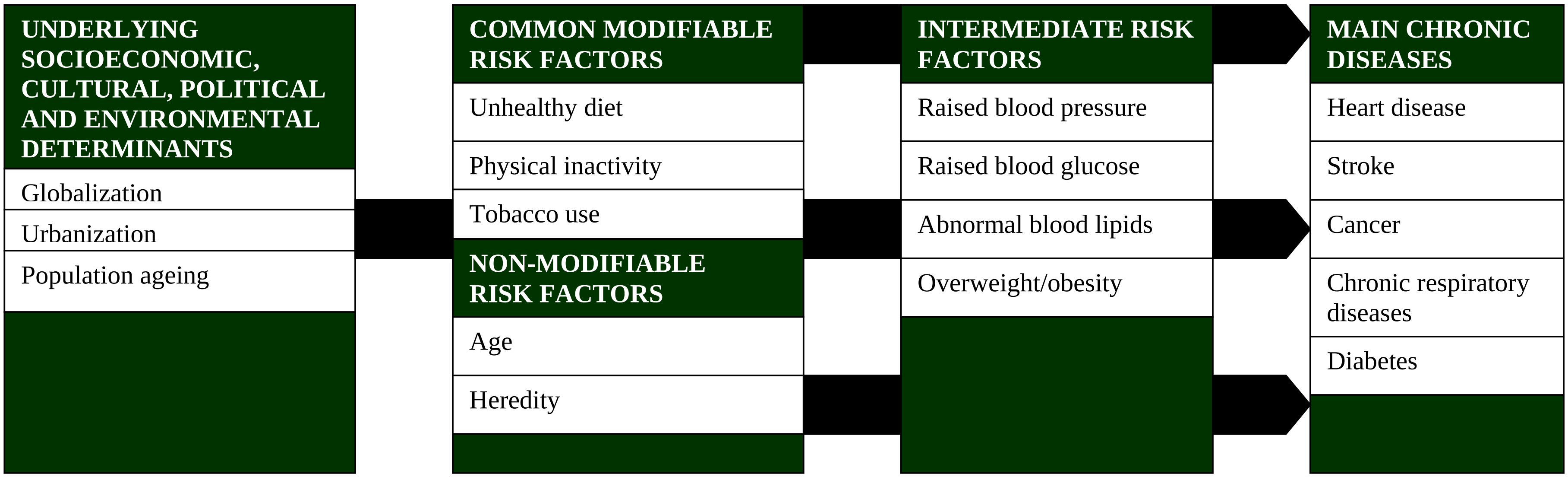


Figure 4: Causes of chronic diseases (WHO, 2005, p.48)



Source: WHO Global Report, 2005, p.48

In Aruba, all three factors, globalization, urbanization and most certainly rapid population ageing are key factors to keep in mind when analyzing the causes of chronic diseases. The tourism industry that bloomed in the late 1980's gave an enormous boost to the economy, bringing about important changes in the composition of the population and changes in lifestyle and availability of unhealthy goods for consumption. In addition, the population of Aruba is ageing rapidly as demonstrated by models developed by the Central Bureau of Statistics (Population Projections Aruba 2003-2023, 2004). However, it is beyond the scope of this report to elaborate further on these factors. This report will focus on the common modifiable and non-modifiable risk factors underlying the main chronic diseases in Aruba (the second part of the WHO model).

The common modifiable risk factors incorporated in the model (unhealthy diet, physical inactivity and tobacco use) together with alcohol misuse (see Table 1) are well-known and are expressed through the intermediate risk factors of raised blood pressure, raised blood glucose, abnormal blood lipids, and overweight and obesity. Modifiable risk factors together with non-modifiable risk factors (age and heredity) explain the majority of new events of heart disease, stroke, cancer, chronic respiratory disease and diabetes.

Table 1: Relationships between various chronic diseases (and conditions) and common-modifiable risk factors

Chronic disease/condition	Common modifiable risk factors			
	Unhealthy diet	Physical inactivity	Tobacco use	Alcohol misuse
Coronary heart disease	*	*	*	*
Stroke	*	*	*	*
Lung cancer			*	
Colorectal cancer	*	*		
Depression			*	*
Diabetes	*	*		
Asthma			*	
Chronic obstructive pulmonary disease			*	
Chronic renal disease	*			
Oral diseases	*		*	
Osteoarthritis		*		
Osteoporosis	*	*	*	*
Overweight/obesity	*	*		
High blood pressure	*	*		*
High blood cholesterol	*	*		

Note: * indicates a relationship
Source: Australian Institute of Health and Welfare, 2001

METHODS

- The scope of the STEPS Aruba 2006 Health Survey
- The study population
- The instrument
- Sampling information
- Response proportions
- Staff recruitment and training
- Survey implementation
- Weighting
- Analysis information

Chapter 2

Chapter 2. Methods

2.1 The scope of the STEPS Aruba 2006 Health Survey

The objectives of STEPS Aruba 2006 were:

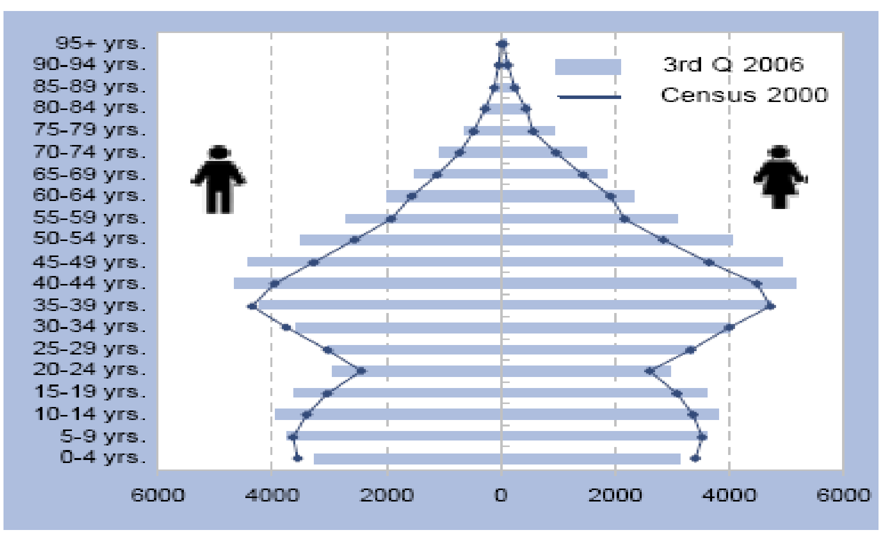
- to collect consistent data on Aruba and make comparisons with other countries
- to develop standard tools to enable comparisons over time
- to predict further case loads of chronic diseases
- to help plan health services and determine public health priorities, and
- to monitor and evaluate population-wide interventions focusing on education and prevention.

The fieldwork for STEPS Aruba was conducted from October 24 to December 4 2006, covering all three levels of assessment of the original STEPS Instrument: STEP 1, questionnaire; STEP 2, physical measurements; and STEP 3, biochemical analyses. The WHO STEPS Instrument was to some extent adapted to suit the specific circumstances of Aruba. The original English version of the STEPS questionnaire was translated into Papiamento, Spanish, and Dutch. Below the way STEPS Aruba 2006 was set up and executed is explained in brief.

2.2 The study population

The WHO sets the minimum target sample size at 2000 adults aged 25 to 64 years, stratified by sex and ten year age groups. To ensure adequate representation of each stratum in the STEPS Aruba survey, the KISH-method was used for sampling persons within households. In each household, two individuals were selected; one in age group 25 to 54 years and one in age group 55 to 64 years. Individuals in the 55 to 64 year age group were thus oversampled to account for the fact that on Aruba the proportion of 55 to 64 years olds is considerably smaller than that of 25 to 54 year olds (see Figure 6). Selecting only one person per household would have resulted in an underrepresentation of 55–64 year olds in the sample.

Figure 6: Population pyramid, CENSUS 2000 - 3rd quarter 2006



2.3 The instrument

As mentioned earlier, the original STEPS Instrument includes three STEPS, and at each STEP specific information is gathered. Table 2 shows the different topics that are covered in each of the three STEPS.

Table 2: The STEPS Instrument, description and purpose

STEP	Description	Purpose
1	Gathering demographic and behavioral information by questionnaire in a household setting	To obtain core data on: ▪ Socio-demographic information ▪ Tobacco and alcohol use ▪ Nutritional status ▪ Physical activity
2	Collecting physical measurements with simple tests	To build on the core data in Step 1 and determine the proportion of adults that: ▪ Are overweight and obese, and ▪ Have raised blood pressure
3	Taking blood samples for biochemical measurement	To measure prevalence of diabetes or raised blood glucose and abnormal lipids

The questionnaire used in the STEPS Aruba survey consisted of an adapted version of the original STEPS questionnaire. The Aruban questionnaire included all the core questions, almost all of the expanded questions (except ethnicity and household income) and some optional ones. Furthermore, some additional questions were included on: family and personal history of chronic diseases, health behavior, and mental health.

In table 3 on page 20 the data collected at each of the three STEPS is summarized. For each STEP the items included from the core, expanded and 'Aruban specific' modules are mentioned. Questions from the core and expanded modules were incorporated literally into the questionnaire. Additional questions were taken from the Aruba Health Survey 2001 and from other studies conducted on Aruba in the past. To optimize comparability with these earlier studies, the wording of the questions was changed as little as possible. The original English STEPS questionnaire was translated into Papiamento and Dutch. The Spanish WHO-version was adapted to approach Aruba's Latino population.

2.4 Sampling information

The sample for STEPS Aruba 2006 was drawn from the Geographical Information System (GIS) of the Central Bureau of Statistics. The GIS has a database containing all housing units on Aruba, with complete street addresses, but no information on the structure and composition of the 'families' living in these housing units (e.g. number of households, number of persons belonging to each household by age and sex, residence status of household members, etc.).

The target sample size of 2000 participants/households was increased by 20 percent to account for a number of possible events that could have affected the ultimate number of participants.

At the time the sample was drawn, the GIS-database consisted of 31,263 housing units. The sampling was done as follows: Aruba was divided into 20 different sampling areas (i.e. one area per interviewer), each consisting of 1,563 housing units. Then, 120 housing units were drawn randomly from each sampling area, using the Statistical Package for the Social Sciences (SPSS). As such, 2400 housing units were selected, ensuring a full geographical coverage of the build-on areas of Aruba. Figure 7 on page 21 shows the regional distribution of all the selected households.

Events controlled for during sampling

- Uninhabited housing units
- Housing units under construction
- Housing units turned into business locations
- Households consisting of tourists/ temporary foreign workers only
- Households consisting of individuals unable to participate (drug/alcohol addiction, mental health problems,..)
- Households consisting of individuals who are never home
- Housing units not located in the field
- Households without individuals in the required age categories
- Refusal to participate

A household was defined as one or more persons who are living together and who have made common living arrangements. Two types of households can be distinguished:

- A one-person household that consist of one person living on his/her own and taking care of his/her own living expenses.
- A multiple-person household that consists of two or more persons who are not necessarily related to one another and who have made arrangements to take care of their daily living expenses together.

Only residents of Aruba were eligible to participate in the STEPS Aruba survey. All participants had to have lived on Aruba for at least one year or had to have the intention of residing on Aruba for at least a year. Tourists, including owners of vacation houses on Aruba, were not included in the sample.

2.5 Response proportions

2.5.1 STEP 1

Of the 2400 selected housing units, 2,103 (87.6 percent) were located in the field and could be contacted to participate in the STEPS Aruba survey, 157 housing units were uninhabited (6.5 percent), and the remaining 140 were either under construction, had been turned into businesses, were occupied by tourists, were inadequate or could not be located in the field. In total, 66 additional households were found at the selected housing units. Thus in total, 2,169 households were invited to participate.

Of the 2,169 households that were asked to participate in the survey, 1,571 (73 percent) agreed. Nine percent of contacted households refused to be interviewed and 18 percent could never be found at home.

Table 3: Items included in STEPS-Aruba 2006

Level	Core items	Expanded items	Aruba specific items
STEP 1 Behavioral Measurement	Age, sex, years of schooling	Level of education	Nationality, number of years lived on the island, marital status, living with partner, country of birth partner, income, occupation
			Reported height - weight, self perception of weight/overweight
	Tobacco use	History of tobacco use	Second hand smoking
	Alcohol consumption	Binge drinking	Type of alcohol consumed
	Fruit & vegetable consumption	Oil and fat consumption	Methods used to loose weight, consumption of non-alcoholic beverages, certain food items, and frequency & type of non-home cooked food
	Physical activity, sedentary behaviour		Subjective appraisal of own physical condition
		History of raised blood pressure + treatment	History of high cholesterol + treatment
		History of diabetes + treatment	History of renal problems + treatment
			Family history of chronic diseases and other health conditions
			Personal history of chronic diseases and other health conditions
			Health behavior, visit to health workers, use of preventive health measures, use of seatbelt, regular checkups of blood pressure, cholesterol, blood glucose
			Mental health
STEP 2 Physical Measurement	Height and weight		
	Waist circumference	Hip circumference	
	Blood pressure	Heart rate	
STEP 3 Biochemical Measurement	Fasting blood glucose	Triglycerides	Creatinine in urine
	Total cholesterol		

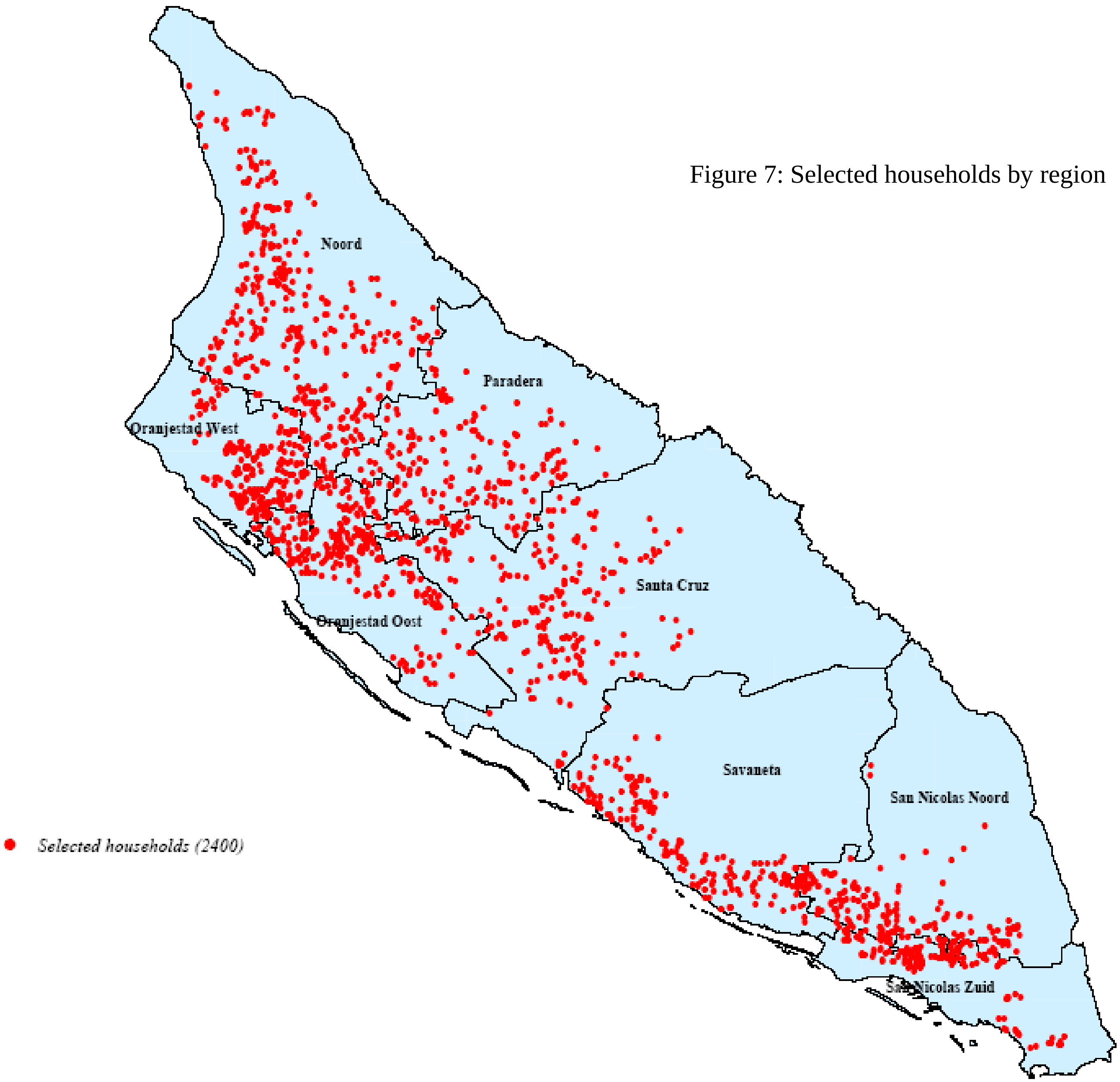


Figure 7: Selected households by region

In the 1,571 households that agreed to participate, 1,565 individuals (97 percent) were successfully interviewed in STEP 1. In 2 percent of households, 2 persons were selected, but one refused to participate, and in 1 percent of households, selected individuals were never found at home.

2.5.2 STEP 2 and STEP 3

In total, of the 1,565 individuals who were successfully interviewed in STEP 1, 817 individuals visited a health center to participate in STEP 2 and 3, which represent 52 percent of all persons interviewed in STEP 1 (see Table 4). All efforts were made to get as many participants as possible to visit the health centers to complete the physical and biochemical measurements (STEP 2 and 3). Before the end of the fieldwork, individuals who had not visited the health centers as yet were approached with a letter thanking them for their participation in the survey and inviting them once again to visit one of the health centers.

Table 4: Participation by age and gender

	Age Range (years)	Recruitment target	Participants STEP 1	Participants STEP 2 and 3	% of STEP 1
Men	25-34	250	130	51	39
	35-44	250	186	77	41
	45-54	250	181	94	52
	55-64	250	169	105	62
Women	25-34	250	147	61	41
	35-44	250	264	133	50
	45-54	250	274	166	61
	55-64	250	214	130	61
Totals		2000	1565	817	52

2.6 Staff recruitment and training

Before the start of STEPS Aruba a total of 20 interviewers were trained in two 4 hour sessions to:

- Locate the selected housing units;
- Determine the number of households in the selected housing units;
- Explain the purpose of STEPS Aruba 2006 to household members by means of an information letter and folder;
- Record the age and sex of each person living in the household on the KISH household coversheet;
- Select the household member(s) who is(are) eligible to participate by means of the KISH tables;
- Obtain verbal and written consent from each participant;
- Conduct the interview and record each answer;
- Give each participant an ID after successfully having completed the questionnaire;
- Write down the participant ID on the questionnaire, the KISH household coversheet and the progress report;

- Complete the progress report for each visited household;
- Invite each participant to visit a health center of their choice to participate in STEP 2 and STEP 3;
- Make appointments for the participants to visit the health centers;
- Check all completed forms and hand them over to the supervisor;
- Report any difficulties to the supervisor.

In total, 18 health professionals and 6 secretaries were in charge of conducting STEP 2 and STEP 3. They were trained to:

- Obtain written consent from each participant to STEP 2 and STEP 3;
- Follow the right logistic procedures;
- Take physical measurements and record the results on a form created for that purpose;
- Take blood and label each sample with a lab code linked to the participant ID.

2.7 Survey implementation

2.7.1 STEP 1

The duration of the survey was six weeks, divided into three periods of 2 weeks. Per period, each interviewer was handed over a list of 40 addresses of 40 housing units they had to visit. In addition, each interviewer was given a map of the sampling area, with the selected addresses pointed in red, to make it easier to locate the addresses. Each interviewer was assigned a personal supervisor, to whom they had to report twice a week.

After a respondent had completed STEP 1 successfully, he/she was given a participant ID, which was a unique identification number consisting of two parts: a five-digit household number and a one-digit person number. The household number consisted of a two-digit interviewer number, ranging from 01 to 20, and a three-digit sequential number that represented the number of households successfully interviewed. Each household thus received a unique household number. The person number represented the age group the participant belonged to. A participant in age-group 25 to 54 years received person number ‘1’ and one in age-group 55 to 64 years received number ‘2’.

2.7.2 STEP 2 and STEP 3

In most countries physical measurements (STEP 2) are taken at the home of the participant and blood is collected (STEP 3) at a health center. For practical reasons, on Aruba both physical measurements and blood and urine samples were collected at health centers. Participants who were successfully interviewed for STEP 1 were subsequently invited to visit one of the six health centers to participate in STEP 2 and STEP 3. Participants were informed that they could not eat or drink a thing (except plain water) starting from 10 p.m. the night before their visit to the health center. Participants were also given a small container to collect their first morning urine.

At the health centers, the identification numbers of all participants were copied onto a bio-measurement form and on a lab form. The participant ID was copied onto all documents. This was crucial for linking the interview data, with the bio-chemical measurements and the laboratory results at the final stage of the data handling. In annex 2, we present the invitation letter that was issued to individuals who participated in STEP 1 to participate in STEP 2 and 3. As can be seen on the invitation letter, the interviewer had to fill in the participant ID of each participant on the invitation letter as well.

Participants could visit one of six health centers. The health centers were set up at the regional offices of the Wit Gele Kruis, at the Instituto Medico San Nicolas (IMSAN) and at the office of the Public Health Department in Oranjestad. The health centers were distributed all over the island.

Locations of health centers

- Noord (Wit Gele Kruis, Don Bosco)
- Oranjestad (Department of Public Health)
- Paradera (Wit Gele Kruis)
- Santa Cruz (Wit Gele Kruis)
- Brazil (Wit Gele Kruis)
- San Nicolas (IMSAN)

Health centers were open on most weekdays in the morning from 8.00 a.m. until 10.00 a.m. during the period October 26th - December 8th, 2006. Each health center was staffed with three staff members: an administrator, a nurse and a medical nurse who was certified to draw blood.

When participants arrived at the health centers, they were registered by the administrator by means of their invitation letter, with their unique participant ID. Subsequently they were asked to sign a consent form. Participants were informed they could get their final results of STEP 2 and 3 at the end of the fieldwork period at the Department of Public Health and in addition, they could give written consent to the Department of Public Health to send their final results to their family physician.

After all information was provided, physical measurements were taken by the nurse. Blood pressure was measured twice, before and after the blood sample was collected. All information gathered at the health centers was written down on a special form. After the examination, participants were offered a small snack, fruit juice, coffee and tea.

Physical measurements were taken by means of standardized and well calibrated equipment. Scales were calibrated after they were installed at the health centers by the Technical Inspection Department (DTI) and blood pressure was measured by means of Digital Automatic Blood Pressure Monitors (OMRON M4-1). The latter were supplied free of charge by the WHO Department of Chronic Diseases and Health Promotion in Geneva. On a daily basis all blood and urine samples (STEP 3) were gathered at the Department of Public Health and transported to the National Laboratory.

2.8 Weighting

The raw STEPS-data were weighted to make them representative for the total target population of Aruba, given that:

- The population of individuals in age category 55-64 years of age was oversampled to ensure an adequate number of respondents in this age category;
- Non-response rates were not evenly distributed among all age and sex categories;
- The age and sex composition of the sample population deviated somewhat from the age-sex structure of the entire population;
- As only one person in the household was selected for the age-group 25-54 years and one for the age-group 55-64 years, the selection probability of a person was a function of the total number of persons in the household in each age category.

Individual weights were used to compensate for the differential probabilities of selection within the household. In the analyses, population weights were also used to make the sample more representative of the target population. These population weights were calculated to adjust for differential selection probabilities, differential response proportions and age and sex differences between the sample and the target population. The weights were calculated for each record. Population weights were multiplied by the individual weights to produce an overall weight.

The Individual Weights were calculated as follows:

W(ind) = 1/(probability of household selection * probability of individual selection)

The Population Weight was calculated as:

W(pop) = ((p1(s,x)/p2(s,x)) * ((p3(s,x)/p1(s,x)).

The first term in the equation ((p1(s,x)/p2(s,x)) is a correction for non-response with p1(s,x) being the proportion of all persons being selected in the sample belonging to age-sex category s and x. In other words, this is the group of persons who were selected using the KISH method who belong to category (s,x) compared to all selected persons in all categories. p2(s,x) being the proportion of all persons effectively interviewed in the sample, belonging to age-sex category (s,x).

The second term in the equation ((p3(s,x)/p1(s,x)) is a post-stratification to the target population because the age-sex structure of the total population may be different from the sample age-sex distribution. p3(s,x) is the proportion of all persons in the population belonging to age-sex category s and x. For population p1(s,x) is defined above.

The overall weight was then simply calculated as follows:

W(overall) = W(ind) * W(pop).

Separate weights were calculated for variables related to STEP 1 (Weight 1) and STEPS 2 and 3 (Weight 2). All tables in this report were constructed on the basis of weighted data. Tables based on data collected in STEP 1 were adjusted with Weight 1, tables based on STEP 2 and STEP 3 data were weighted with Weight 2.

2.9 Analysis information

The information gathered at the health centers was entered daily into a SPSS-system file. At the end of the fieldwork, the data on physical measurements (STEP 2) was extensively checked and edited for errors. All the questionnaires of STEP 1, the KISH-forms, and the interview tracking forms, were scanned at the Central Bureau of Statistics using optical mark reading, optical character recognition and imaging techniques for data entry. Data sets were processed per interviewer and all data was verified and edited. An extensive SPSS-program was used to control and edit the data. Each data set was subjected to a large set of tests to control for invalid values, structural errors and inconsistencies. Errors were corrected keeping the original questionnaires at hand. In addition to the correction of errors, a number of new variables were created. At the end of the editing process, all individual data sets were merged into one SPSS-system file. Thereafter, the data from STEP 1 was merged with the dataset of STEP 2 (physical measurements) and the data obtained from the National Laboratory (STEP 3; biochemical measurements). The final results of STEP 3 were obtained from the National Laboratory at the beginning of January 2007. The data was presented digitally in an Excel-file that could easily be converted into a SPSS-system file. All data was analyzed using SPSS Complex Samples Module and EpiInfo. Results are presented as means, medians, or percentages, with 95% confidence intervals.

COMMON MODIFIABLE RISK FACTORS

- Unhealthy diet
- Physical inactivity
- Tobacco use
- Alcohol misuse

Chapter 3

Chapter 3. Common Modifiable Risk Factors

3.1 Unhealthy diet

Following an unhealthy diet is unequivocally related to the development of chronic diseases, both directly and indirectly through a range of risk factors, such as lack of physical activity. In westernized countries, the main problem is often the overconsumption of foods in general, and the overconsumption of energy-rich products in particular, consisting of high levels of fats, salt and sugar. In addition, unhealthy diets often lack dietary fibers, complex carbohydrates, and essential vitamins and minerals.

Health problems associated with an unhealthy diet

- Coronary heart disease
- Stroke
- Certain types of cancers (e.g. gastrointestinal cancer)
- Bowel conditions
- Oral health problems (e.g. dental caries)
- High blood pressure
- High blood cholesterol
- Type 2 diabetes
- Overweight

In table 5 the dietary recommendations issued by the WHO and the Food and Agriculture Organization of the United Nations (FAO) for the prevention of diet-related chronic diseases are presented.

Table 5: Ranges of population nutrient intake goals

	Goal (% of total energy)
Total fat	15-30%
Total carbohydrate	55-75%
Protein	10-15%
Cholesterol	<300 mg per day
Sodium chloride (sodium)	<5 g per day
Fruits and vegetables	≥400 g per day
Total dietary fibre	From foods
Non-starch polysaccharides	From foods

Source: WHO Technical Report (2003). Diet, nutrition and the prevention of chronic diseases.

In the following sections the findings of the STEPS Aruba 2006 Health Survey on the consumption of fruits and vegetables, the use of fats and oils for meal preparation, and other eating and drinking habits will be discussed.

3.1.1 Consumption of fruits and vegetables

Low fruit and vegetable intake is among the top 10 risk factors contributing to global mortality, causing about 19 percent of gastrointestinal cancer, 31 percent of ischaemic heart disease and 11 percent of stroke (WHO, 2003).

There is compelling empirical evidence that a diet rich in fruits and vegetables can lower the risk of developing certain chronic diseases. A recent large prospective study which included 110,000 men and women who were followed over the course of 14 years revealed, for example, that the higher the average daily intake of fruits and vegetables, the lower the chances of developing cardiovascular disease (Hung et al., 2004). Yet another prospective study on fruit and vegetable intake and total mortality in Spanish adults (EPIC-Spain) indicated that a high intake of fresh fruit, root vegetables, and fruiting vegetables was associated with reduced overall mortality (Agudo et al., 2007). A diet rich in fruits and vegetables can help lower high blood pressure and high cholesterol levels, and is, because of the indigestible fibers it contains, key to maintaining a good gastrointestinal health (Appel et al. 1997, Djousee et al., 2004, Aldoori et al., 1998).

Nutritional experts, including those at the WHO and at the Centers for Disease Control and Prevention (CDC) recommend consuming at least 400 grams (or 5 servings) of fruits and vegetables per day for the prevention of chronic diseases. Despite these recommendations, levels of fruit and vegetable intake vary considerably around the world, depending on a number of factors, including availability of fruits and vegetables, and socio-economic, socio-demographic and health-related lifestyle factors (Billson, Pryer & Nichols, 1999; Deshmukh-Taskar et al., 2007; Devine et al. 1999; Friel, Newell & Kelleher, 2005; Kamphuis et al., 2006; Naska et al. 2000).

During the STEPS Aruba 2006 Health Survey, the consumption of fruits and vegetables was assessed by means of four separate questions asking participants to indicate how often they consumed fruits and vegetables per week and how many servings of fruits and vegetables they consumed (see text box).

STEPS Aruba 2006: Questions asked on the consumption of fruits and vegetables

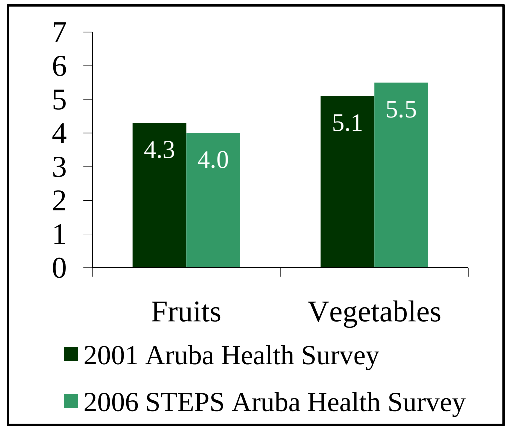
- In a typical week, on how many days do you eat fruit?
- How many servings of fruit do you eat on one of those days?
- In a typical week, on how many days do you eat vegetables?
- How many servings of vegetables do you eat on one of those days?

Firstly, data obtained on the frequency of fruit and vegetable consumption will be discussed and comparisons will be made with previous surveys. Then, the results of the analyses with regards to the number of servings of fruits and vegetables consumed will be presented.

3.1.1.1 Frequency of consumption of fruits and vegetables

According to data obtained during the STEPS Aruba 2006 Health Survey, vegetables are significantly more often consumed per week than fruits (see Figure 8). On average, participants reported consuming vegetables on 5.5 days per week and fruits on 4 days per week. These findings are comparable to those of the 2001 Aruba Health Survey, where participants reported, on average, consuming vegetables on 5.1 days per week and fruits on 4.3 days per week.

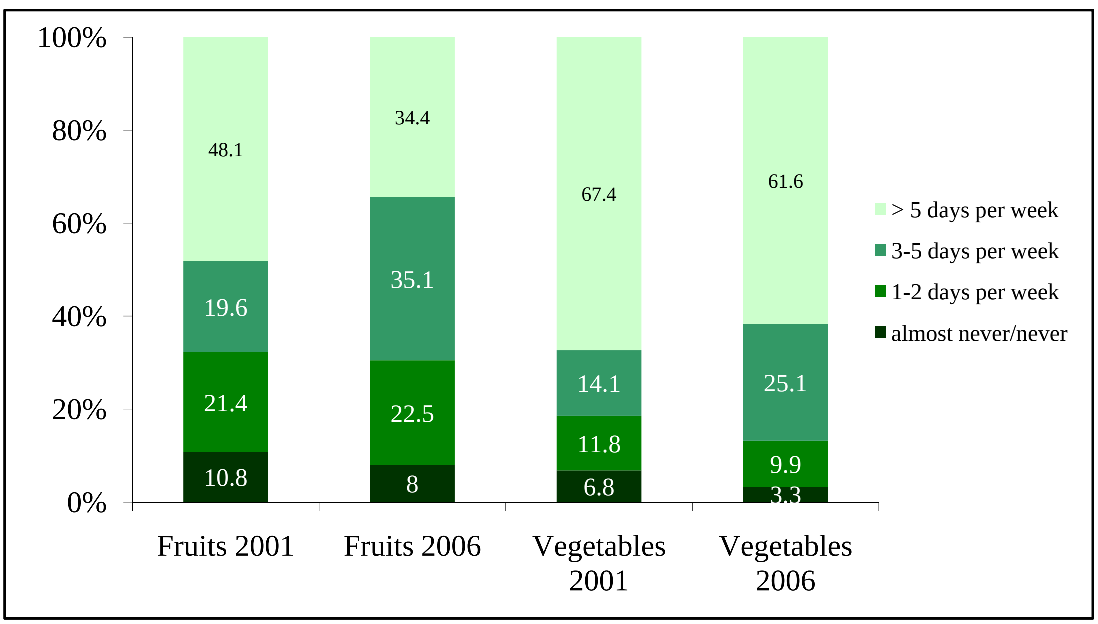
Figure 8: Number of days per week fruits and vegetables consumed



However, between 2001 and 2006, the number of participants who reported consuming fruits on more than 5 days per week decreased substantially (from 48.1 percent in 2001 to 34.4 percent in 2006; see Figure 9). While in 2001 the majority reported consuming fruits on more than 5 days per week, in 2006 the majority reported consuming fruits on 3 to 5 days per week.

Where the consumption of vegetables was concerned, the percentage of participants who reported consuming vegetables on more than 5 days per week, decreased somewhat between 2001 and 2006, but in 2006 the vast majority still reported consuming vegetables on more than 5 days per week (see Figure 9).

Figure 9: Percentage consuming fruits and vegetables per week according to data from the 2001 Health Survey and STEPS Aruba 2006



Further analysis of the STEPS Aruba 2006 data revealed that the frequency of the consumption of fruits was significantly related to age and gender (see Figures 10 and 11). Participants in the age category of 55 to 64 years reported eating fruits significantly more often per week than the rest. In addition, women reported consuming fruits significantly more often per week than men (on 4.2 days and on 3.6 days, respectively). This difference was more pronounced in the 45 to 54 age category, where women reported consuming fruits on 4.4 days per week and men on 3.4 days per week. In contrast, the frequency of the consumption of vegetables was not significantly related to either age or gender.

Figure 10: Number of days per week fruits and vegetables consumed by age

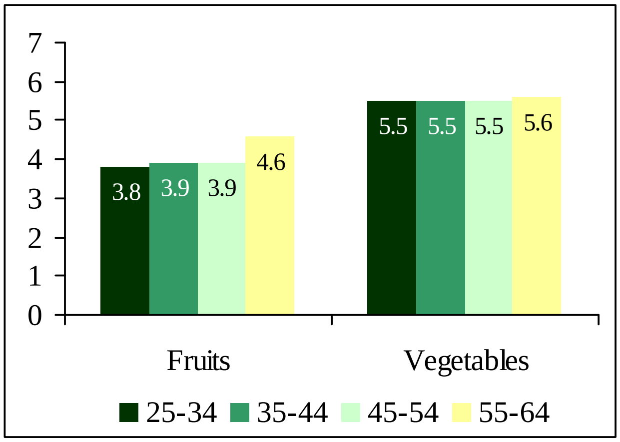
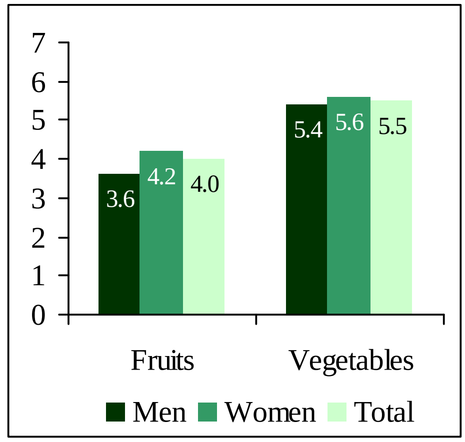


Figure 11: Number of days per week fruits and vegetables consumed by gender



Research has further indicated that the frequency of the consumption of fruits and vegetables is also related to socio-economic and socio-demographic variables, such as level of education, income, and cultural differences/country of birth (Deshmukh-Taskar et al., 2007; Estaquio et al., 2008; Irala-Estévez et al., 2000; Roos et al, 2000). For the purpose of explaining the variance in the frequency of the consumption of fruits, a linear regression analysis was conducted and socio-economic and socio-demographic variables were included as factors. For this purpose, personal income and educational level attained were categorized as either low or high income and low education and high education. Low and high income groups were created by using the median income (equal to AFL. 1999,50 a month), which is the value that divides the higher half of the population from the lower half. The low income group consisted of individuals with a personal income below the median income, and the high income group consisted of those with a personal income equal or above the median income. The low education group consisted of participants whose highest level of education attained was below the population median (which was equal to general and higher secondary education, such as MAVO, MULO), whereas the high education group consisted of participants whose highest level of education attained was equal to or higher than the population median.

The results of the analyses revealed that next to age and gender, country of birth and level of education contributed significantly to the equation. Personal income did however not contribute significantly to the explanation of the variance in the frequency of the consumption of fruits (see Table 6). Those who reported consuming fruits most often per week were: women, participants between 55 and 64 years of age, those not born on Aruba, and those who completed an education at a high level. On the other hand, those who reported consuming fruits least often per week were: men, participants between 25 and 34 years of age, those born on Aruba, and those who completed an education at a low level (see Table 7).

Where the frequency of the consumption of vegetables was concerned, a linear regression analysis revealed that neither age, gender, country of birth, or personal income explained a significant amount of variance in the frequency of the consumption of vegetables (see Table 6). Level of education was the sole significant contributor to the explanation of the variance in the frequency of vegetable consumption. Those who reported consuming vegetables most often were those participants who completed an education at a high level (see Table 7).

Table 6: Results of linear regression analyses to explain the variance in the frequency of the consumption of fruits and vegetables

	Frequency of consumption of fruits per week*	Frequency of consumption of vegetables per week**
	Significance level	Significance level
(Corrected Model)	.000	.095
(Intercept)	.000	.000
Gender	.002	.144
Age category	.000	.837
Country of birth	.002	.152
Highest level of education	.000	.027
Personal income category	.762	.390

Note: *R^2=.05; **R^2=.01

Table 7: Frequency of consumption (in days) of fruits and vegetables per week by gender, age, country of birth, and level of education*

	Average number of days per week fruits consumed	Average number of days per week vegetables consumed
Gender		
Men	3.6	
Women	4.2	
Age group		
25-34 years	3.8	
35-44 years	3.9	
45-54 years	3.9	
55-64 years	4.6	
Country of birth		
Aruba	3.9	
Other	4.3	
Level of education		
Low level of education	3.7	5.3
High level of education	4.4	5.6

Note: *Only the means for those variables that contributed significantly to the regression analyses are depicted in the table

3.1.1.2 Number of servings of fruits and vegetables consumed

Participants of the STEPS Aruba 2006 survey reported consuming, on average, 0.8 servings of fruit and 1 serving of vegetables per day, amounting to 1.8 combined servings of fruits and vegetables per day. The majority reported consuming between 1 and 3 combined servings of fruits and vegetables per day (68.5 percent; see Figure 12). Only 2.4 percent (1.5 percent of males and 3.5 percent of females) reported consuming the recommended 5 combined servings of fruits and vegetables per day. Compared to figures from other countries, this percentage is very low (see Figure 13). Thus, whilst in Aruba fruits and vegetables are consumed on an average of 4 to 5.5 days per week, the number of servings consumed on any of those days is very low.

Figure 12: Consumption of combined servings of fruits and vegetables per day

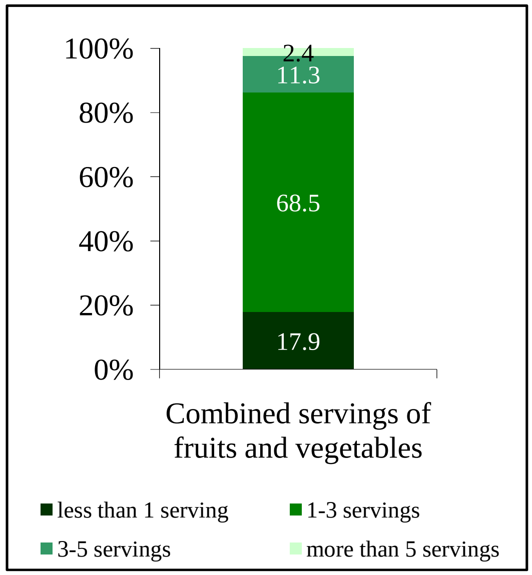
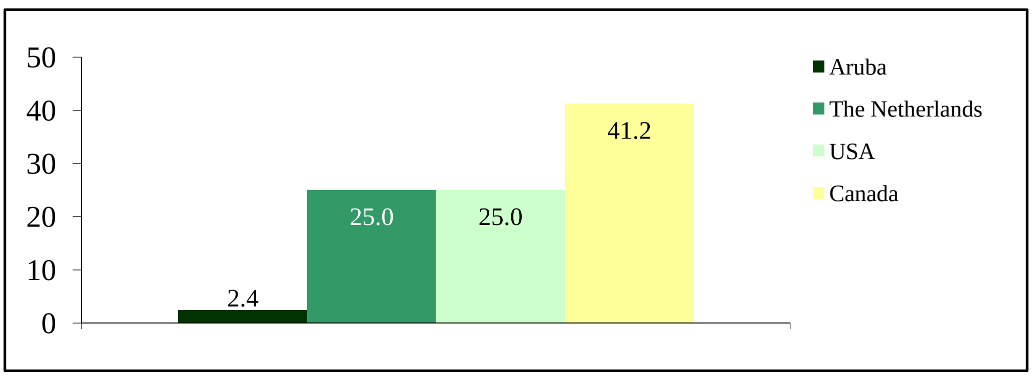


Figure 13: Percentage consuming the recommended 5 combined servings of fruits and vegetables per day



Source: Aruba: STEPS Aruba 2006 Health Survey; The Netherlands: RIVM report, 2004; USA: CDC, Behavioral Risk Factor Surveillance System (BRFSS), 2005; Canada: Statistics Canada, 2006.

Furthermore, data analysis revealed that the number of servings of fruits consumed was significantly related to participants' age and gender (see Figures 14 and 15). Participants in the 55 to the 64 year age category reported consuming significantly more servings of fruit per day than the rest. In addition, women reported consuming significantly more servings of fruit per day than men (0.8 and 0.7, respectively). In contrast, the number of servings of vegetables consumed per day was not significantly related with age and gender (see Figures 14 and 15).

Figure 14: Number of servings of fruits and vegetables per day by age

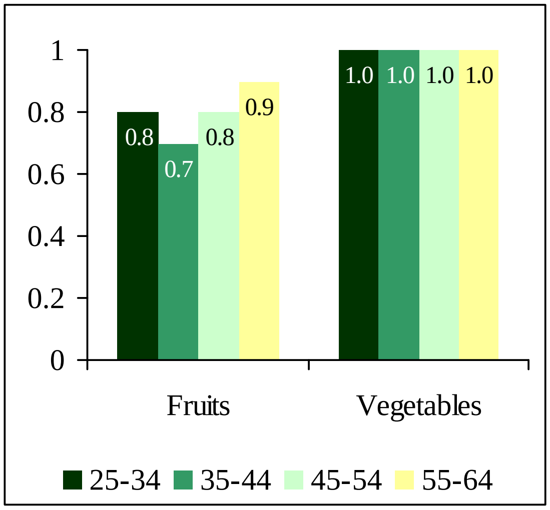
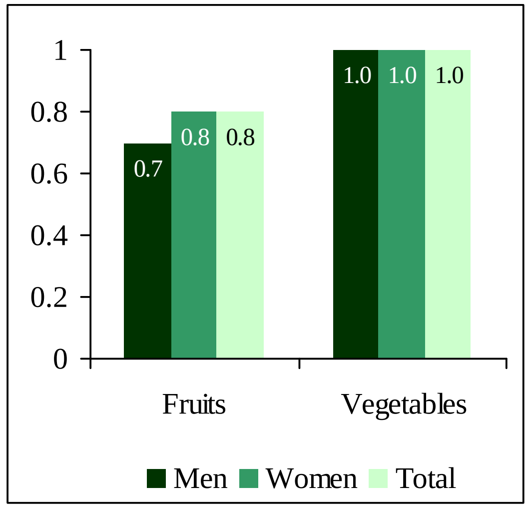


Figure 15: Number of servings of fruits and vegetables per day by gender



Subsequently, a linear regression analysis was conducted to explain the variance in the number of servings of fruit consumed per day. Age, gender and other socio-economic and socio-demographic variables, such as country of birth, level of education, and personal income were included as predictors. The results revealed that next to age and gender, country of birth and level of education contributed significantly to the equation. On the other hand, personal income did not contribute significantly to the explanation of the variance in the number of servings of fruit consumed per day (see Table 8).

Those who reported consuming the largest number of servings of fruits per day were women, participants between 55 and 64 years of age, those not born on Aruba and participants who completed an education at a high level. On the other hand, those who reported consuming the smallest number of servings of fruits per day were men, participants between 25 and 44 years of age, those born on Aruba and participants who completed an education at a low level (see Table 9).

A similar linear regression analysis was conducted to explain the number of servings of vegetables consumed per day. The results revealed that level of education was the sole significant contributor to the equation. Neither age, gender, country of birth, or personal income contributed significantly to the explanation of the variance in the number of servings of vegetables consumed per day (see Table 8). Those who reported consuming the largest number of servings of vegetables per day were participants who completed an education at a high level (see Table 9)

.

Table 8: Results of a linear regression analysis to explain the variance in the number of servings of fruits and vegetables consumed per day on days consumed

	Frequency of consumption of fruits per day*	Frequency of consumption of vegetables per day**
	Significance level	Significance level
(Corrected Model)	.000	.001
(Intercept)	.000	.000
Gender	.015	.130
Age category	.000	.429
Country of birth	.000	.100
Highest level of education	.000	.000
Personal income category	.422	.303

Note: *R^2=.06; **R^2=.03

Table 9: Mean number of servings of fruits and vegetables per day on days consumed by gender, age, country of birth, and level of education*

	Average number of servings of fruits consumed	Average number of servings of vegetables consumed
Gender		
Men	0.7	
Women	0.8	
Age group		
25-34 years	0.7	
35-44 years	0.7	
45-54 years	0.8	
55-64 years	0.9	
Country of birth		
Aruba	0.7	
Other	0.9	
Level of education		
Low level of education	0.7	0.9
High level of education	0.8	1.0

Note: *Only the means for those variables that contributed significantly to the regression analyses are depicted in the table

3.1.2 Use of oil or fat for meal preparation

According to the recommendations of the WHO and the FAO, a total fat intake of at least 20 percent of the total energy intake is consistent with good health. Highly active individuals may however sustain a total fat intake of up to 35 percent without the risk of unhealthy weight gain (WHO/FAO, 2003).

The relationship between the intake of dietary fats and chronic non-communicable diseases has been extensively studied, particularly where cardiovascular disease is concerned. Animal experiments, observational studies, clinical trials and metabolic studies have provided strong and consistent evidence for the association between the consumption of fats and cardiovascular disease. Research indicates that the intake of dietary fats strongly influences the risk of cardiovascular disease through effects on blood lipids, thrombosis, blood pressure, arterial function, and inflammation. However, the composition of dietary fats has a significant role in modifying the risk. In particular, the intake of saturated fatty acids is directly related to cardiovascular risk.

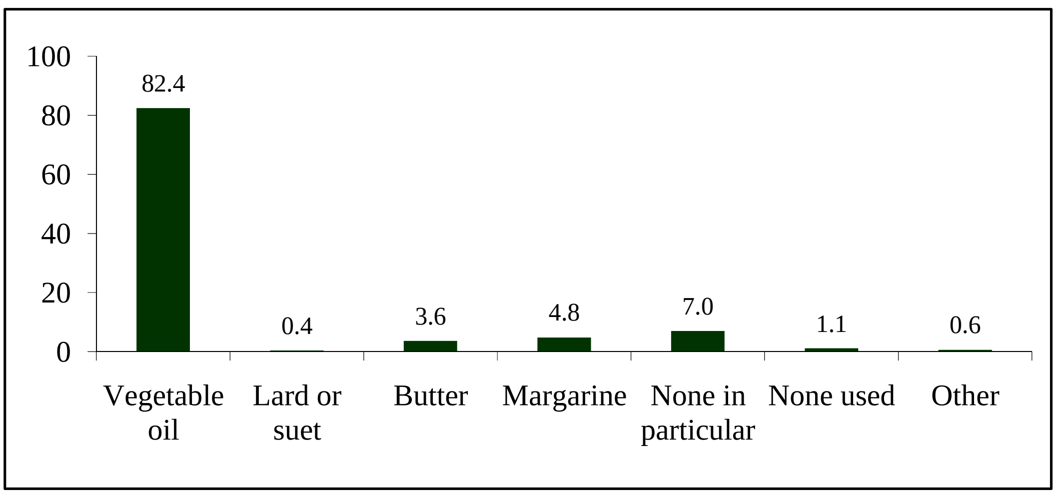
A high intake of saturated fats has also been linked to a higher risk of impaired glucose tolerance, and higher fasting glucose and insulin levels. In addition, observational studies have indicated that a high intake of total fat is associated with higher fasting insulin concentrations and a lower insulin sensitivity index, and predicts the development of impaired glucose tolerance and the progression of impaired glucose tolerance to type 2 diabetes (Haag & Dippenaar, 2005; WHO/FAO, 2003).

During STEPS Aruba 2006, participants were asked what type of oil or fat was most often used to prepare meals in their household. The majority (82.4 percent) indicated that vegetable oil was most often used and only 0.4 percent indicated that lard was most often used (see Figure 16).

STEPS Aruba 2006: Question asked on the use of oil or fat for food preparation

- What type of oil or fat is most often used for meal preparation in your household?

Figure 16: Percentage using certain types of oil or fat most often for meal preparation



Overall, and taking into account several demographic and socio-economic variables (e.g. age, gender, country of birth, living with a partner, country of birth of partner, level of education and personal income) the majority of participants reported vegetable oil being most often used in their household for meal preparation.

Where the use of vegetable oil on itself was concerned, none of the abovementioned variables played a significant role, with the exception of “living with a partner”. Living with a partner was significantly related to the use of vegetable oil in that a significantly higher percentage of participants who indicated living with a partner reported using vegetable oil most often compared to those not living with a partner (84.0 percent and 76.7 percent, respectively). Instead, a significantly higher percentage of those not living with a partner reported using no oil or fat in particular for meal preparation than those living with a partner (10.4 percent and 5.0 percent, respectively).

3.1.3 Consumption of various food products

Participants of the STEPS Aruba 2006 Health Survey were also asked how often they ate whole grain products, beans (red beans, black beans, garbanzos), snacks (pastechi, egg rolls, croquet, empana, chips), sweets (chocolate, cake, cookies, ice-cream, candy, etc.), and meals not prepared at home. Participants could indicate whether they consumed these food products on a daily or almost daily basis, 3 to 5 days per week, 1 to 2 days per week, 1 to 3 days per month, seldom or never.

STEPS Aruba 2006: Question asked on the consumption of various food products

- How often do you eat the following food products?
  - Whole grain products like whole grain bread or whole grain (breakfast) cereals
  - Beans such as red beans, black beans, garbanzos
  - Snacks like pastechi, egg rolls, croquet, empana, chips
  - Sweets like chocolate, cake, cookies, ice cream, candy, donut, drigidek, pan boyo, pan dushi
  - Meals not prepared at home (dine-in, take away meals like Chinese, hamburger, pizza)
- What type of food do you most often eat when you pay for food that was not prepared at home? (Chinese, fast-food, barbecue, truck, typical Arubian food, other)

3.1.3.1 Whole grains and beans

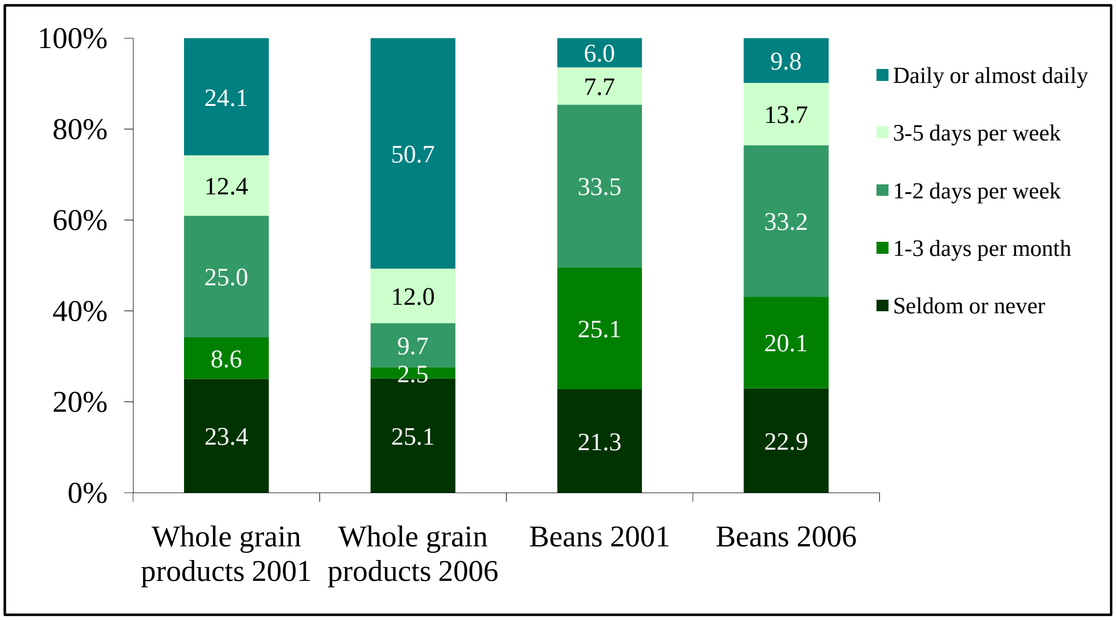
Whole grains and beans are a rich source of fiber. Fiber is unlike other food components such as fats, proteins and carbohydrates not digested by the body. It passes virtually unchanged through the digestive tract.

The consumption of a diet high in fiber has, through extensive research, been associated with weight loss and with a lower risk of developing certain chronic conditions such as coronary heart disease, type 2 diabetes, high blood cholesterol levels, and digestive diseases (Jacobs, Andersen & Blomhoff, 2007; Koh-Banerjee et al., 2004; Rose et al., 2007; Schulze et al., 2007, Timm & Slavin, 2008). The role of dietary fiber in reducing the risk of developing colorectal cancer is inconsistent (Park et al., 2005; Schatzkin et al., 2007; Wakai et al., 2007).

Data gathered during STEPS Aruba 2006 indicated that the majority of participants (50.7 percent) reported consuming whole grain products on a daily or almost daily basis. Compared to data from the 2001 Aruba Health Survey, the percentage of participants reporting consuming whole grain products on a daily basis more than doubled between 2001 and 2006. Furthermore, in 2006, more than 60 percent of participants reported consuming whole grain products on more than 3 days per week, compared to 36.5 percent in 2001. Finally, the percentage of participants who reported seldom or never consuming whole grain products remained practically the same between 2001 and 2006 (see Figure 17).

Where the consumption of beans was concerned, the majority of participants of STEPS Aruba 2006 (33.2 percent) reported consuming beans on 1 or 2 days per week, as was the case in 2001. However, the percentage of participants who reported consuming beans on more than 3 days per week increased between 2001 and 2006 from less than 15 percent to almost 25 percent. The percentage of participants who reported seldom or never consuming beans remained virtually the same (see Figure 17).

Figure 17: Percentage consuming whole grain products and beans according to data from the 2001 Aruba Health Survey and STEPS Aruba 2006



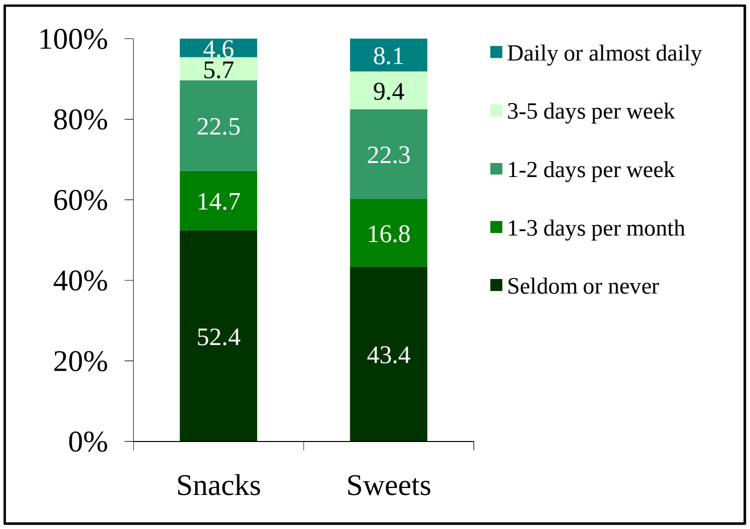
Further analyses of the STEPS Aruba 2006 data revealed that there where no significant differences in the consumption of whole grain products were age, gender, country of birth and personal income were concerned. The only socio-demographic variable that was significantly related to the consumption of whole grain products was level of education. A significantly higher percentage of those who completed an education at a high level reported consuming whole grain products at least 3 times per week (63.6 percent), compared to those who completed an education at a low level (59.7 percent).

Furthermore, age, gender, level of education and personal income were not significantly related to the consumption of beans. Only participants' country of birth and the country of birth of their partner were significantly related to the consumption of beans. Compared to participants born on Aruba, a significantly higher percentage of those not born on Aruba reported consuming beans on 3 days or more per week (16.7 percent and 33.3 percent, respectively). In addition, a significantly higher percentage of participants born on Aruba reported seldom or never consuming beans (29.4 percent and 14.5 percent, respectively). Where the country of birth of the partner was concerned, a significantly higher percentage of participants with a partner not born on Aruba reported consuming beans on 3 days or more per week when compared to participants with a partner born on Aruba (30.0 percent and 19.7 percent, respectively).

3.1.3.2 Snacks and sweets

Snacking and the consumption of sweets have been associated in different studies with weight gain and obesity (Forslund et al. 2005; Keski-Rahkonen et al., 2007; Macdiarmid et al., 1998; Marín-Guerrero et al., 2008).

Figure 18: Percentage consuming snacks and sweets according to STEPS Aruba 2006

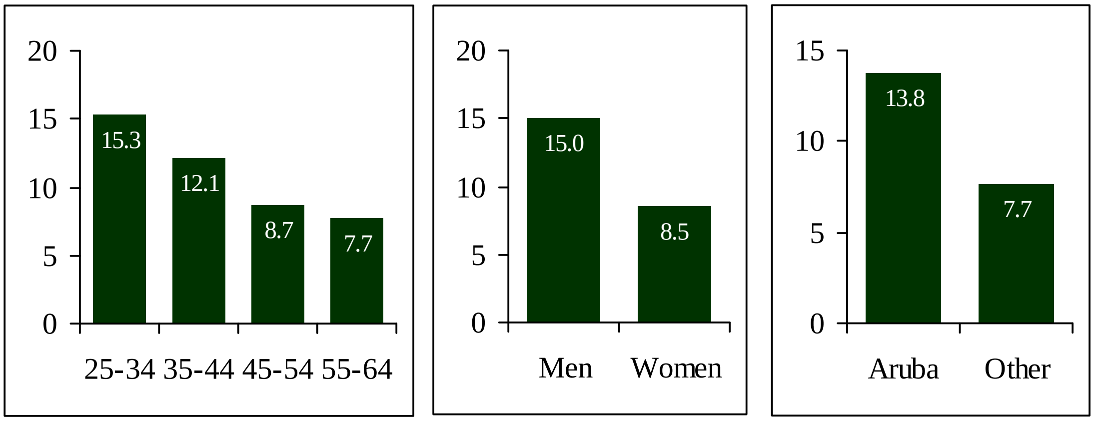


STEPS Aruba 2006 data (see text box on page 32) indicated that more than half the participants reported seldom or never consuming snacks and over 40 percent reported seldom or never consuming sweets. On the other hand, 10.3 percent of participants reported consuming snacks at least 3 days per week, and 17.5 percent reported eating sweets at least 3 days per week (see Figure 18).

Further analyses revealed that the consumption of snacks was significantly related to participants' age, gender and country of birth. A significantly higher percentage of 25 to 34 year olds, men and Aruban born participants reported consuming snacks on 3 days or more per week compared to, respectively, 55 to 64 year olds, women and not Aruban born participants (see Figure 19). On the other hand, other demographic and socio-economic variables, such as country of birth of partner, level of education and personal income, were not significantly related to the consumption of snacks.

Where the consumption of sweets was concerned, no demographic and socio-economic variables showed a significant relationship with the consumption of sweets.

Figure 19: Percentage consuming snacks on 3 days or more per week by age, gender, and country of birth, according to STEPS Aruba 2006



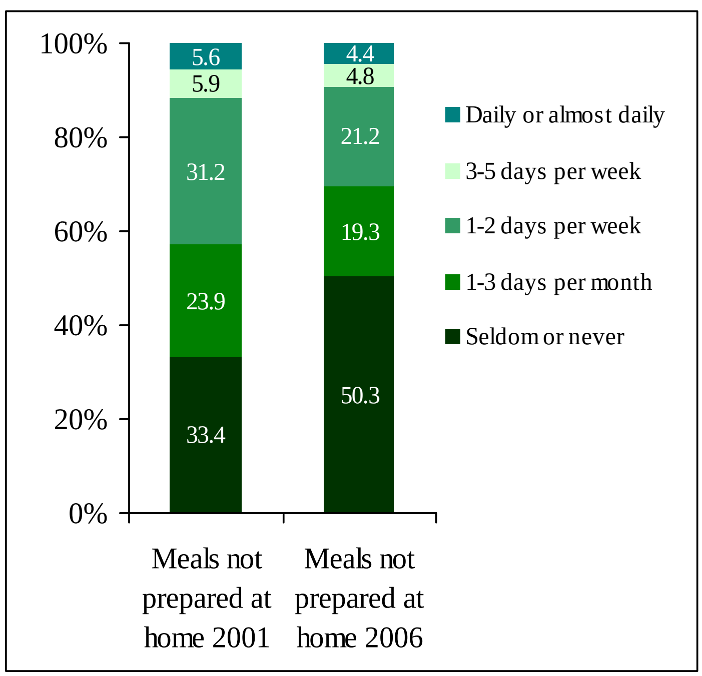
3.1.3.3 Meals not prepared at home

The consumption of food prepared outside the home, in particular, the consumption of fast food, has been associated in many studies with higher total energy intake, poor diet quality and higher BMI (Bowman & Vinyard, 2004; Duffey et al., 2007; Ma et al., 2003; Rosenheck, 2008; Schröder et al., 2007).

Research has indicated that time scarcity or the feeling of not having enough time, due to for example long working hours, is one of the factors implicated in the changes in food consumption patterns over the past years. The preparation of food at home has decreased and the consumption of ready-prepared food or food not prepared at home has increased, contributing to less healthful diets and on the long run, chronic health problems (Jabs & Devine, 2006).

During STEPS Aruba 2006 half the participants reported seldom or never consuming meals not prepared at home (see text box on page 32), which was a substantial increase when compared to data from the 2001 Aruba Health Survey. In 2001, a third of the participants reported seldom or never consuming meals not prepared at home (see Figure 20). In addition, the percentage of participants who reported consuming meals not prepared at home at

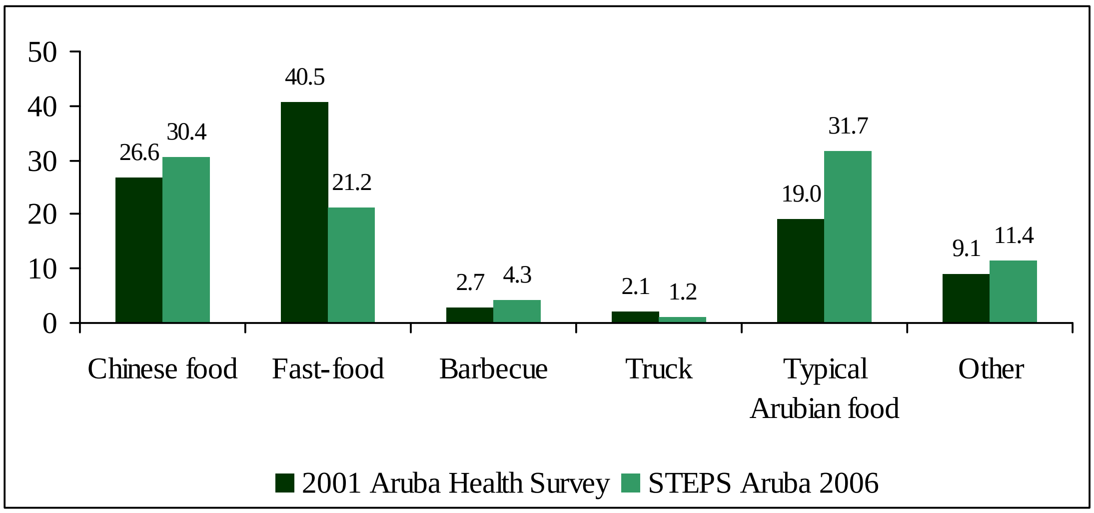
Figure 20: Percentage consuming meals not prepared at home according to data from the 2001 Aruba Health Survey and STEPS Aruba 2006



least once a week decreased between 2001 and 2006 with more than 10 percent (from 42.7 percent in 2001 to 30.4 percent in 2006).

When participants where asked what type of food they most often consumed when buying food not prepared at home, the majority reported consuming typical Arubian food. In contrast, in 2001, the majority reported most often consuming fast-food. Between 2001 and 2006, the percentage of participants that reported most often consuming fast-food nearly halved, whereas the percentage that reported most often consuming typical Arubian food increased with some 12 percent. The second type of food most often consumed was both in 2001 and 2006, Chinese food (see Figure 21).
Further analysis of the relationships between various demographic and socio-economic variables and the consumption of meals not prepared at home revealed that of the variables analyzed, only age and employment status were significantly related to the consumption of meals not prepared at home. Gender, country of birth, country of birth of partner, level of education and personal income were not.

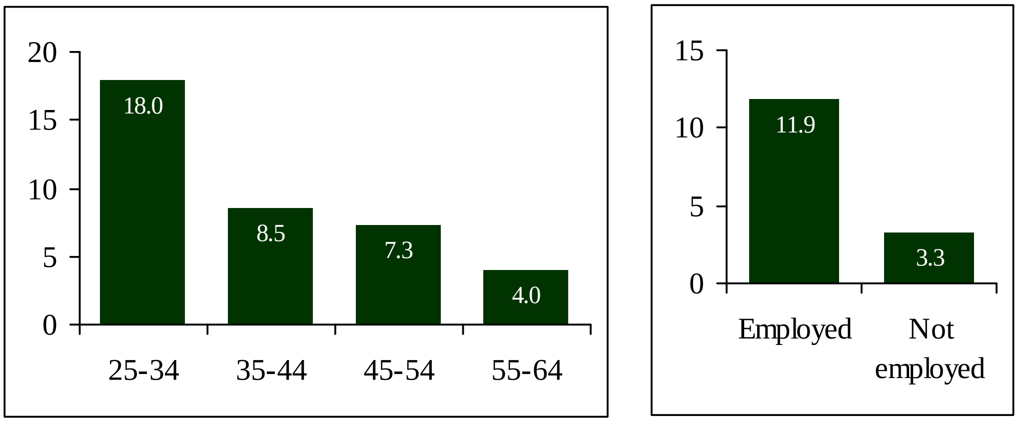
Figure 21: Type of food most often consumed when buying meals not prepared at home according to data from the 2001 Aruba Health Survey and STEPS Aruba 2006



Where age was concerned, a significantly higher percentage of participants between 25 and 34 years of age reported consuming meals not prepared at home on at least 3 days per week, compared to those between 35 and 44 years of age. In addition, a significantly higher percentage of participants between 45 and 64 years of age reported seldom or never consuming meals not prepared at home, compared to those between 25 and 44 years of age (see Figure 22).

Furthermore, employment status was significantly related to the consumption of meals not prepared at home in that a significantly higher percentage of participants who were employed reported consuming meals not prepared at home on at least 3 days per week. In addition, a significantly higher percentage of those who indicated not being employed reported seldom or never consuming meals not prepared at home (see Figure 22).

Figure 22: Percentage consuming meals not prepared at home on 3 days or more per week by age, and employment status, according to STEPS Aruba 2006



Summarizing the results obtained with regards to the consumption of various food products, including whole grain products, beans, snacks, sweets, and meals not prepared at home, we can conclude that no single demographic or socio-economic variable is unequivocally related to the consumption of “healthy” and “less healthy/unhealthy” food products (see Tables 10 and 11).

Table 10: Summary of the results of analyses on the relationships between demographic and socio-economic variables and the consumption of various food products

	Whole grains	Beans	Snacks	Sweets	Meals not prepared at home
Gender			*		
Age			*		*
Country of birth		*	*		
Country of birth of partner		*			
Level of education	*				
Personal income					
Employment status					*

Note: *indicates a significant relationship

Table 11: Summary of the direction of the relationships between demographic and socio-economic variables and the consumption of various food products

	Whole grains	Beans	Snacks	Sweets	Meals not prepared at home
Men			↑		
Age between 25 and 34 years			↑		↑
Not born on Aruba		↑	↓		
Partner not born on Aruba		↑			
High level of education	↑				
Employed					↑

Note: ↑ indicates a significant positive relationship; ↓ indicates a significant negative relationship

There is increasing empirical evidence that indicates that hydration plays an important role in the maintenance of health (WHO recommended daily fluid intake is depicted in Table 12). Water supports the digestion of food, the absorption, transportation and use of nutrients and the eliminations of toxins and wastes from the body (Kleiner, 1999). Even mild dehydration has been linked to the development of various diseases, including urinary stone disease, cancers of the breast, colon and urinary tract, fatal coronary disease and cognitive problems (Chan et al., 2002; Kleiner 1999; Manz, 2007; Manz & Wentz, 2005; Ritz & Berrut, 2005).

Table 12: WHO recommendations on fluid intake in liters (Howard & Bartram, 2003)

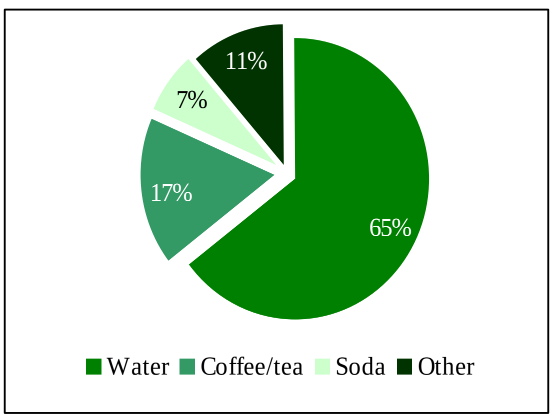
	Sedentary, temperate environment	Physically active and/or increased temperature
Female adult (58 kilograms)	2.2	4.5
Male adult (70 kilograms)	2.9	4.5

During STEPS Aruba 2006, participants were asked to report how many fluid ounces of non-alcoholic beverages (water, coffee or tea, soda, and other non-alcoholic beverages) they drank per day.

STEPS Aruba 2006: Question asked on the consumption of certain products

- How many of the following non-alcoholic beverages do you drink per day? (water, coffee/tea, soda, other)

Figure 23: Amount of non-alcoholic beverages consumed per day as a percentage of total fluid consumption per day (= 95.5 fluid ounces = 2.8 liters)



On average, participants reported drinking 95.5 fluid ounces of non-alcoholic beverages per day (which equals 2.8 liters), of which 61.6 fluid ounces of water, 16.3 fluid ounces of coffee and tea, 7.0 fluid ounces of sodas, and 10.8 fluid ounces of other beverages, including a variety of fruit juices and milk (see Figure 23). Men reported drinking, on average, 103.9 fluid ounces per day (which equals 3.1 liters), and women, on average, 88.8 fluid ounces per day (which equals 2.6 liters), which is below the daily recommendations of the WHO for the warm Aruban climate.

It has been acknowledged that the consumption of sugar-sweetened beverages, including carbonated soft drinks, is a main contributor to the epidemic of overweight and obesity. Furthermore, while sugar-sweetened beverages provide little nutritional benefits, they probably increase the risk of diabetes, fractures and dental caries (Larsson, Bergkvist, Wolk, 2006; Malik, Schulze, Hu, 2006; Montonen et al., 2007; Schulze, 2005).

As mentioned before, participants reported drinking, on average, 7.0 fluid ounces (0.2 liters) of soda/soft drinks per day, which represents an intake of approximately 90 calories and 29 grams or 6 teaspoons of sugar per day.

A linear regression analysis to explain the number of fluid ounces of soda/soft drinks consumed per day revealed that age was a significant contributor to the equation. Participants between 25 and 44 years of age reported consuming significantly more ounces of soda/soft drinks per day, compared to those between 45 and 64 years of age. Other demographic variables, such as gender, country of birth, level of education and personal income did not contribute significantly to the explanation of the variance in the number of ounces of soda/soft drinks consumed per day (see Tables 13 and 14).

Table 13: The results of a regression analyses to explain the number of fluid ounces of soda consumed per day

	Fluid ounces of soda/soft drinks
	Sign. level
(Corrected Model)	.010
(Intercept)	.000
Gender	.197
Age category	.000
Country of birth	.729
Level of education	.392
Personal income	.345

Note: *R^2=.02

Table 14: Mean number of fluid ounces of soda consumed per day by age group

	Mean number of fluid ounces of soda/soft drinks
Age group	
25-34 years	9.0
35-44 years	8.0
45-54 years	5.2
55-64 years	4.4

3.2 Physical inactivity

Along with an unhealthy diet, lack of physical activity is a major risk factor for developing chronic non-communicable diseases. Physical inactivity was estimated by the WHO to cause 10 to 16 percent of cases of breast cancer, colon cancers, and diabetes, and 22 percent of ischaemic heart disease (WHO, 2003). On the other hand, regular physical activity is associated with a wide range of physical, social, economic, and mental health benefits.

During the STEPS Aruba 2006 survey, participants were asked to indicate the amount of time they spent doing physical activity on each of three domains of everyday life: work, transport and recreation. In addition, participants were asked to indicate the amount of time they spent doing moderate and high levels of activity during work and recreation. Finally, the amount of time spent per day on sedentary activities was assessed.

Health benefits associated with regular physical activity

- Reduction of risk of dying prematurely
- Reduction of risk of dying from heart disease
- Reduction of risk of developing diabetes
- Reduction of risk of developing high blood pressure
- Helping reduce blood pressure in people who already have high blood pressure
- Reduction of risk of developing colon cancer
- Reduction of feelings of depression and anxiety
- Helping control weight
- Helping to build and maintain healthy bones, muscles, and joints
- Helping older adults become stronger and better able to move about without falling
- Promoting psychological well-being

(Bauman & Craig, 2005; Report of the Surgeon General, 1996; WHO, 2003).

3.2.1 Total physical activity

In total, participants reported spending 137.7 minutes per day on work-, travel-, and recreation-related physical activities, which equals 2 hours and 17.7 minutes per day. Women reported spending significantly less time per day on physical activities than men (121.1 minutes per day, and 158.5 minutes per day, respectively).

Table 15: The results of a regression analysis to explain the variance in the amount of time spent per day (in minutes) on physical activities

	Physical activity*
	Sign. level
(Corrected Model)	.000
(Intercept)	.000
Gender	.001
Age category	.017
Country of birth	.004
Employment status	.000
Level of education	.458
Personal income	.065

Note: *R^2=.06

Other demographic and socio-economic variables, such as age, country of birth, and employment status, also contributed significantly to the explanation of the variance in the amount of time participants spent on physical activities (see Table 15).

Participants who reported spending significantly less time on physical activities per day were: women, participants in the age category of 55 to 64 years of age, participants born on Aruba, and those who were not employed (see Table 16).

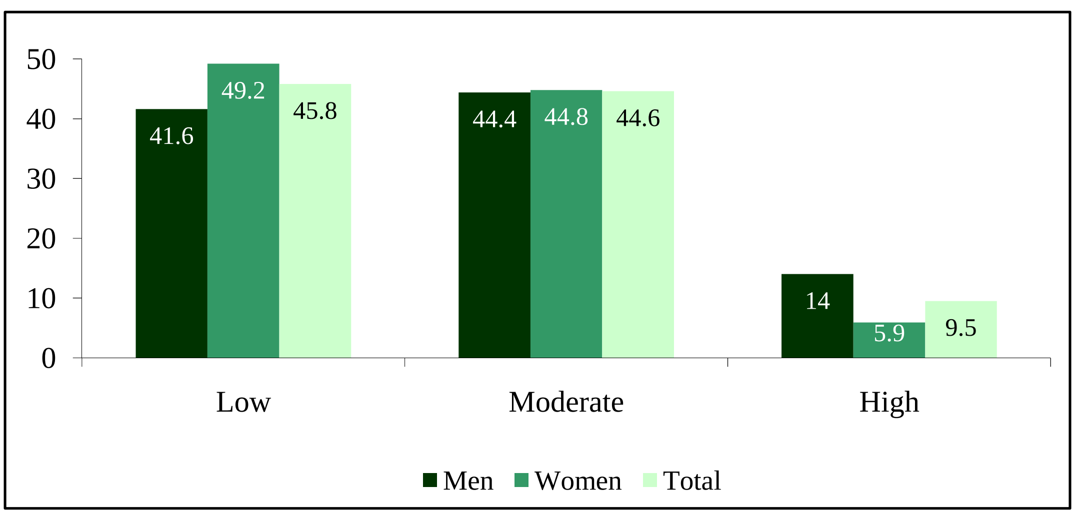
Table 16: Mean time (in minutes) spent per day on physical activities by gender, age, country of birth, and employment status

	Mean time (in minutes)
Gender	
Men	158.5
Women	121.1
Age group	
25-34 years	171.5
35-44 years	134.8
45-54 years	122.8
55-64 years	106.5
Country of birth	
Aruba	98.9
Other	132.9
Employment Status	
Employed	147.6
Not employed	87.6

Note: *Only the means for those variables that contributed significantly to the regression analyses are depicted in the table

The level of activity participants engaged in was derived from the total amount of time participants reported spending on all three domains of functioning. The total amount of physical activity was then categorized into three levels of total physical activity, low, moderate, and high. The results revealed that participants engaged primarily in low and moderate levels of physical activities, spending 9.5 minutes per day on high levels of physical activity (see Figure 24).

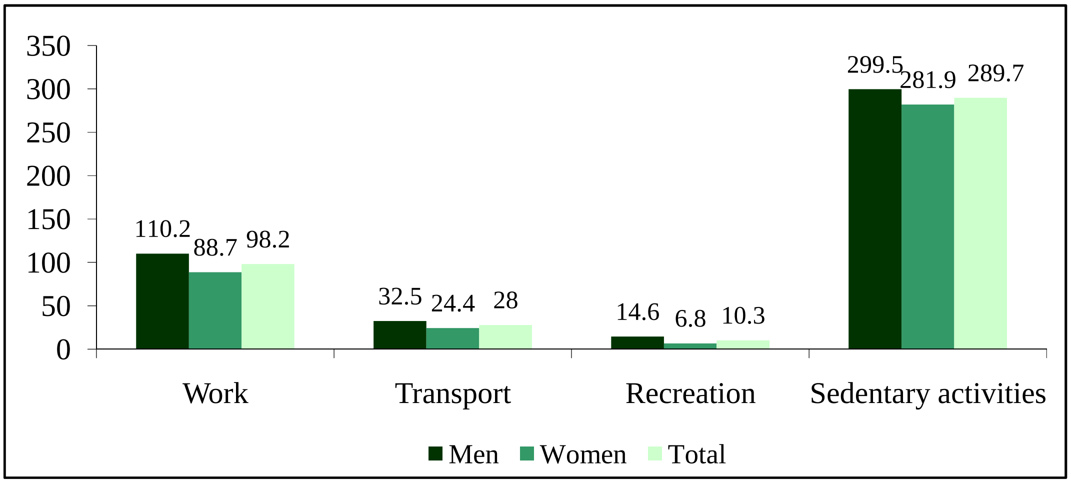
Figure 24: Mean time spent per day in minutes on physical activities by level of activity



The amount of time participants spent on low and moderate levels of physical activity was not related to age and gender, although women reported spending relatively more time on low levels of physical activity when compared to men and participants in the age category of 25 to 34 years reported spending relatively less time on low levels of physical activity and relatively more time on moderate levels of physical activities when compared to participants between 35 and 64 years of age. These differences were however not significant.

Finally, the results were also analyzed per domain of physical activity: work-, transport- and recreation-related physical activities, and sedentary activities (see Figure 25). In the following sections, the results will be discussed per domain.

Figure 25: Mean time spent per day in minutes in work-, transport-, and recreation-related physical activities and sedentary activities



3.2.2 Work-related physical activities

Participants reported spending, in a typical week on average 98.2 minutes per day on work-related physical activities (see Figure 25). A linear regression analysis conducted to explain the variance in the amount of time spent per day on work-related physical activities, revealed that neither gender, nor age, country of birth, level of education and personal income contributed significantly to the equation. Only participants' occupation contributed significantly to the explanation of their work-related physical activity (see Table 17).

Table 17: The results of a regression analysis to explain the variance in the amount of time spent per day (in minutes) on work-related physical activities

	Work-related physical activity*
	Sign. level
(Corrected Model)	.000
(Intercept)	.000
Gender	.674
Age category	.326
Country of birth	.195
Level of education	.160
Occupation (for those employed)	.000
Personal income	.257

Note: *R^2=.11

STEPS Aruba 2006: Questions asked on work-related physical activity

- Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like carrying or lifting heavy loads, digging or construction work, for at least 10 minutes continuously?
- In a typical week, on how many days do you do vigorous-intensity activities as part of your work?
- How much time do you spend doing vigorous-intensity activities at work on a typical day?
- Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking or carrying light loads for at least 10 minutes continuously?
- In a typical week, on how many days do you do moderate-intensity activities as part of your work?
- How much time do you spend doing moderate-intensity activities at work on a typical day?

Those who reported spending significantly more time on work-related physical activities were skilled agricultural and fishery workers, craft and related trade workers, and participants with elementary occupations. Those who reported spending significantly less time on work-related physical activities were professionals, technicians, and associate professionals and clerks (see Table 18).

Table 18: Mean time (in minutes) spent per day on work-related physical activities by level of education, occupation, and personal income*

	Mean time (in minutes)
Occupation (for those employed)	
Legislators, senior officials, and managers	103.6**
Professionals	58.9
Technicians and associate professionals	52.5
Clerks	46.2
Service workers and shop and market sales workers	99.1
Skilled agricultural and fishery workers	190.0
Craft and related trades workers	178.6
Plant and machine operators and assemblers	101.5
Elementary occupations	181.0

Note: *Only the means for those variables that contributed significantly to the regression analyses are depicted in the table; **managers reported spending more than would be expected on work-related physical activities, as this category includes owners of small businesses who are actively involved in the daily activities of their business

When the level of work-related physical activity was taken into account, the results revealed that participants spent significantly more time per day on moderate levels of work-related physical activity (57.4 minutes) than on vigorous levels of work-related physical activities (40.4 minutes), especially where women were concerned. Women reported spending more than twice as much time on moderate work-related physical activities per day than on vigorous work-related activities.

The results of a linear regression analysis to explain the variance in the amount of time spent on moderate work-related physical activities revealed that participants' occupation (for those employed) was the sole significant contributor to the equation. Those who reported spending significantly more time in moderate work-related physical activities were participants with elementary occupations, craft and related trades workers, service workers and shop and market sales workers. Other demographic and socioeconomic variables, such as age, gender, and country of birth, level of education, and personal income did not contribute significantly to the explanation of the variance in the amount of time spent on moderate work-related physical activities (see Tables 19 and 20).

Where the amount of time spent on vigorous work-related physical activities was concerned, a linear regression analysis showed a significant contribution of occupation (for those employed) and personal income to the equation. However, neither gender, nor age, nor country of birth, nor level of education contributed significantly to the explanation of the variance in the amount of time participants reported spending on vigorous work-related physical activities (see Table 19). Those who reported spending significantly more time on vigorous work-related physical activities were: skilled agricultural and fishery workers, and craft and related trades workers and, counter intuitively, participants with a personal income in the high income class (see Table 20).

Table 19: Results of a series of linear regression analyses to explain the variance in time spent (in minutes per day) on work-related physical activities

	Work-related physical activity	
	Moderate*	Vigorous**
	Sign. level	Sign. level
(Corrected Model)	.000	.000
(Intercept)	.000	.000
Gender	.468	.269
Age category	.969	.127
Country of birth	.150	.696
Level of education	.055	.891
Occupation (for those employed)	.007	.000
Personal income	.242	.018

Note: *R^2=.04; **R^2=.10

Table 20: Mean time (in minutes) spent per day on moderate and vigorous work-related physical activities by gender, country of birth, level of education, and personal income*

	Moderate	Vigorous
Occupation		
Legislators, senior officials, and managers	48.2	55.4
Professionals	42.9	15.9
Technicians and associate professionals	35.8	16.7
Clerks	38.0	8.1
Service workers and shop and market sales workers	68.3	30.5
Skilled agricultural and fishery workers	40.1	149.9
Craft and related trades workers	72.7	105.9
Plant and machine operators and assemblers	28.5	73.1
Elementary occupations	95.5	81.6
Income class		
Low income class		29.3
High income class		46.1

Note: *Only the means for those variables that contributed significantly to the regression analyses are depicted in the table

3.2.3 Transport-related physical activities

In a typical week, participants reported spending and average of 28.0 minutes per day on transport-related physical activities (see Figure 25).

The results of a linear regression analysis to explain the variance in the amount of time spent per day on transport-related physical activities revealed that only gender and place of residence contributed significantly to the equation. Other demographic and socioeconomic variables, such as age, country of birth, level of education, and personal income did not contribute significantly to the explanation of the variance in the amount of time participants spent per day on transport-related physical activities (see Tables 21 and 22).

STEPS Aruba 2006: Questions asked on transport-related physical activity

- Do you walk or use a bicycle for at least 10 minutes continuously to get to and from places?
- In a typical week, on how many days do you walk or use a bicycle for at least 10 minutes continuously to get to and from places?
- How much time do you spend walking or cycling for travel on a typical day?

Table 21: The results of a regression analysis to explain the variance in the amount of time spent per day (in minutes) on transport-related physical activities

	Transport-related physical activity*
	Sign. level
(Corrected Model)	.000
(Intercept)	.000
Gender	.053
Age category	.261
Country of birth	.674
Place of residence	.000
Employment status	.006
Level of education	.481
Personal income	.046

Note: $*R^2=.08$

The results indicated that employed participants, those who lived in the area of Santa Cruz, and participants in the low income class, reported spending significantly more time on transport-related activities (see Table 22).

Table 22: Mean time (in minutes) spent per day on transport-related physical activities by gender, and income*

	Mean time (in minutes)
Place of residence	
Noord/Tanki Leendert	13.5
Oranjestad West	18.9
Oranjestad Oost	39.6
Paradera	2.7
Santa Cruz	57.5
Savaneta	20.6
San Nicolas Noord	45.6
San Nicolas Zuid	22.5
Employment status	
Employed	29.1
Not employed	19.9
Personal income	
Low income class	28.8
High income class	26.6

Note: *Only the means for those variables that contributed significantly to the regression analyses are depicted in the table

3.2.4 Recreation-related physical activities

Participants reported spending, in a typical week on average 10.3 minutes per day on recreation-related physical activities (see Figure 25). A linear regression analysis conducted to explain the variance in the amount of time spent per day on recreation-related physical activities revealed that gender and age were significant contributors to the equation (see Tables 23 and 24). Men reported spending significantly more time per day on recreation-related activities than women, and participants in the age category of 25 to 34 years, reported spending significantly more time on recreation-related activities per day than those between ages 35 and 64 years. Other demographic and socioeconomic variables, such as country of birth, level of education, and personal income did not contribute significantly to the explanation of the variance in the amount of time spent on recreation-related physical activities.

STEPS Aruba 2006: Questions asked on recreation-related physical activity

- Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like running or football, for at least 10 minutes continuously?
- In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (leisure) activities?
- How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?
- Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, cycling, swimming, volleyball for at least 10 minutes continuously?
- In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?

Table 23: The results of a regression analysis to explain the variance in the amount of time spent per day (in minutes) on recreation-related physical activities

	Recreation-related physical activity*
	Sign. level
(Corrected Model)	.000
(Intercept)	.000
Gender	.000
Age category	.001
Country of birth	.617
Level of education	.083
Personal income	.371

Note: *R^2=.06

Table 24: Mean time (in minutes) spent per day on recreation-related physical activities by gender, and income*

	Mean time (in minutes)
Gender	
Men	14.6
Women	6.8
Age group	
25-34 years	18.3
35-44 years	9.4
45-54 years	5.5
55-64 years	6.3

Note: *Only the means for those variables that contributed significantly to the regression analyses are depicted in the table

Taking into account the level of recreation-related physical activities participants engaged in, the results indicated that participants spend 4.4 minutes per day on moderate recreation-related physical activities and 5.6 minutes on vigorous recreation-related physical activities.

A linear regression analysis conducted to explain the variance in the amount of time participants spend on moderate recreation-related physical activities, revealed that gender was the sole significant contributor to the equation (see Table 25). Men reported spending significantly more time on moderate recreation-related activities than women. Other demographic and socioeconomic variables, such as age, country of birth, level of education, and personal income were not significant contributors to the explanation of the variance in the amount of time participants spent on moderate recreation-related physical activities (see Table 26).

Another linear regression analysis to explain the variance in the amount of time spent on vigorous recreation-related physical activities, revealed a significant contribution of age, gender and level of education (see Table 25). Men reported again spending significantly more time than women on vigorous recreation-related physical activities, and participants in the age category of 25 to 34 years reported spending significantly more time per day on vigorous recreation-related activities than those between 35 and 64 years of age. In addition, participants who completed a high level of education, reported spending nearly double the amount of time on vigorous recreation-related physical activities than those with a low level of education. Other demographic and socioeconomic variables showed no significant contribution to the explanation of the variance of the amount of time participants spent on vigorous recreation-related physical activities (see Table 26).

Table 25: Results of a series of linear regression analyses to explain the variance in time spent (in minutes per day) on recreation-related physical activities

	Recreation-related physical activity	
	Moderate*	Vigorous**
	Sign. Level	Sign. level
(Corrected Model)	.000	.000
(Intercept)	.000	.000
Gender	.016	.000
Age category	.069	.000
Country of birth	.688	.672
Level of education	.315	.049
Personal income	.382	.589

Note: *R^2=.02; **R^2=.07

Table 26: Mean time (in minutes) spent per day on moderate and vigorous recreation-related physical activities by gender and age*

	Moderate	Vigorous
Gender		
Men	6.2	8.4
Women	3.5	3.3
Age group		
25-34 years		11.4
35-44 years		5.1
45-54 years		2.3
55-64 years		1.5
Level of education		
Low level of education		3.6
High level of education		7.1

Note: *Only the means for those variables that contributed significantly to the regression analyses are depicted in the table

3.2.5 Sedentary activities

STEPS Aruba 2006: Questions asked on sedentary activities

- How much time do you usually spend sitting or reclining on a typical day?

The results of the STEPS Aruba 2006 survey indicate furthermore, that in a typical week, participants spend the majority of their time on sedentary activities, including sitting and reclining at home, or with friends, sitting at a desk at work, traveling in a car, reading, playing computer games, watching television, etc. (289.7 minutes per day; see Figure 25 on page 42).

A linear regression analysis to explain the variance in the amount of time spent per day on sedentary activities revealed that age, country of birth and level of education contributed significantly to the equation (see Table 27). Participants between 35 and 44 years of age, participants born on Aruba, and those who completed a high level of education reported spending significantly more time on sedentary activities. Other demographic and socioeconomic variables, such as gender, and personal income did not contribute significantly to the explanation of the variance in the amount of time participants reported spending on sedentary activities (see Table 28).

Table 27: Results of a series of linear regression analyses to explain the variance in the amount of time (in minutes) spent per day on sedentary activities

	Sedentary activities
	Sign. level
(Corrected Model)	.000
(Intercept)	.000
Gender	.426
Age category	.031
Country of birth	.001
Level of education	.000
Personal income	.126

Note: $*R^2$=.04

Table 28: Mean time (in minutes) spent per day on sedentary activities by country of birth and level of education*

	Mean time (in minutes)
Age group	
25-34 years	267.9
35-44 years	311.6
45-54 years	282.2
55-64 years	298.2
Country of birth	
Aruba	346.2
Other	299.2
Level of education	
Low level of education	260.7
High level of education	312.3

Note: *Only the means for those variables that contributed significantly to the regression analyses are depicted in the table

Summarizing, a series of regression analyses revealed that demographic and socioeconomic variables contributed significantly to the explanation of the variance in the amount of time participants of the STEPS Aruba 2006 survey reported spending per day on physical activities (see Table 29).

The results of all the analyses followed a common pattern, in that overall those who reported spending more time on physical activities were: men, participants between 25 and 34 years of age, and those not born on Aruba (see Table 30).

Table 29: Summary of the results of a series of regression analyses to explain the variance in the amount of time per day (in minutes) spent on physical activities by modality and intensity

	Total physical activities	Work-related physical activities			Transport-related physical activities	Recreation-related physical activities			Sedentary activities
		Total	Moderate	Vigorous		Total	Moderate	Vigorous	
Gender	*					*	*	*	
Age	*					*		*	*
Country of birth	*								*
Place of residence	-	-	-	-	*	-	-	-	-
Employment status	*	-	-	-	*	-	-	-	-
Level of education								*	*
Occupation	-	*	*	*	-	-	-	-	-
Personal income				*	*				

Note: * indicates a significant relationship; - indicates which variables were not included in the analyses

Table 30: Summary of the contribution of demographic and socioeconomic variables to the explanation of the variance in the amount of time per day (in minutes) spent on physical activities by modality and intensity

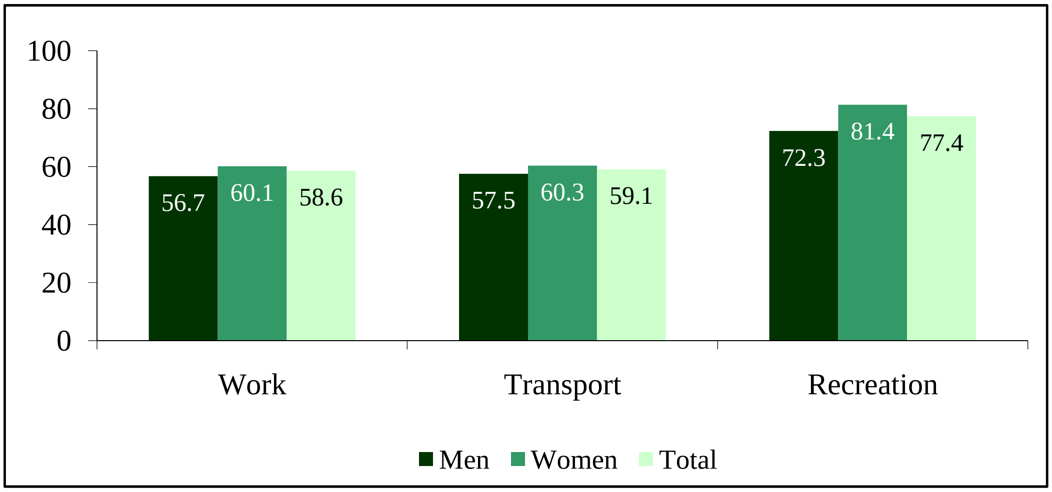
	Total physical activities	Work-related physical activities			Transport-related physical activities	Recreation-related physical activities			Sedentary activities
		Total	Moderate	Vigorous		Total	Moderate	Vigorous	
Men	↑					↑	↑	↑	
Age between 25-34 years	↑					↑		↑	↓
Not born on Aruba	↑			↑					↓
Lives in the area of Santa Cruz	-	-	-	-	↑	-	-	-	-
Employed	↑	-	-	-	↑	-	-	-	-
High level of education								↑	↑
Skilled agricultural and fishery workers, craft and related trade workers, and those with elementary occupations	-	↑	↑	↑	-	-	-	-	-
High income class				↑	↓				

Note: ↑ indicates a significant positive relationship; ↓ indicates a significant negative relationship; - indicates which variables were not included in the analyses

3.2.6 No physical activity

Finally, the majority of participants of the STEPS Aruba 2006 survey indicated spending no time whatsoever on moderate or vigorous work-related, transport-related and recreation-related physical activity (58.6 percent, 59.1 percent, and 77.4 percent, respectively; see Figure 26).

Figure 26: Percentage of participants involved in no moderate or vigorous work-, transport, and recreation-related physical activities



Comparison of means and confidence intervals revealed that a significantly higher percentage of participants born on Aruba reported spending no time whatsoever on moderate or vigorous work-related physical activities compared to those not born on Aruba (62.2 percent and 53.1 percent, respectively). Furthermore, a significantly higher percentage of women than men reported spending no time on moderate or vigorous recreation-related physical activities (81.3 percent and 72.6 percent, respectively). The results indicated that other demographic and socioeconomic variables, such as age, level of education and personal income were not significantly related to the lack of physical activity in participants of the STEPS Aruba 2006 survey.

3.3 Tobacco use

According to the WHO, smoking and other forms of tobacco use are the second major cause of death in the world, claiming an estimated 4.9 million lives a year, which equals one in ten deaths worldwide. Tobacco use is the fourth most common risk factor for disease worldwide, being a major cause of many of the world's top killer diseases. In addition, tobacco use is linked to huge economic costs, due to, among others, high public health expenses to treat tobacco-caused diseases, decreased productivity of tobacco users due to illness, and untimely death of a substantial part of the workforce (WHO, 2007).

During the STEPS Aruba 2006 survey, participants were asked a number of questions on their smoking habits, including if they smoked at the time of the interview.

Health problems associated with tobacco use

Heart and vascular diseases
- Coronary heart disease
- Stroke
- Peripheral vascular disease

Cancers
- Lung
- Mouth
- Oesophagus
- Kidney
- Pancreas
- Bladder
- Larynx
- Stomach
- Cervix

Respiratory diseases
- Chronic obstructive pulmonary disease (COPD)
- Asthma

Other
- Oral diseases

3.3.1 Current smoking

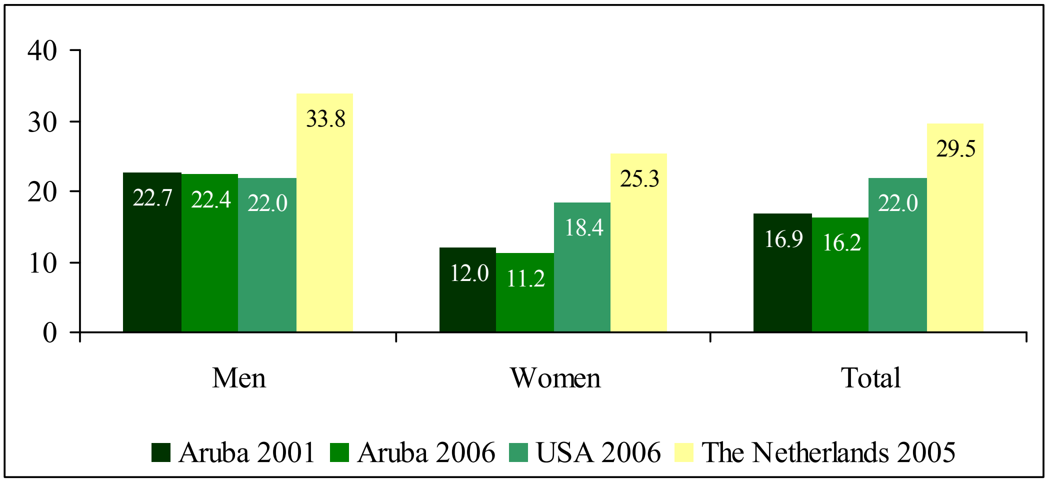
STEPS Aruba 2006: Question asked on current smoking
- Do you currently smoke tobacco products?

In total, 16.2 percent of participants reported being current smokers, significantly more men than women (22.4 percent and 11.2 percent, respectively). Although a relatively higher percentage of participants in the 45 to 54 age category reported being current smokers, compared to participants in the other age categories, this difference was not significant. Age was thus not significantly related to current smoking status. Furthermore, neither country of birth, level of education or personal income were significantly related to current smoking status, despite the fact that a relatively higher percentage of participants who had completed a university preparatory education reported being current smokers (41.0 percent) and the prevalence of current smokers increased with increasing gross monthly personal income.

Compared to data obtained by means of the 2001 Aruba Health Survey, the percentage of participants who reported being current smokers in the STEPS Aruba 2006 survey was very similar to that in 2001 (16.2 percent and 16.7 percent, respectively).

The prevalence of current smokers in Aruba is relatively low compared to that in the United States and the Netherlands, especially where women are concerned. Only 11.2 percent of women reported being current smokers in the STEPS Aruba 2006 survey, compared to 18.4 percent of women in the United States and 25.3 percent in the Netherlands (see Figure 27).

Figure 27: The prevalence of current smokers in Aruba, compared to that in the United States and the Netherlands



Source: Aruba 2001: Health Survey Aruba 2001; Aruba 2006: Aruba STEPS 2006; USA 2006: Prevalence data nationwide tobacco use 2006, Behavioral Risk Factor Surveillance System, National Center for Chronic Disease Prevention & Health Promotion; The Netherlands 2005: Gerapporteerde gezondheid en leefstijl 2005, Cental Bureau of Statistics, the Netherlands.

3.3.2 Daily smoking

In the STEPS Aruba 2006 survey, among those participants who reported being current smokers, the majority reported smoking daily (77.8 percent; 76.9 percent of males and 79.4 percent of females). In total, the prevalence of daily smokers was 12.6. Significantly more men than women reported being daily smokers (17.2 percent and 8.9 percent, respectively). There was however no significant difference in age, country of birth, level of education and personal income.

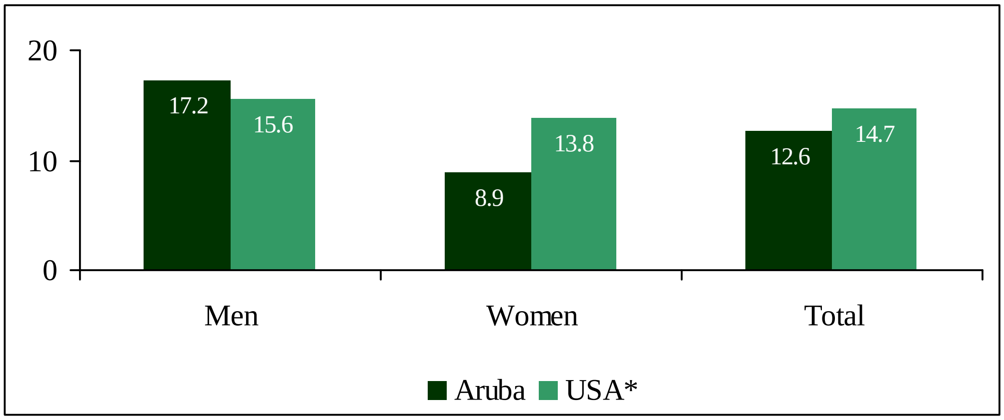
Compared to data from the United States, the prevalence of daily smokers according to data obtained in the STEPS Aruba 2006 survey was relatively lower. However, when gender was taken into account, the prevalence of daily smokers among men in Aruba was higher than that

STEPS Aruba 2006: Question asked on daily smoking

- Do you currently smoke tobacco products daily?
- Did you ever smoke daily in the past?
- How old were you when you stopped smoking daily?
- Do you remember how long ago it was?
- How old were you when you first started smoking daily?
- Do you remember how long ago it was?
- On average, how many of the following (manufactured cigarettes, hand-rolled cigarettes, pipes full of tobacco, cigars, cheroots, cigarillos, other) do you smoke each day?

in the United States (see Figure 28). On the other hand, the prevalence of daily smokers among women in Aruba was more than 35 percent lower compared to that in women in the United States.

Figure 28: The prevalence of daily smokers in Aruba compared to that in the United States



* Source: Prevalence data 2006, Behavioral Risk Factor Surveillance System, National Center for Chronic Disease Prevention & Health Promotion.

During the STEPS Aruba 2006 survey, participants who indicated they smoked daily were also asked at what age they started smoking. By this means the duration of their daily smoking activities could also be determined. The results indicated that daily smokers started smoking daily on average at age 19, women starting smoking daily significantly later in life than men (at 21.1 years of age and at 18.0 years of age, respectively; see Figure 29).

A linear regression analysis to explain the variance in the age at which daily smokers started smoking daily, revealed that gender was the sole significant contributor. Other demographic variables, such as country of birth, level of education, and personal income showed no significant contribution to the explanation in the variance of the age at which participants started smoking daily (see Table 31).

Furthermore, daily smokers indicated having smoked daily for an average duration of 24.5 years (see Figure 29). A linear regression analysis to explain the variance in the duration of participants' daily smoking, revealed that gender and level of education contributed significantly to the equation. Women reported smoking daily for a significantly shorter period of time when compared to men (22.0 years and 26.2 years, respectively), which was to be expected given the fact that, as mentioned earlier, women report starting smoking significantly later in life. Where level of education was concerned, the results revealed that participants who had completed an education at a low level reported smoking daily for a longer period of time (27.1 years) when compared to those who completed an education at a high level (23.5 years; see Table 31).

Figure 29: Initiation and duration of smoking (in years) among current daily smokers

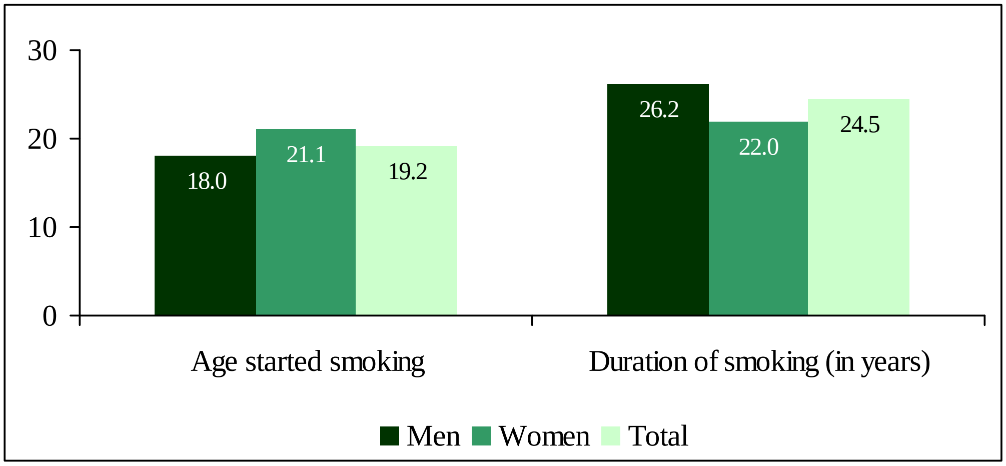
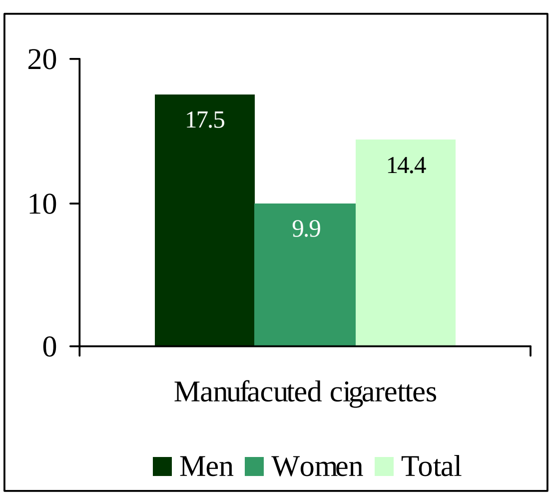


Table 31: Results of a linear regression analysis to explain the variance in the age at which participants started smoking daily

	Age at starting smoking daily*	Duration of daily smoking**
	Significance level	Significance level
(Corrected Model)	.000	.000
(Intercept)	.000	.000
Gender	.000	.000
Age category	.080	-
Country of birth	.887	.137
Level of education	.920	.014
Personal income	.297	.749

Note: *R^2=.10; **R^2=.09

Figure 30: Mean number of manufactured cigarettes smoked by daily smokers a day



Finally, participants of the STEPS Aruba 2006 survey who reported being daily smokers were asked what kind of tobacco products they used and how many of these products they used per day. The results revealed that almost all daily smokers used manufactured cigarettes (90.6 percent). Age, gender, country of birth, level of education and personal income were not related to the preference of manufactured cigarettes above the other types of tobacco products.

Daily smokers reported furthermore smoking on, on average, 14.4 manufactured cigarettes a day. Women reported smoking significantly less manufactured cigarettes than men (9.9 and 17.5, respectively; see Figure 30). Other demographic variables such as age, country of birth, level of education and personal income were not significantly related to the number of manufactured cigarettes smoked a day.

Summarizing, the results indicated that gender was the single common variable that was significantly related to all aspects of tobacco use. Overall, men reported significantly more often being current smokers, and smoking daily. In addition, men started using tobacco significantly earlier in life and over a significantly longer period of time. Furthermore, men reported smoking significantly more manufactured cigarettes per day (see Tables 32 and 33).

Table 32: Summary of the results of a series of analyses to explain the contribution of a number of variables to different aspects of tobacco use

	Current smoking	Daily smoking	Age at starting smoking daily	Duration of daily smoking	Number of cigarettes smoked a day
Gender	*	*	*	*	*
Age					
Country of birth					
Level of education				*	
Personal income					

Note: * indicates a significant relationship

Table 33: Summary of the contribution of a number of variables to different aspects of tobacco use

	Current smoking	Daily smoking	Age at starting smoking daily	Duration of daily smoking	Number of cigarettes smoked a day
Men	↑	↑	↑	↑	↑
Age between 25-34 years					
Not born on Aruba					
Level of education				↓	
Personal income					

Note: ↑ indicates a significant positive relationship; ↓ indicates a significant negative relationship

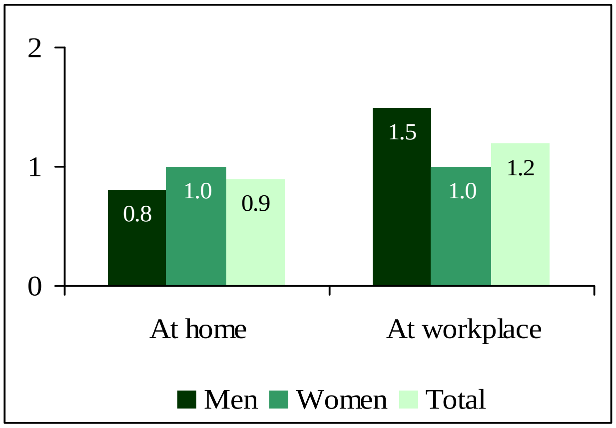
STEPS Aruba 2006: Question asked on second-hand smoking

- During the last 7 days, how many days did someone smoke in your home while you were present?
- During the last 7 days, how many days did someone smoke in closed areas in your workplace (in the building, in the workstation or a specific office) while you were present?

3.3.3 Second-hand smoking

According to the Center of Disease Control, being exposed to second-hand smoking equals being exposed to at least 250 chemicals known to be toxic, of which more than 50 can cause cancer. Second hand smoking is related to a number of diseases in nonsmokers, including cardiovascular disease, lung cancer and sudden infant death syndrome. Non-smokers who are exposed to second-hand smoking at their home or workplace have an estimated increased risk of developing heart disease of 25 to 30 percent and an estimated increased risk of developing lung cancer of 20 to 30 percent. Furthermore, being exposed to second-hand smoking can make a heart attack more severe than it would have been in the absence of exposure (Center of Disease Control, 2006, 2007).

Figure 31: Mean number of days in contact with tobacco smoke



Participants of the STEPS Aruba 2006 survey were asked how many days per week they were exposed to second-hand smoking at their home and workplace. The results revealed that less than 1 percent of participants were exposed to second-hand smoking at their home and only 1.2 percent was exposed to second-hand smoking at their workplace (see Figure 31).

3.4 Alcohol misuse

Alcohol consumption has demonstrated in numerous studies to have both beneficial and detrimental effects on health and well-being. There appears to be a U-shaped relation between alcohol consumption and total mortality, reflecting the beneficial effects of light to moderate alcohol on cardiovascular mortality and the detrimental effects of heavy alcohol use on, in particular, cancer mortality. The detrimental effects of heavy drinking appear to begin with 2 or 3 drinks per day. Lowering high levels of alcohol consumption (3 drinks per day or more) has been associated with a reduction in blood pressure in various prospective observational studies and clinical trials (Malinski et al., 2004).

Health problems associated with alcohol misuse

Heart and vascular diseases
- Coronary heart disease
- Stroke
- Hypertension

Cancers
- Mouth
- Pharynx, larynx, hypopharynx, oesophagus
- Liver
- Female breast cancer
- Stomach, pancreas, colon, rectum
- Prostate
- Salivary glands
- Ovarium, endometrium
- Bladder

Liver cirrhosis

Metabolic syndrome

Neuropsychiatric conditions
- Depression
- Epilepsy

Increasing evidence indicates that not only the volume of alcohol is relevant for the health outcomes, but also the pattern of drinking (Fan et al., 2008; WHO, 2008). Research has indicated that binge drinking (or heavy episodic alcohol use) is associated with high rates of impaired driving and alcohol-related accidents, with significantly worse health-related quality of life and mental distress, with higher odds of overweight and obesity, and with significantly less favourable effects of alcohol intake on coronary heart disease (Arif & Rohrer, 2005; Bagnardi et al., 2008; Flowers et al., 2008; Marczinski, Harrison & Fillmore, 2008; O'Keefe, Bybee & Lavie, 2007; Okoro et al., 2004; Valencia-Martín, Galán & Rodríguez-Artalejo, 2008).

During STEPS Aruba 2006, participants were asked whether they had ever consumed alcohol and at what age they started using alcohol. In addition, questions were asked about both the frequency and the amount of alcohol consumption during the year prior to the survey, the month prior to the survey and the week prior to the survey. Participants were then categorized as either current drinkers (those who reported having consumed alcohol in the month prior to the survey), not current drinkers (those who reported having consumed alcohol in the year prior to survey, but not in the month prior to the survey), abstainers (those who reported not having consumed alcohol in the year prior to the survey), or those who reported never having used alcohol.

STEPS Aruba 2006: Question asked on alcohol use

- Have you ever consumed alcohol?
- How old were you when you first started using alcohol?
- Have you consumed alcohol (such as beer, wine, spirits, fermented cider) within the past 12 months?
- In the past months, how frequently have you had at least one drink?
- When you drink alcohol, on average, how many drinks do you have during one day?
- What kind of alcoholic drinks do you usually drink?
- Have you consumed alcohol (such as beer, wine, spirits, fermented cider) within the past 30 days?
- In the last 30 days, how many days did you consume alcoholic beverages?
- In the past 30 days, how many days did you consume alcoholic beverages?
- In the last 30 days, what was the largest number of drinks you had on a single occasion, counting all types of standard drinks together?
- For men only: In the past 30 days, on how many days did you have five or more standard drinks in a single day?
- For women only: In the past 30 days, on how many days did you have four or more standard drinks in a single day?
- During each of the past 7 days, how many standard drinks of any alcoholic drink did you have each day?

The results indicated that the majority of participants fell into the category of current drinkers, followed by those who reported never having used alcohol, which represented surprisingly, almost a third of all participants (see Figure 32).

3.4.1 Current drinkers

Where current drinkers were concerned, there was a significant difference in age and gender. A significantly higher percentage of participants between 25 and 54 years of age fell into the category of current drinkers, compared to those between 55 and 64 years of age. In addition, the prevalence of current drinkers in men was almost double the prevalence of current drinkers in women (52.9 percent and 26.6 percent, respectively). This significant gender difference was present across all age categories (see Figure 33). Taking age and gender into account, the prevalence of current drinkers was significantly lowest in women between 55 and 64 years of age, when compared to both men and women across all age categories. Other demographic and socio-economic variables (e.g. country of birth, living with a partner, level of education, occupation, personal income) were not significantly related to current drinking.

Figure 32: Men and women who participated in STEPS Aruba 2006 categorized according to their alcohol use (in percentages)

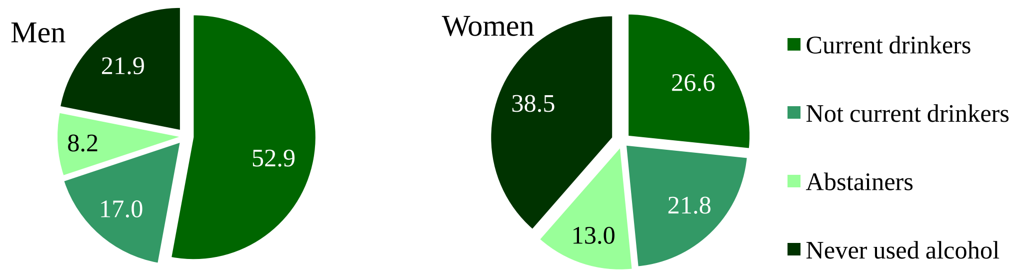
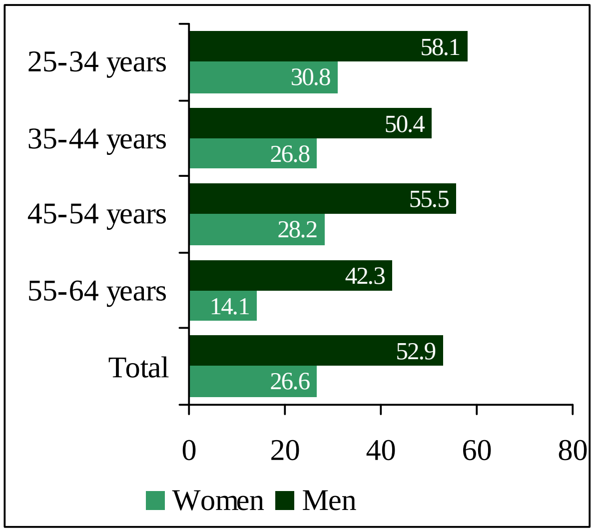


Figure 33: Current alcohol users by age and gender



Comparing the prevalence of current drinkers in Aruba to that in the United States (data from the National Center for Chronic Disease Prevention & Health Promotion, 2006), the prevalence of current drinkers in Aruba was lower in both men and women and across all age categories (see Figures 34 and 35). This difference was particularly prominent in women.

Figure 34: Current alcohol users in Aruba and in the United States by age category

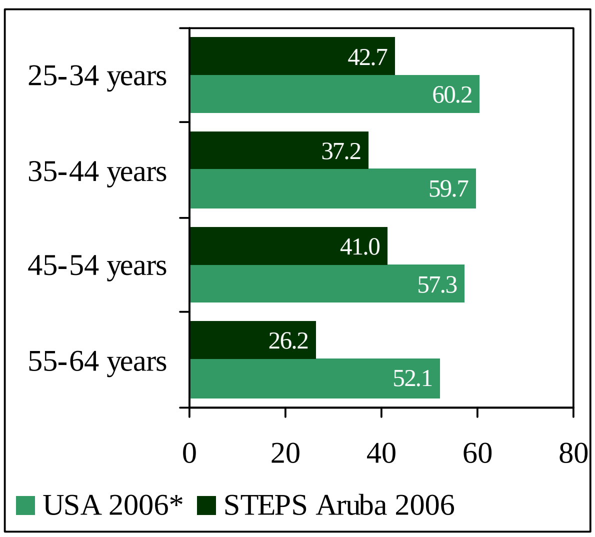
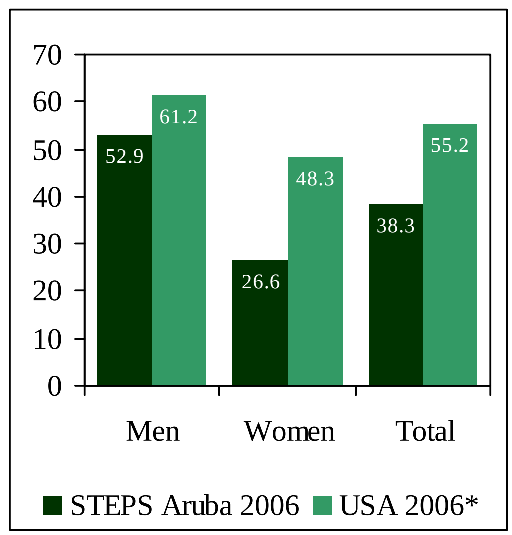


Figure 35: Current alcohol users in Aruba and in the United States by gender



*Source: Prevalence data 2006, Behavioral Risk Factor Surveillance System, National Center for Chronic Disease Prevention & Health Promotion.
Note: Data from the National Center for Chronic Disease Prevention & Health Promotion included adults between 18 and 65+ years of age.

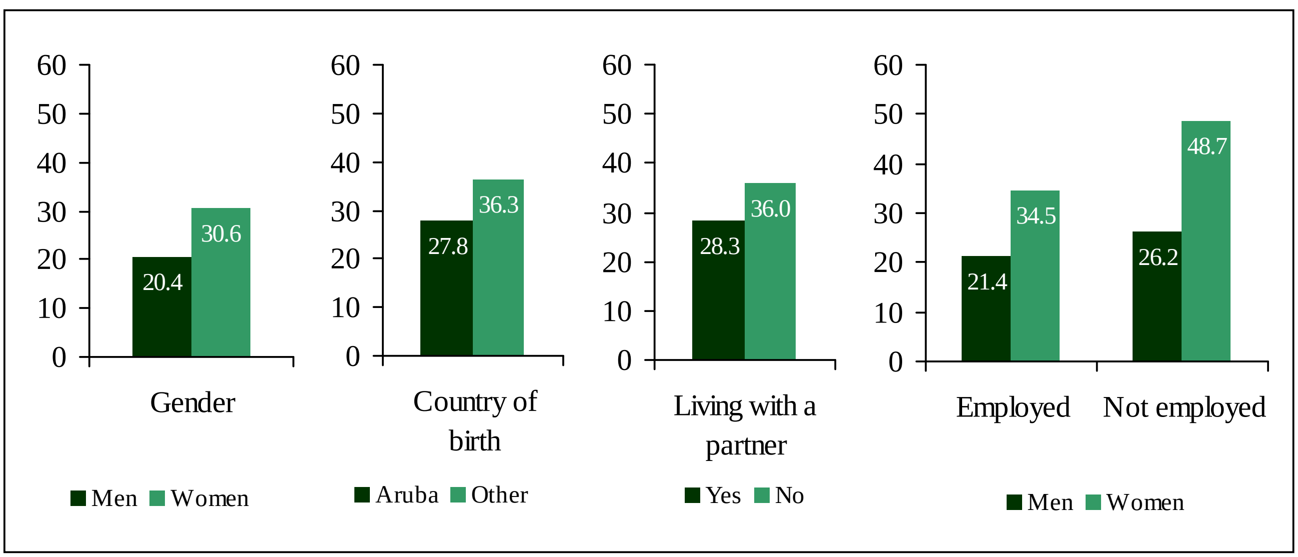
3.4.2 Not current drinkers, abstainers, and never used alcohol

Further analyses of the STEPS Aruba 2006 data revealed that not having consumed alcohol in the month prior to the survey was not related to any of the demographic or socio-economic variables we included in the analyses (e.g. age, gender, country of birth, living with a partner, employment status, occupation, level of education, personal income).

However, not having consumed alcohol in the year prior to the survey proved to be significantly related to participants' age, employment status, and a combination of employment status and gender. A significantly higher percentage of participants between 55 and 64 years of age reported not having consumed alcohol in the year prior to the survey, compared to those between 25 and 34 years of age (17.9 percent, and 9.8 percent, respectively). Furthermore, a significantly lower percentage of employed participants reported being abstainers, compared to those who were not employed (9.3 percent, and 16.6 percent, respectively). In addition, a significantly lower percentage of men who were employed reported being abstainers compared to men who were not employed (6.6 percent, and 20.5 percent, respectively). The prevalence of abstainers in women who were employed did not differ significantly from that in women who were not employed (12.1 percent, and 15.4 percent, respectively). Other demographic and socio-economic variables (e.g. country of birth, living with a partner, occupation, level of education, personal income) were not significantly related not having consumed alcohol in the year prior to the survey.

When investigating the relationships between never having consumed alcohol and various demographic and socio-economic variables, some interesting relationships came to light. Never having consumed alcohol was significantly related to gender, country of birth, living with a partner and employment status. Those participants who reported significantly more often never having used alcohol were: women, participants not born on Aruba, those not living with a partner, and participants who were not employed, particularly women who were not employed (see Figure 36). Other demographic and socio-economic variables, such as age, occupation, level of education, and personal income were not significantly related to never having consumed alcohol.

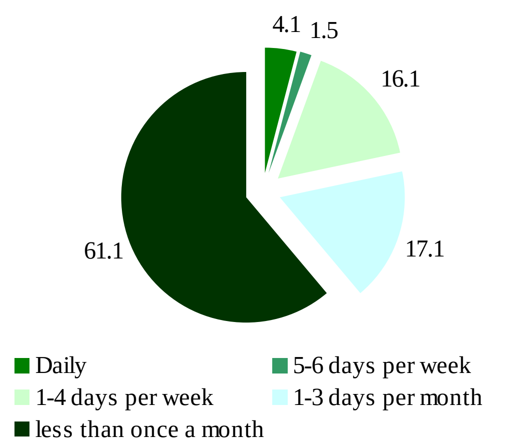
Figure 36: The percentage of participants of STEPS Aruba 2006 that reported never having consumed alcohol by gender, country of birth, living with a partner, and employment status combined with gender



3.4.3 Frequency of alcohol consumption

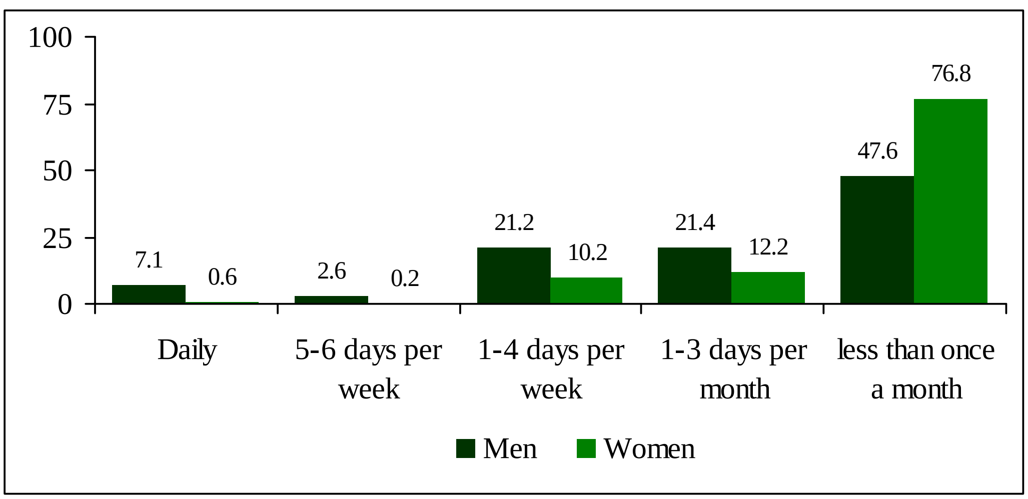
The majority of participants of STEPS Aruba 2006, who reported having consumed alcohol in the year prior to the survey, reported having consumed alcohol less than once a month (see Figure 37). This percentage was relatively high when compared to that in 2001 (Aruba Health Survey), where 43.1 percent of the participants reported having consumed alcohol less than once a month prior to that survey. Furthermore, 4.1 percent of participants of STEPS Aruba 2006 reported consuming alcohol daily, which was a little more than the 2.9 percent in 2001.

Figure 37: Frequency of alcohol consumption in the year prior to STEPS Aruba 2006



Investigating the relationship between demographic and socio-economic variables and the frequency of alcohol consumption during STEPS Aruba 2006, the results indicated that gender was the only variable that was significantly related to the frequency of alcohol consumption. Overall, men reported having consumed alcohol on a more frequent basis than women in the year prior to the survey. A significantly higher percentage of men than women reported having consumed alcohol on a daily basis, on 1 to 4 days per week, and on 1 to 3 days per month. Women, on the other hand, reported significantly more often than men having consumed alcohol less than once a month in the year prior to the survey (see Figure 38). Other demographic and socio-economic variables, such as age, country of birth, living with a partner, marital status, employment status, occupation, level of education, and personal income were not related to the frequency of alcohol consumption.

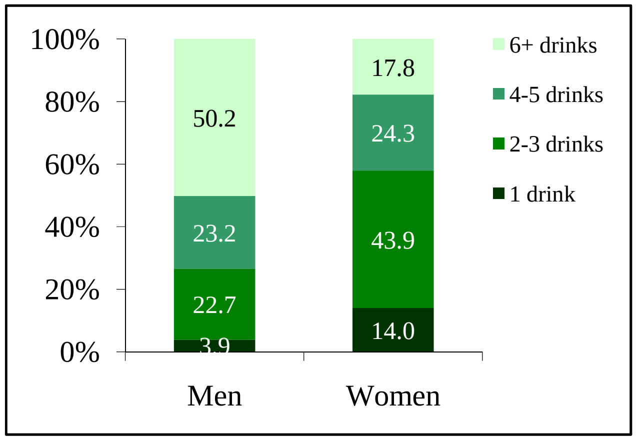
Figure 38: The frequency of alcohol consumption in the year prior to STEPS Aruba 2006 by gender



3.4.4 Amount of alcohol consumed

When consuming alcohol, participants reported drinking on average 5.4 standard alcoholic beverages a day, men consuming nearly twice as many alcoholic beverages as women (6.9 and 3.6 alcoholic beverages, respectively). In addition, over half the group of male participants reported consuming 6 or more standard alcoholic beverages a day, when consuming alcohol, while the majority of female participants (43.9 percent; see Figure 39) reported consuming between 2 and 3 drinks a day.

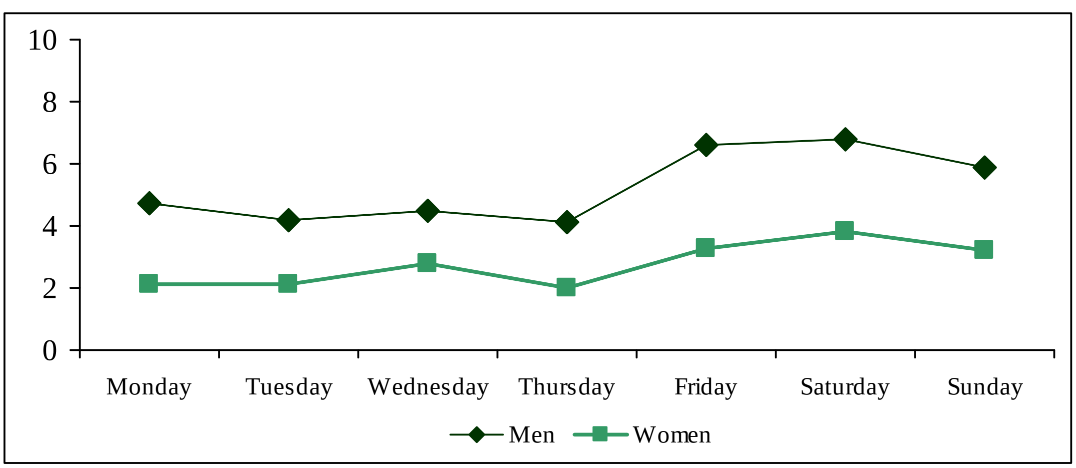
Figure 39: Percentage consuming a number of standard alcoholic drinks consumed per day, when consuming alcohol, by gender



Other demographic and socio-economic variables, such as age, country of birth, living with partner, employment status, occupation, level of education, and personal income were not related to the number of alcoholic beverages consumed per day.

Participants who reported having used alcohol in the month prior to the survey were also asked to report their alcohol consumption on each day of the week prior to the survey. The majority of participants (46.7 percent) reported having consumed alcohol on only one day during that week. Only 1.9 percent of women and 12.8 percent of men reported consuming alcohol on 4 days or more during that week. Where the amount of alcohol consumed was concerned, nearly half of men (48.7 percent) and over a third of women (34.4 percent) reported consuming, respectively, 5 or more and 4 or more alcoholic beverages on a single day during that week. Particularly during the weekend, relatively more alcoholic beverages were consumed per day, especially where men were concerned (see Figure 40).

Figure 40: Average number of alcoholic beverages consumed per day during the week prior to STEPS Aruba 20006 for those who reported using alcohol in the month prior to the survey by gender

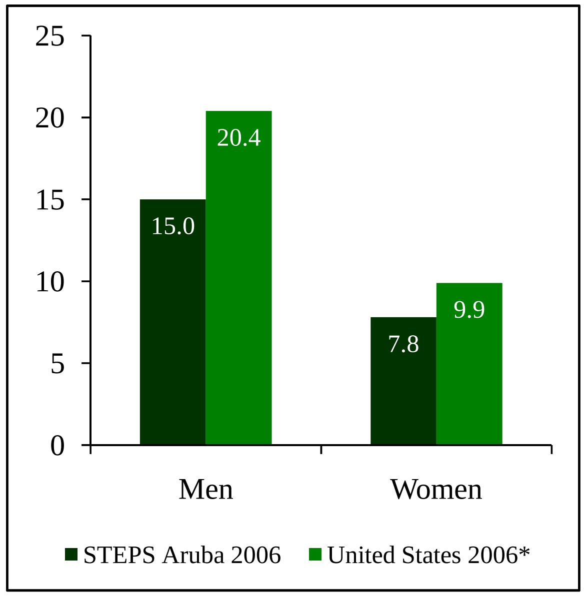


3.4.5 Binge drinking

Binge drinking is defined as the consumption of large quantities of alcohol during a short period of time. Overall, men drinking 5 or more alcoholic beverages and women drinking 4 or more alcoholic beverages on a single occasion is considered to be binge drinking.

Participants of STEPS Aruba 2006, who reported having consumed alcohol in the month prior to the survey, were asked to indicate the largest number of alcoholic beverages they consumed on a single occasion during that month. In total, participants reported having consumed, on average, a maximum of 6.8 alcoholic beverages on a single occasion, men consuming nearly twice as many alcoholic beverages on a single occasion as women (8.5 and 4.2 alcoholic beverages, respectively). When binge drinking in men and binge drinking in women were analysed separately, the results indicated that neither demographic (age, country of birth) nor socio-economic variables (living with a partner, employment status, occupation, level of education, and personal income) showed a significant relationship to the prevalence of binge drinking in men or to the prevalence of binge drinking in women.

Figure 41: The prevalence of binge drinking in Aruba compared to that in the United States



*Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System Survey Data, 2006

The results of STEPS Aruba 2006 indicated that the majority of both men and women, who reported having consumed alcohol in the month prior to the survey (73.7 percent and 55.0 percent, respectively), could be categorized as binge drinkers. In total, 15.0 percent of men and 7.8 percent of women who participated in the survey could thus be categorized as binge drinkers. Compared to the United States, the prevalence of binge drinking in Aruba is relatively low (see Figure 41).

3.4.6. Age at starting using alcohol

According to scientific research, the age at which young people first start using alcohol is a powerful predictor of alcohol-related harm, abusive consumption of alcohol and the development of alcohol disorders. First use of alcohol before the age of 14 is considered to heighten the risk of developing alcohol related problems. (DeWit et al., 2000; Hingson, Heeren & Winter, 2008a; Hingson, Heeren & Winter, 2008b, Verdurmen et al., 2006).

Participants of STEPS Aruba 2006 reported starting using alcohol at an average age of 19.5 years. Women reported starting using alcohol significantly later in life than men (at age 20.7 and 18.3, respectively). Other demographic and socio-economic variables were not significantly related to the age at which participants started using alcohol. Compared to the United States and The Netherlands, men and women in Aruba start using alcohol relatively later in life. In the United States, men start using alcohol at a mean age of 14 years and women at a mean age of 14.4 years (Newes-Adeyi, et al. 2007). In the Netherlands, people start using alcohol at a mean age of 16.5 years (IVO, 2005).

NON-MODIFIABLE RISK FACTORS

- Age
- Gender
- Heredity

Chapter 4

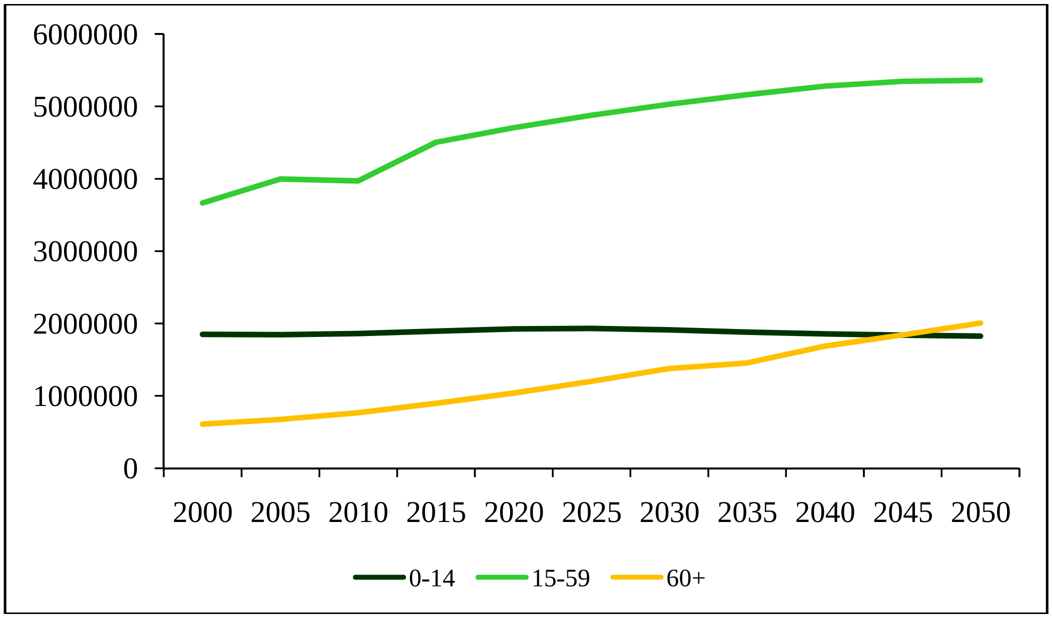
Chapter 4. Non-Modifiable Risk Factors

4.1 Age

Whereas chronic diseases are a burden for individuals of all ages, the impact of risk factors on individuals' health increases with age. According to the WHO, almost half of chronic diseases occur in people under the age of 70. In addition, health expenditure increases with age, and is concentrated in the last year of life (WHO, 2007).

Worldwide, ageing is a growing problem. People 60 years and older belong to the fastest growing age group. According to projections from the United Nations, by 2045 the number of persons 60 years and older will likely surpass the number of children under the age of 15 (see Figure 42). Long term reductions in fertility and mortality are leading to a steady ageing of the world population (Department of Economic and Social Affairs (DESA), 2007).

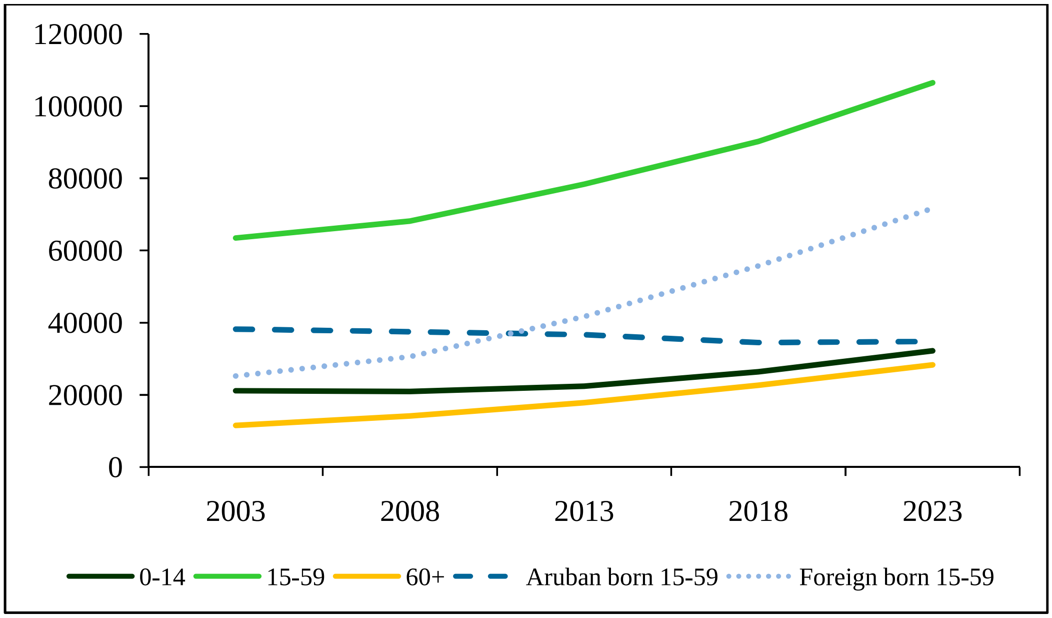
Figure 42: World population by age category



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2005 Revision, Medium variant, http://esa.un.org/unpp

In Aruba, projections from the Central Bureau of Statistics (CBS; high scenario) show that the population is also ageing fast, despite a projected accelerated growth of persons between 15 and 59 years of age in the upcoming years, which is mainly due to a high influx of foreign workers (CBS, 2004; see Figure 43).

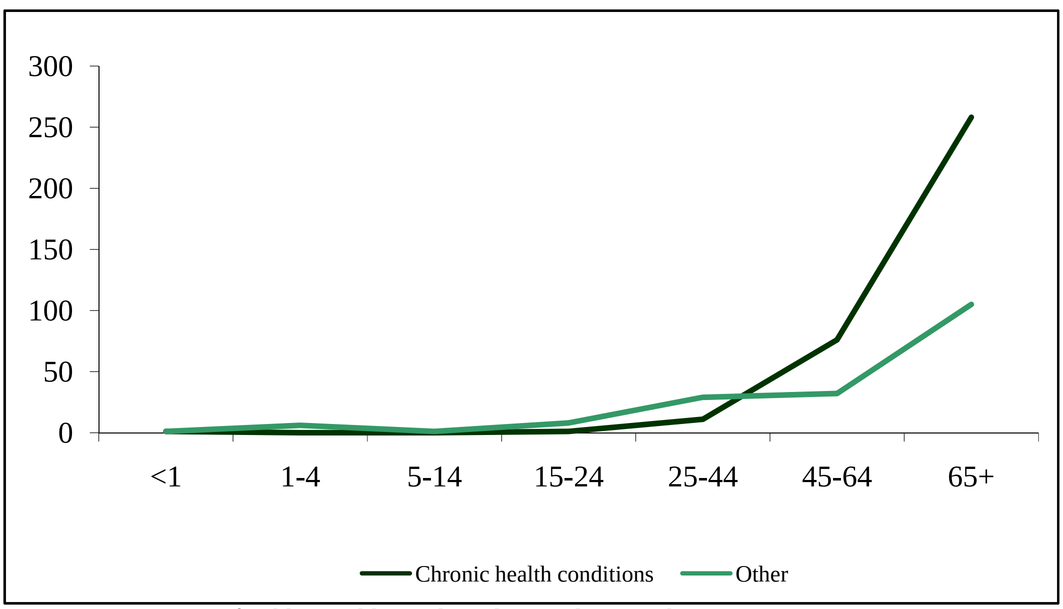
Figure 43: Aruban population by age category



Source: Population Projections Aruba, 2003-2023, Central Bureau of Statistics, 2004

In addition, as in the rest of the world, chronic diseases in Aruba account for the majority of deaths, particularly in the elderly. As people in Aruba age, a swift increase in mortality due to chronic health conditions can be observed (see Figure 44).

Figure 44: Number of deaths in Aruba in 2006 by cause of death and age category



Source: Department of Public Health, Epidemiology and Research

According to the WHO model describing the causes of chronic disease (WHO, 2005, p.50; see Chapter 1: Introduction, Figure 4), age is a non-modifiable risk factor that influences the development of chronic diseases via intermediate risk factors, such as raised blood pressure, raised blood glucose, abnormal blood lipids, and overweight/obesity.

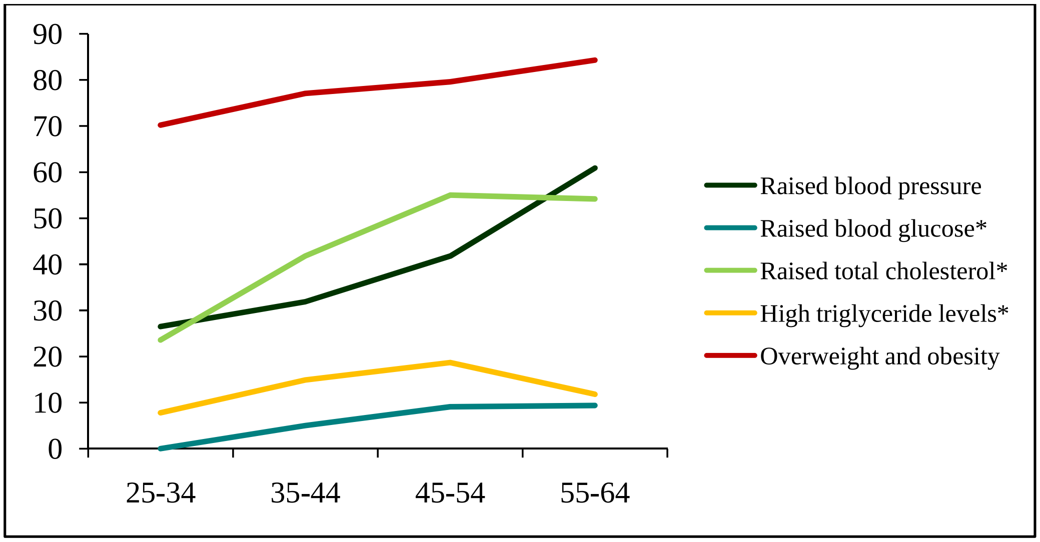
During STEPS Aruba 2006, the prevalence of common modifiable risk factors (unhealthy diet, tobacco use, physical inactivity, alcohol misuse) was assessed via a questionnaire and the prevalence of intermediate risk factors was assessed via physical and biochemical measurements. In addition, participants were asked to report from which of a number of chronic health conditions they suffered or did suffer in the year prior to the survey.

STEPS Aruba 2006: Question asked on chronic health conditions

- Do you suffer from any of the following diseases/health problems or did you suffer from them in the last 12 months?
  - Asthma/chronic bronchitis
  - Sinusitis
  - Serious heart condition or heart attack
  - Problems of the stomach
  - Constipation
  - Chronic bladder infection
  - Chronic spinal problems longer than 3 months, slipped disc
  - Arthrosis/Arthritis of the joints (rheumatism, rheumatoid arthritis)
  - Migraine or heavy headaches
  - Chronic skin disease or eczema
  - Malignant neoplasm or cancer
  - Allergy
  - Psychological problems (stress, depression, nervousness, fear,..)
  - Serious consequences due to an accident, such as broken bones, serious burns
  - Stroke or effects of a stroke
  - Varicose vein
  - Stomach ulcer
  - Kidney stone
  - Arthrosis of the joints (osteoporosis)
  - Cataract, glaucoma
  - [Women] Problems with menstruation or menopause
  - [Women] Myoma or fibroid
  - [Men] Prostate problems
  - Other chronic condition

In the previous chapter (Chapter 3) the results with regards to the prevalence of common modifiable risk factors, including their prevalence according to age were discussed. Now, the results with regards to the prevalence of chronic health conditions according to age and gender will be discussed. The results indicated that the prevalence of intermediate risk factors (raised blood pressure, raised blood glucose, raised total cholesterol, and overweight/obesity) increased with increasing age, with the exception of the prevalence of high triglyceride levels, which showed an increase followed by a decrease as age progressed (see Figure 45). Where the prevalence of raised blood pressure was concerned, a significantly higher percentage of individuals between 55 and 64 years of age had raised blood pressure compared to individuals in other age categories. Age differences in the prevalence of raised blood glucose and

Figure 45: The prevalence of measured intermediate risk factors by age category according to the results of STEPS Aruba 2006



overweight/obesity were however not significant.

* Note: Participants were instructed to refrain from eating or drinking after 10:00 PM on the night before their blood and urine samples were taken. Individuals who used tablets and/or insulin to control their diabetes were instructed to refrain from taking them on the morning prior to their appointment.

Where the prevalence of chronic health conditions was concerned, the prevalence of those chronic health conditions which are considered by the WHO as being the leading causes of death worldwide (heart disease, stroke, and cancer), increased with increasing age. The prevalence of heart disease, in particular, showed a steep increase as age progressed, as would be expected in the light of the steep increases in raised blood pressure and raised total cholesterol seen in Figure 45. However, statistical analyses revealed that the increase in the prevalence of heart disease with age was not significant at a .05 level, and neither were the increases in the prevalence of stroke nor cancer. Moreover, the prevalence of chronic respiratory diseases (asthma/chronic bronchitis) tended to decrease with increasing age (see Figure 46).

Figure 46: The prevalence of self-reported chronic health conditions that are the leading causes of death worldwide, by age category, according to the results of STEPS Aruba 2006

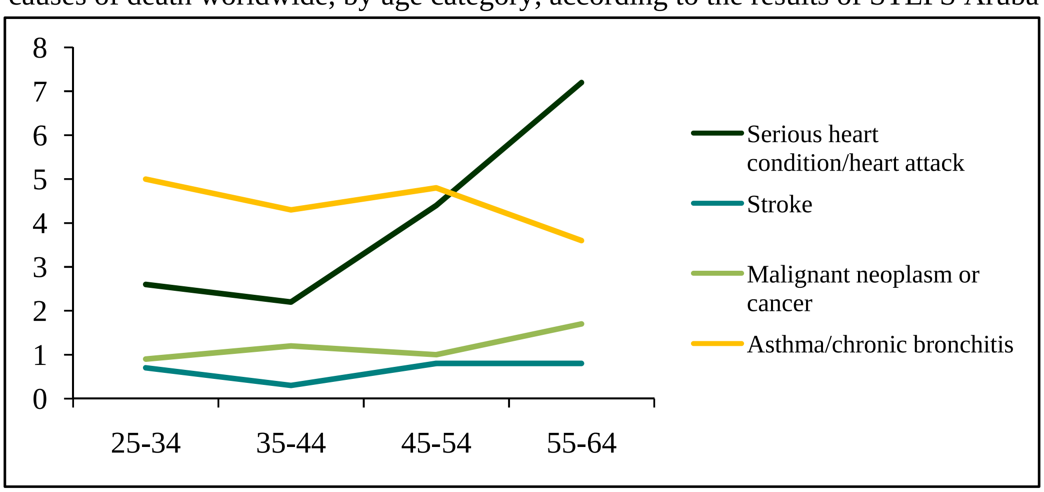


Figure 47: The prevalence of self-reported chronic health conditions of which the prevalence increase with increasing age, according to the results of STEPS Aruba 2006

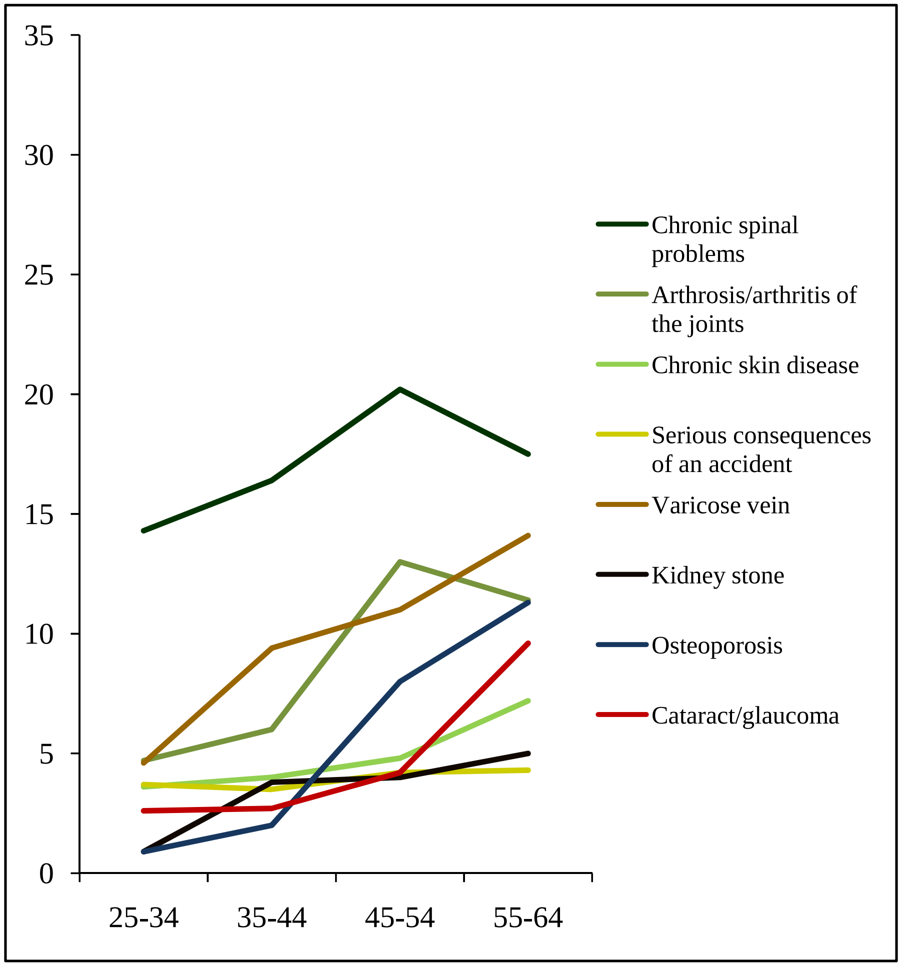


Figure 48: The prevalence of self-reported chronic health conditions of which the prevalence decrease with increasing age, according to the results of STEPS Aruba 2006

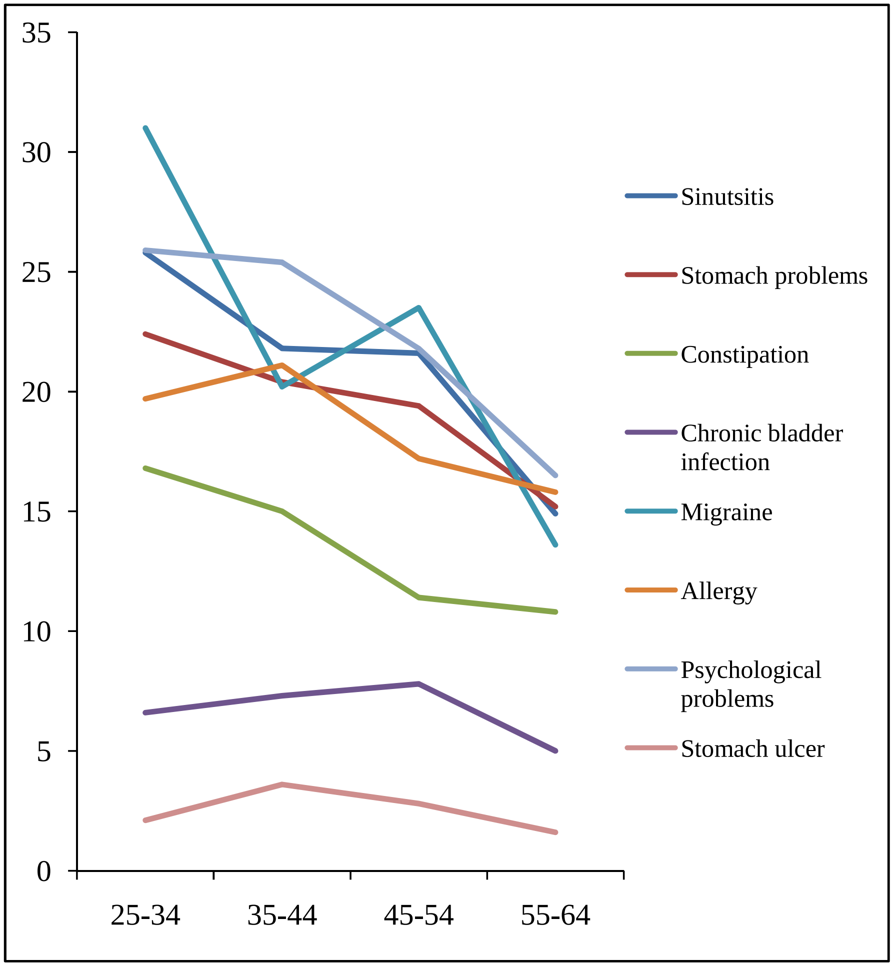


Table 32: Mean number of self-reported chronic health conditions by age category

	Mean number of self-reported chronic health conditions	Min-Max
25-34 years	1.9	0-8
35-44 years	1.9	0-10
45-54 years	2.0	0-11
55-64 years	1.9	0-9

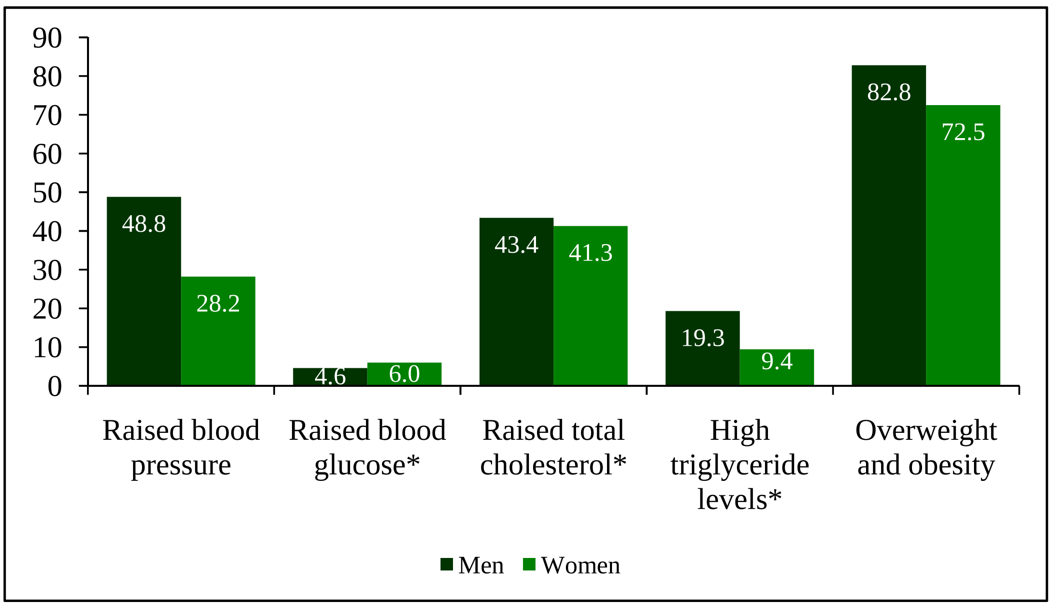
The prevalence of other self-reported chronic health conditions, tended either to increase or decrease with increasing age, in a manner consistent with health literature (see Figures 47 and 48).

Overall, age category was not significantly related to the number of chronic health conditions participants reported suffering from. Participants in all age categories reported suffering an average of two chronic health conditions (median=1.0; see Table 32). In total, 29.4 percent of participants reported suffering from no chronic health conditions.

4.2 Gender

Investigating the relationship between gender and intermediate risk factors (raised blood pressure, raised blood glucose, raised total cholesterol, and overweight/obesity), physical and biochemical measurements taken during STEPS Aruba 2006 showed that the prevalence of raised blood pressure, high triglycerides, and overweight and obesity were significantly higher in men than in women (see Figure 49). Gender differences in the prevalence of raised blood glucose and raised total cholesterol were not significant (see Figure 49).

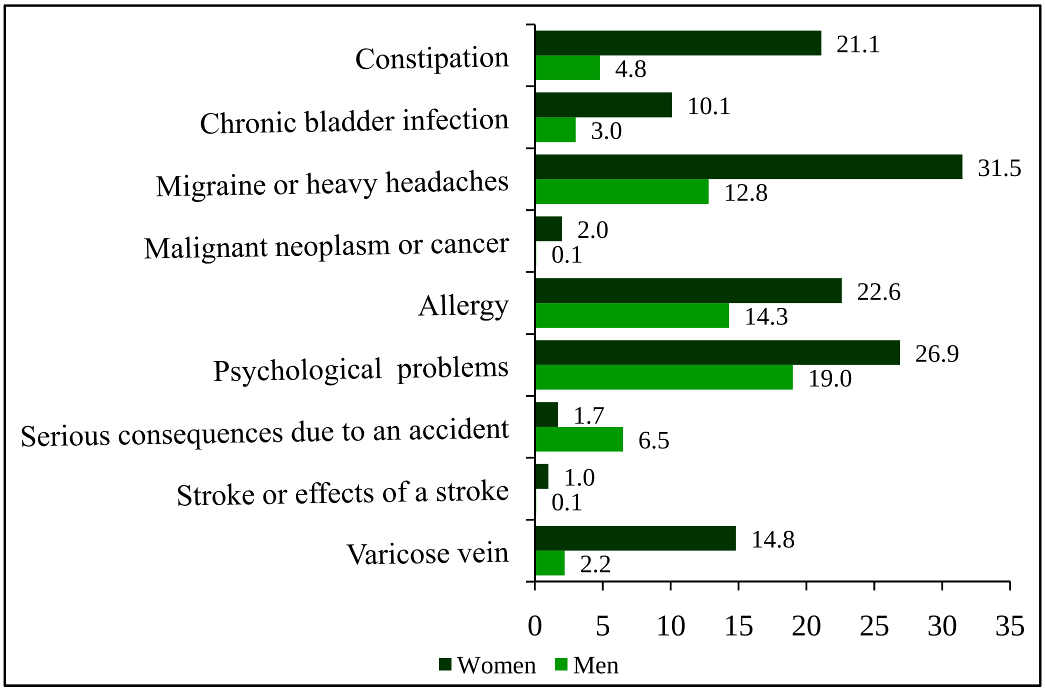
Figure 49: The prevalence of measured intermediate risk factors by gender according to the results of STEPS Aruba 2006



* Note: Participants were instructed to refrain from eating or drinking after 10:00 PM on the night before their blood and urine samples were taken. Individuals who used tablets and/or insulin to control their diabetes were instructed to refrain from taking them on the morning prior to their clinic appointment.

Furthermore, the results of STEPS Aruba 2006 indicated that women reported suffering from significantly more chronic health conditions than men. On average, men reported suffering from one chronic health condition, while women reported on average suffering from two. In addition, a significantly higher percentage of women, compared to men, reported suffering from certain chronic health conditions, such as constipation, chronic bladder infection, migraine, cancer, allergy, psychological problems, stroke, and varicose vein, whereas men reported suffering significantly more often than women from serious consequences due to an accident (see Figure 50).

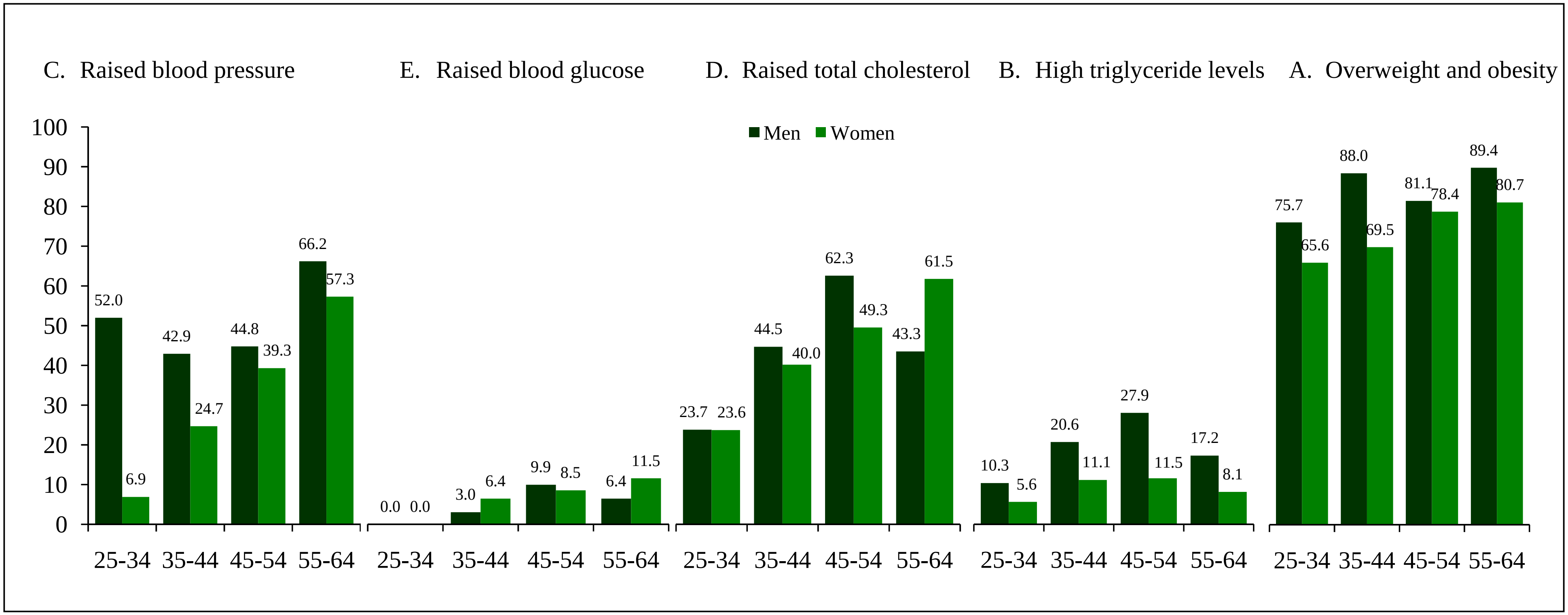
Figure 50: The prevalence of self-reported chronic health conditions which were significantly related to gender, according to the results STEPS Aruba 2006



Age and gender

Analyzing the relationships between age and gender combined and the prevalence of intermediate risk factors, the results indicated that whereas, as previously mentioned, gender was significantly related to the prevalence of raised blood pressure, high triglycerides, and overweight and obesity, the significant differences between men and women were only present in certain age categories. The prevalence of raised blood pressure was significantly higher in men between 25 and 34 years of age, the prevalence of high triglycerides was significantly higher in men between 35 and 54, and the prevalence of overweight and obesity was significantly higher in men between 35 and 44 years of age, compared to women in the same age categories (see Figure 51).

Figure 51: The prevalence of measured intermediate risk factors by age and gender according to the results of STEPS Aruba 2006



4.3 Heredity

Heredity is, alongside age, a non-modifiable risk factor which via other intermediate risk factors influences the development of chronic diseases. The magnitude of the contribution of heredity to the development of chronic diseases is still being investigated. Genetic, environmental and lifestyle factors interact in very complex ways to the development of chronic diseases. Scientific research has recently identified a number of genetic factors that play a role in the etiology of various health conditions, such as raised cholesterol (Klos et al., 2008), overweight and obesity (Loos & Bouchard, 2008), diabetes (Florez, 2008), and also in the etiology of various chronic diseases, such as breast cancer (Atchley et al., 2008), and asthma (Moffatt, 2008).

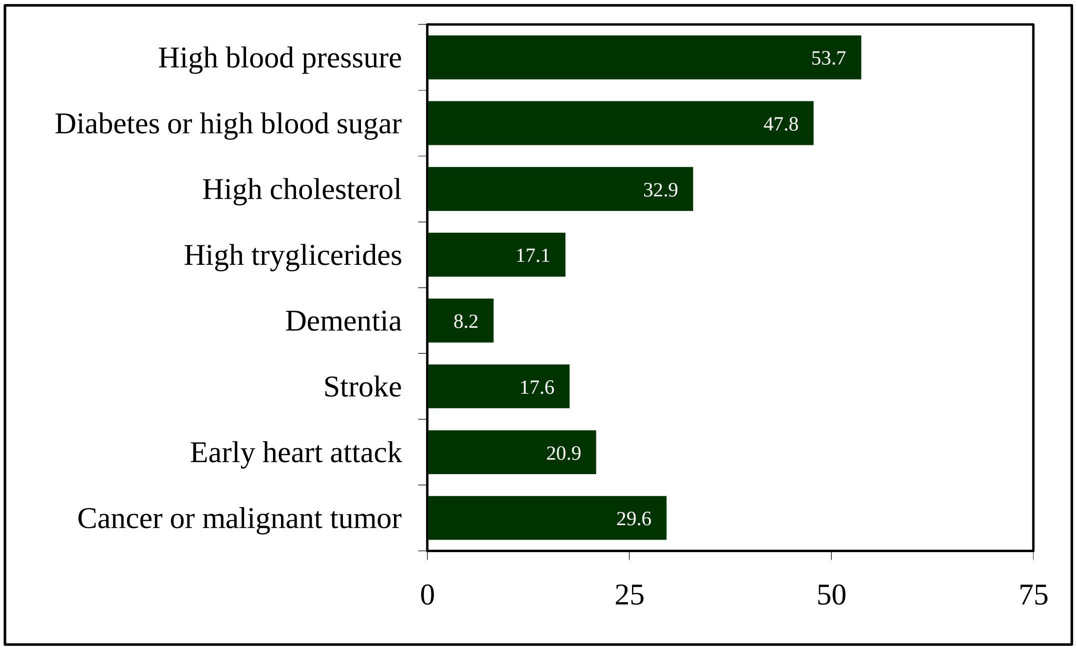
During STEPS Aruba 2006, participants were asked to indicate whether any of their immediate relatives have ever been diagnosed with one or more of a number of chronic health conditions.

STEPS Aruba 2006: Question asked on alcohol use

- Has any of your immediate relatives (including siblings, parents, grandparents, and excluding children, spouse, and in-laws) ever been diagnosed with the following diseases/health conditions?
  - High blood pressure
  - Diabetes or high (elevated) blood sugar
  - High cholesterol
  - High triglycerides
  - Dementia (Alzheimer's,..)
  - Stroke
  - Early heart attack (before the age of 55 for males and before the age of 65 for females)
  - Cancer or malignant tumor

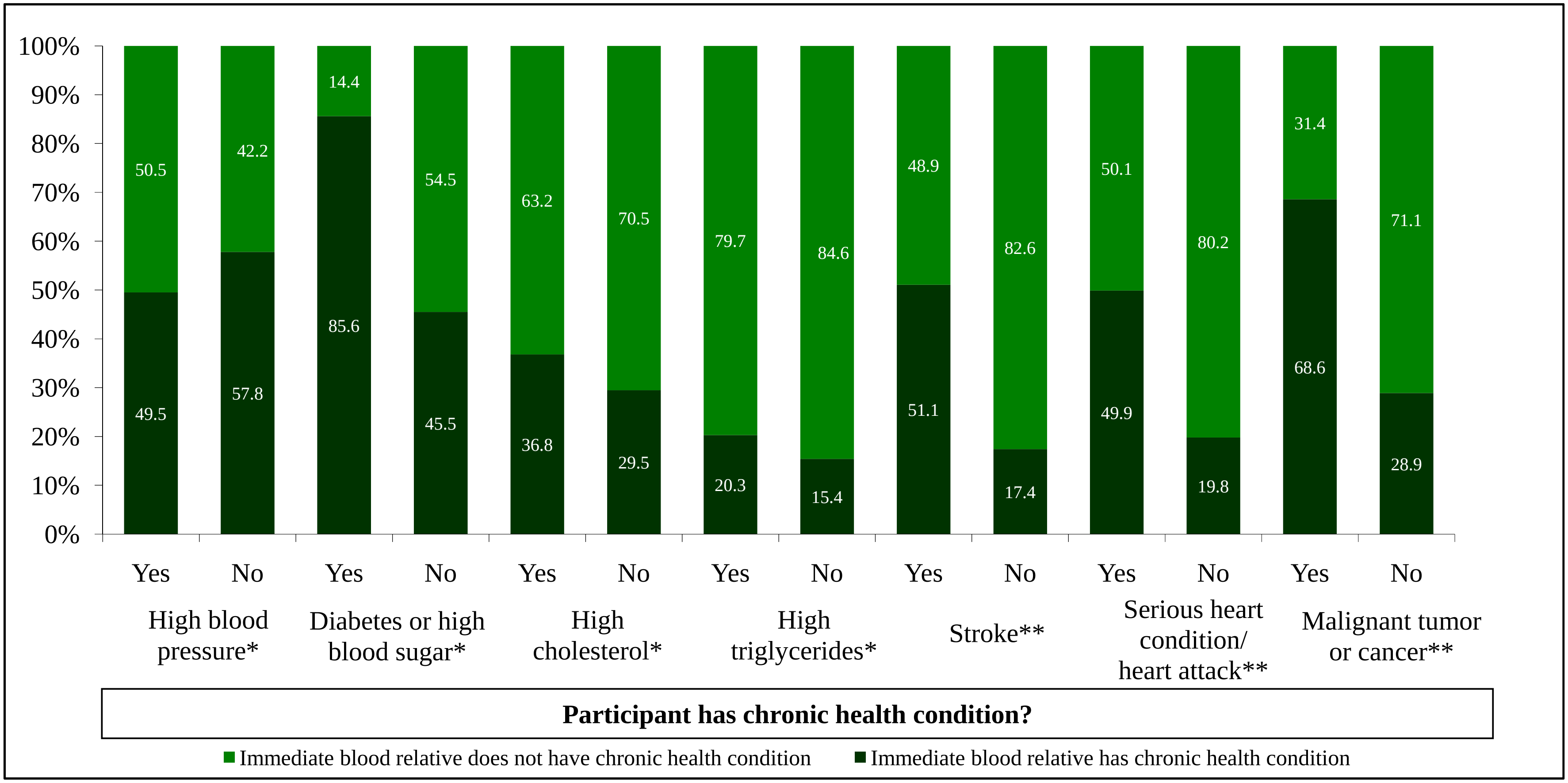
The results indicated that more than 50 percent of participants reported having one or more immediate relatives that had been diagnosed with high blood pressure. In addition, nearly 50 percent reported having one or more relatives that had been diagnosed with diabetes or high blood sugar (see Figure 52), and some 30 percent reported having one or more relatives that had been diagnosed with high cholesterol or cancer/malignant tumor.

Figure 52: Percentage of participants with immediate blood relatives who have been diagnosed with chronic diseases/health conditions



Comparing the chronic disease situation of the participants themselves to that of their immediate relatives, two significant relationships came to light. Firstly, of the participants with high blood sugar (measured via blood samples), a significantly higher percentage reported having one or more immediate relatives who had been diagnosed with diabetes or high blood sugar. In addition, of the participants who reported suffering from cancer or having had a malignant tumor in the year prior to the survey, a significantly higher percentage reported having one or more immediate relatives who had ever been diagnosed with cancer (see Figure 53). The latter result must be viewed with some caution, given that no information was available about the types of cancer patients and/or their immediate relatives suffered from.

Figure 53: Overview of the relationship between participants' chronic disease situation and the chronic disease situation of their immediate relatives



* Data concerning participants obtained via physical measurements, analyses of blood samples, and analyses of urine samples; Data concerning immediate blood relatives are reported by participants ** Data from participants obtained via self-report; Data concerning immediate blood relatives are reported by participants

Note: High blood pressure = SYST ≥ 140 and/or DIAST ≥ 90; Very high blood pressure = SYST ≥ 170 and/or DIAST ≥ 100; Diabetes or high blood sugar = fasting blood glucose level ≥ 7 mmol/L; High cholesterol = total cholesterol level ≥ 5.2 mmol/L; Very high cholesterol = total cholesterol level ≥ 6.5 mmol/L; High tryglicerides = triglyceride level ≥ 2.26 mmol/L

RAISED RISK

- Risk status
- Raised risk and chronic disease

Chapter 5

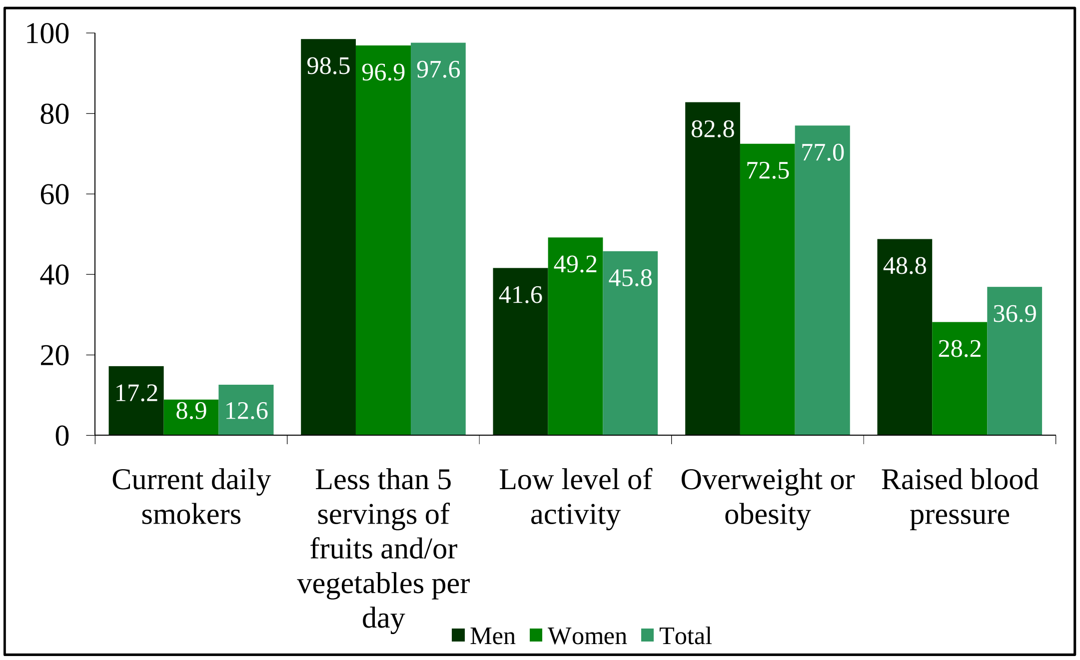
Chapter 5. Raised Risk

5.1 Risk status

The WHO recognizes 5 important risk factors for developing chronic non-communicable diseases: current daily smoking, consuming of less than 5 servings of fruits and vegetables per day, engaging in low levels of activity, being overweight or obese, and having raised blood pressure. Individuals with none of these risk factors are considered to be at low risk of developing chronic non-communicable diseases, whereas those with three or more of these risk factors are considered to be at raised risk.

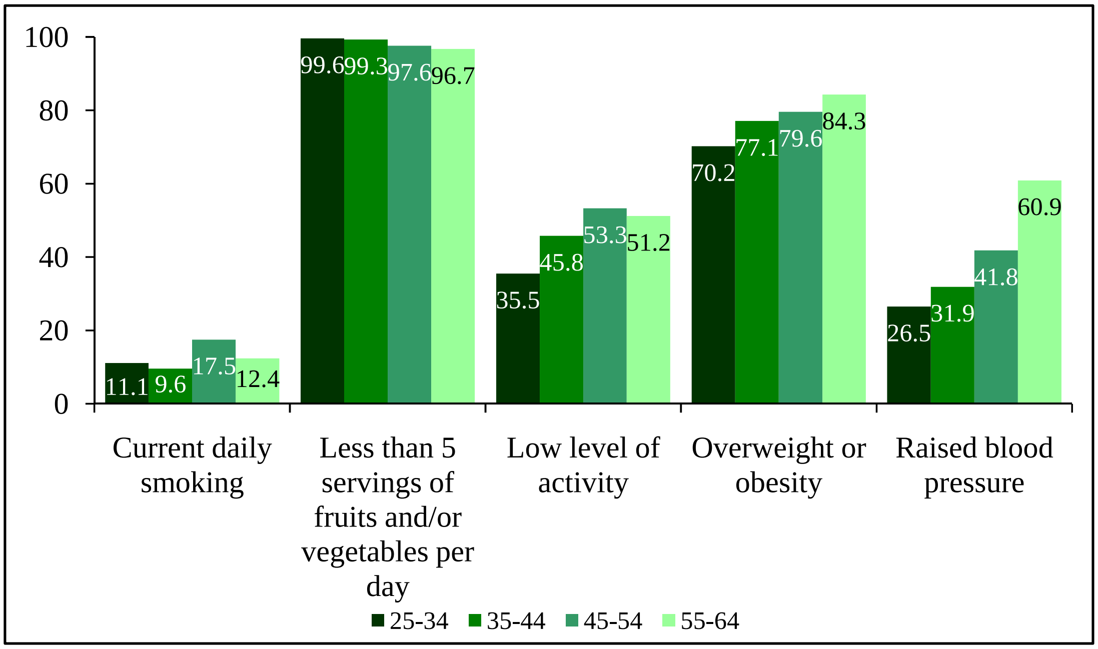
In Figure 54, the prevalence of abovementioned risk factors for both men and women who participated in the STEPS Aruba 2006 survey is depicted. The results showed that nearly all participants consumed less than 5 servings of fruits and/or vegetables per day, nearly half of participants engaged in low levels of physical activity, nearly 80 percent were overweight or obese and some 40 percent had raised blood pressure. Only the prevalence of current daily smoking was relatively low, particularly where women were concerned (see Chapter 3).

Figure 54: Prevalence of 5 risk factors in participants of STEPS Aruba 2006 by gender



When participants' age was taken into account, the results revealed that a significantly higher percentage of individuals between 45 and 64 years of age engaged in low levels of activity, compared to 25 to 34 years olds. In addition, a significantly higher percentage of participants between 55 to 64 years of age had raised blood pressure, compared to younger participants (see Figure 55).

Figure 55: Prevalence of 5 risk factors in participants of STEPS Aruba 2006 by age category



In addition, the results showed that only 0.6 percent of participants were at a low risk of developing chronic non-communicable diseases, in that they had none of the risk factors already mentioned. It is worth mentioning that these 0.6 percent include only women. No men were at low risk. Furthermore, significantly more men than women could be categorized as being at raised risk of developing chronic non-communicable diseases, (67.7 percent and 54.5 percent, respectively; see Figure 56). In total 60.2 percent of participants could be categorized as being at raised risk (3 or more risk

Figure 56: The prevalence of low risk and raised risk in participants of STEPS Aruba 2006

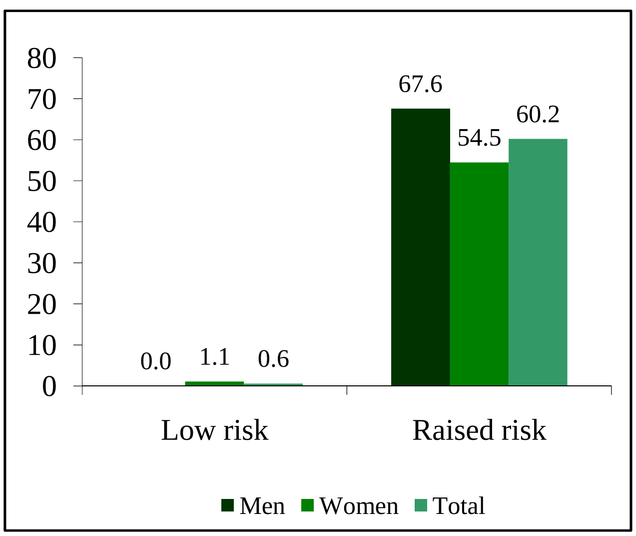
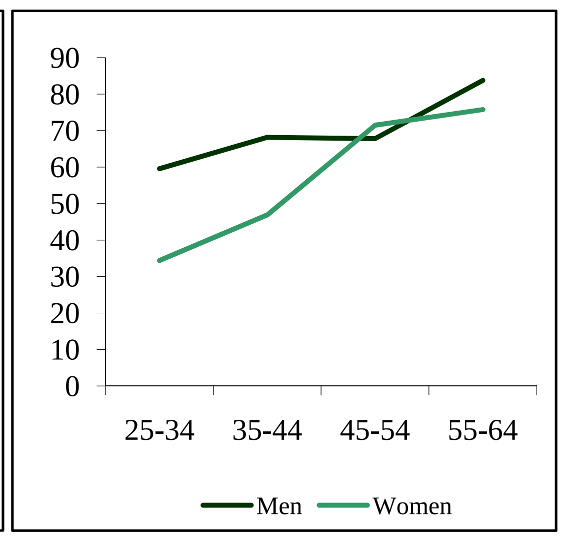


Figure 57: The prevalence of raised risk by age category



However, the significant difference between men and women where the prevalence of raised risk was concerned was only valid for men and women between 25 and 44 years of age. As age progressed, the prevalence of raised risk in women showed a steep increase (from 34.4 percent between ages 25 and 34 to 75.8 percent between ages 55 and 64), while the prevalence of raised risk in men increased only slightly (from 59.6 percent between ages 25 and 34 to 83.8 between ages 55 and 64). Within the age category of 45 to 64 years, there was no significant difference in gender where the prevalence of raised risk was concerned (see Figure 57).

Taking other key demographic and socio-economic variables into account, such as country of birth, living with a partner or spouse, country of birth of spouse, marital status, employment status, level of education, occupation, and personal income, the results showed some interesting relationships. Firstly, country of birth was significantly related to the prevalence of raised risk, in that a significantly higher percentage of participants born on Aruba could be categorized as being at raised risk for developing chronic non-communicable diseases, compared to those not born on Aruba. However, this significant difference was not valid for participants between 25 and 34 years of age. The prevalence of raised risk in participants born on Aruba between 25 and 34 years of age was not significantly higher, at a .05 level, than the prevalence of raised risk in participants not born on Aruba in the same age category. When gender was included in the analyses, the results revealed that a significantly higher percentage of women born on Aruba were at raised risk, compared to women not born on Aruba (see Figure 58). These results must be however viewed with some caution, given the fact that in the age categories 45 to 54 years and 54 to 64 years there were significantly less participants not born on Aruba than participants born on Aruba.

Furthermore, the results indicated that a significantly higher percentage of participants living with a partner or spouse were at raised risk, compared to those not living with a partner or spouse (66.0 percent, and 52.7 percent, respectively). In addition, the country of birth of the partner/spouse participants were living with was also significantly related to the prevalence of raised risk, in that a significantly higher percentage of participants living with a partner or spouse born on Aruba were at raised risk, compared to those living with a partner not born on Aruba (72.1 percent, and 54.7 percent, respectively). However, when the country of birth of participants themselves was included in the analyses, the country of birth of the partner/spouse they were living with was no longer significantly related to their raised risk status. The prevalence of raised risk in participants born on Aruba, independent of where the partner/spouse they were living with was born, was significantly higher compared to that in participants not born on Aruba, with the exception of those between 25 and 34 years of age, where the prevalence of raised risk was not significantly different at a .05 level (see Figure 59).

Figure 58: Prevalence of raised risk by country of birth and gender

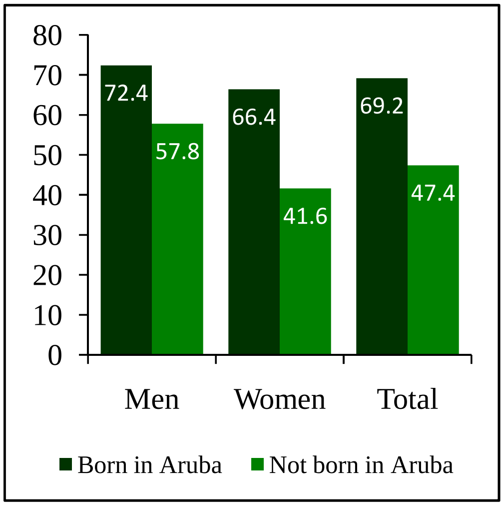
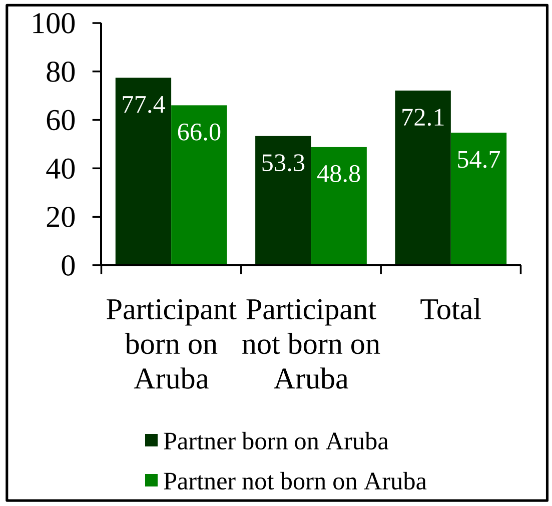


Figure 59: The prevalence of raised risk by country of birth of participants and country of birth of the partner/spouse they were living with



Where the marital status of participants was concerned, the results indicated that the prevalence of raised risk was significantly lower in those who had never been married, compared to those who were married, widowed, or divorced (47.1 percent, 66.5 percent, 81.9 percent, and 69.4 percent, respectively). However, participants who had never been married were also significantly younger than the rest. The mean age of participants who had never been married was 38.3 years, whereas the mean age of married, widowed, and divorced participants, was respectively, 43.6 years, 52.3 years, and 44.6 years.

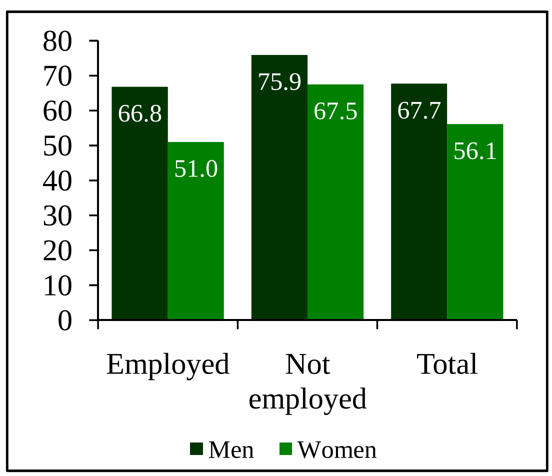
Employment status was by itself not significantly related to the prevalence of raised risk, however when participants' gender was included in the analyses, the results indicated that the prevalence of raised risk was significantly lower in women who were employed (see Figure 60).

Other demographic and socio-economic variables, such as level of education, occupation, and personal income were not significantly related to participants' risk status.

5.2 Raised risk and chronic disease

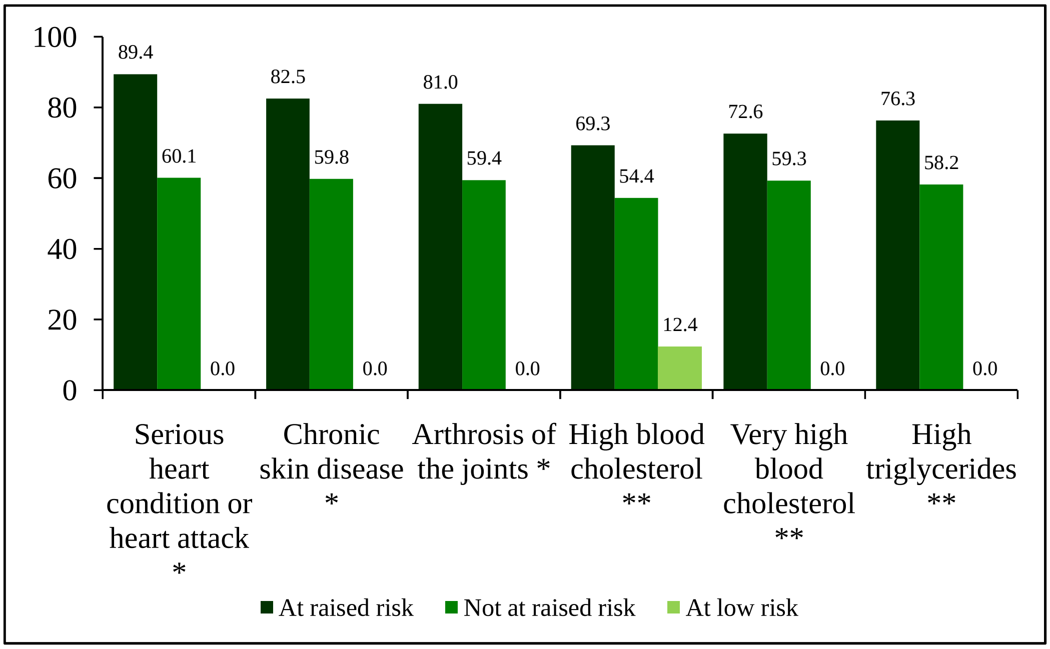
To investigate whether participants who were categorized as being at raised risk of developing chronic non-communicable diseases already showed some health problems, their self-

Figure 60: Prevalence of raised risk by employment status and gender



reported and measured health status was further analysed. The results indicated that participants who were at raised risk reported significantly more often than those who were not at raised risk, suffering from: a serious heart condition or heart attack, chronic skin disease, and arthrosis of the joints (see Figure 61). In addition, when compared to participants not at raised risk and those at low risk, a significantly higher percentage of participants at raised risk had blood test results indicating that they had high and/or very high blood cholesterol levels and high triglyceride levels.

Figure 61: Prevalence of self-reported and measured chronic health status of participants of STEPS Aruba 2006 by risk status



* Data obtained via self-report
** Data obtained via analyses of blood samples
Note: High cholesterol = total cholesterol level ≥ 5.2 mmol/L; Very high cholesterol = total cholesterol level ≥ 6.5 mmol/L; High tryglicerides = triglyceride level ≥ 2.26 mmol/L

In addition to asking participants to report the chronic health conditions they were suffering from and taking physical and biochemical measurements to assess the prevalence of intermediate risk factors, participants were also asked to indicate how they would describe their physical condition.

STEPS Aruba 2006: Question asked on physical condition

- Considering your age, how would you describe your physical condition?

The results indicated that participants at raised risk of developing chronic health conditions reported significantly more often having a poor physical condition, when compared to participants not at raised risk and those at low risk (see Figure 62). In addition, participants at raised risk reported significantly less often having a good physical condition, compared to those at not at raised risk and those at low risk. Of those at low risk, one hundred percent reported having a good physical condition (see Figure 63).

Figure 62: Percentage of participants of STEPS Aruba 2006 reporting their physical condition by risk status

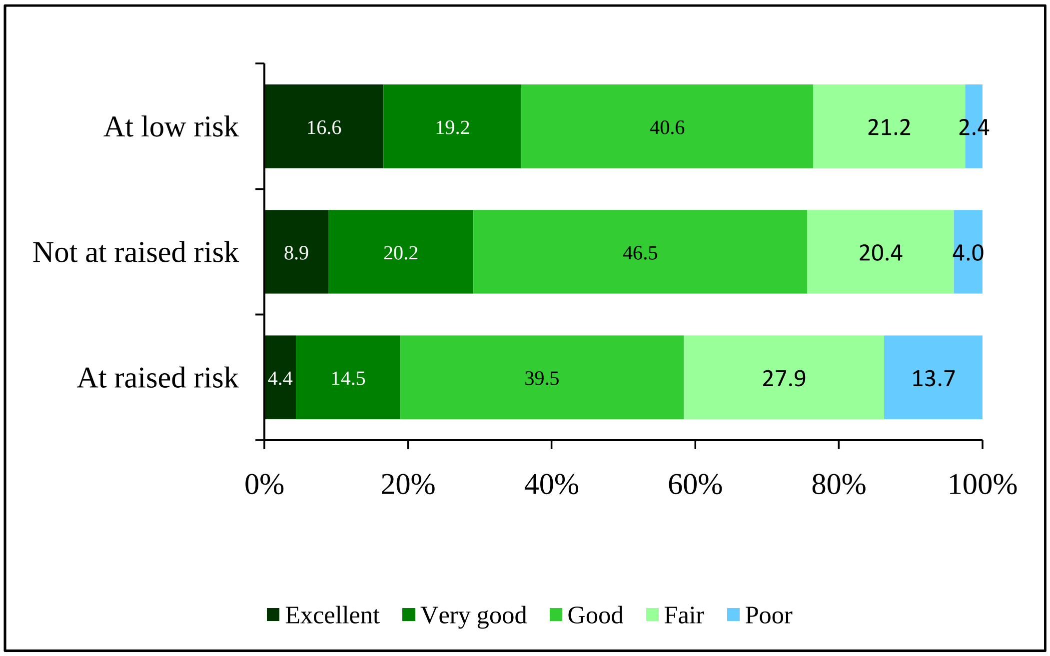
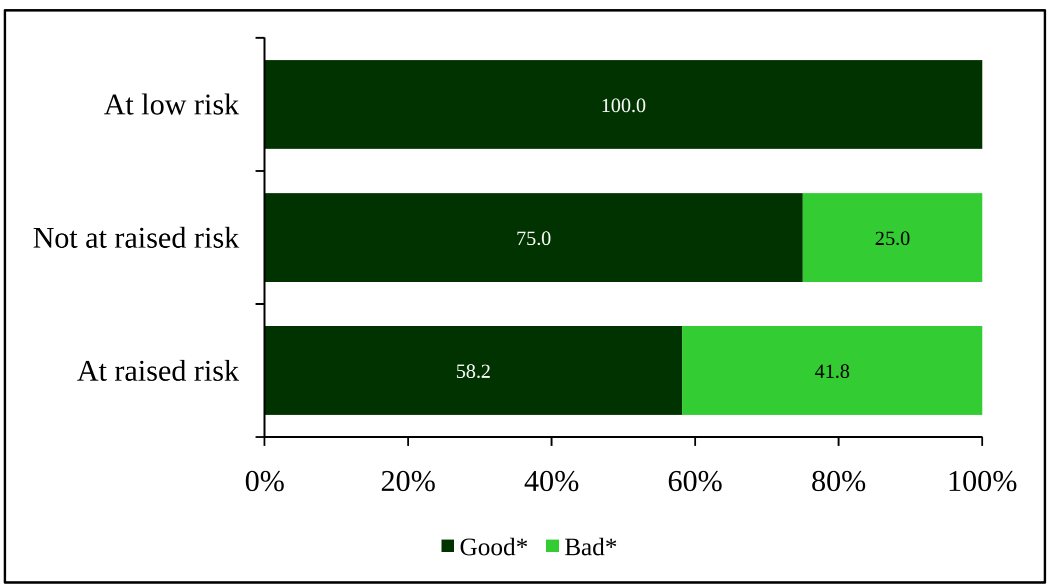


Figure 63: Percentage of participants of STEPS Aruba 2006 reporting their physical condition (aggregated) by risk status



Note: * “Good” = aggregation of “Excellent”, “Very good”, and “Good”; “Bad” = aggregation of “Fair” and “Poor”

DISCUSSION

Chapter 6

Chapter 6. Discussion

As mentioned previously, chronic non-communicable diseases are the major causes of death worldwide. Without urgent comprehensive and integrated action, the impact of chronic diseases is expected to continue growing steadily. By the end of 2015, the number of deaths by chronic non-communicable diseases is expected to have increased by 17 percent (WHO, 2005).

In Aruba, as in the rest of the world, chronic non-communicable diseases account for the vast majority of deaths. In order to be able to effectively manage and control the chronic disease situation in Aruba, it was decided by the Aruban government to set up a surveillance system for chronic non-communicable diseases. The STEPS Aruba 2006 Health Survey was conducted to obtain up to date information for this surveillance system. For that purpose, a total number of 1,565 individuals between 25 and 64 years of age were interviewed.

In September 2007, a data book was published with basic tables depicting the results of STEPS Aruba 2006. In this second paper, the results of further analyses of the modifiable and non-modifiable risk factors underlying the main chronic diseases in Aruba are presented.

6.1 Modifiable risk factors

According to the WHO (2003), modifiable risk factors together with non-modifiable risk factors explain the majority of new events of heart disease, stroke, cancer, chronic respiratory disease and diabetes (see Chapter 1: Introduction, page 7; WHO, 2003). Modifiable risk factors include:

- Unhealthy diet
- Physical inactivity
- Tobacco use
- Alcohol misuse

6.1.1 Unhealthy diet

Research has been consistent in demonstrating that an unhealthy diet puts individuals at significant risk of developing a number of chronic health conditions, such as digestive diseases, cardiovascular disease, type 2 diabetes, and different types of cancer (Chan et al., 2002; Haag & Dippenaar, 2005; Hung et al., 2004; Jacobs, Andersen & Blomhoff, 2007; Kleiner 1999; Koh-Banerjee et al., 2004; Manz, 2007; Manz & Wentz, 2005; Ritz & Berrut, 2005; Rose et al., 2007; Schulze et al., 2007; Timm & Slavin, 2008). During STEPS Aruba 2006, various aspects of participants' diet were assessed via self-report:

- Consumption of fruits and vegetables
- Use of oil or fat for meal preparation

- Consumption of whole grains and beans, snacks and sweets, and meals not prepared at home
- Consumption of non-alcoholic beverages

The results of STEPS Aruba 2006 indicated that the majority of those interviewed reported consuming:

- fruits and vegetables on a regular basis (on an average of 4 and 5.5 days per week, respectively), but consuming, on average, only 1 serving of fruits and/or vegetables per day (which is significantly less than the recommended 5 combined servings of fruits and/or vegetables per day);
- whole grains on a daily basis;
- beans on one or two days per week;
- snacks and sweets seldom or never;
- meals not prepared at home seldom or never;
- and using primarily vegetable oil for meal preparation.

The below recommended consumption of fruits and vegetables, in particular, is a significant risk factor for developing chronic health conditions. Those at significantly higher risk proved to be men, individuals between 25 and 54 years of age, and individuals born on Aruba. Surprisingly, contrary to what could be expected, gross personal income was not related to the consumption of either fruits or vegetables. One explanation for this finding could be that personal income by itself is not sufficient to determine purchasing power. Instead, household income could be used to elucidate the role of income in the consumption of fruits and vegetables. Another possible explanation for this finding could be that independent of the amount of money individuals earn, other factors, such as cultural factors and “unhealthy” eating habits, are related to the low consumption of fruits and vegetables. Further research should focus on the reasons why individuals do not consume the recommended daily amount of fruits and vegetables.

Furthermore, while the majority of those interviewed reported seldom or never consuming snacks, sweets, and meals not prepared at home, a relatively small, but for prevention purposes, significant group reported consuming snacks, sweets, and meals not prepared at home at least 3 times per week (10.3 percent, 17.5 percent, and 9.2 percent, respectively). This group consisted predominantly of men, individuals between 25 and 34 years of age, individuals born on Aruba and where the consumption of meals not prepared at home was concerned, employed individuals.

Finally, an important positive development was observed in the consumption of whole grain products. Comparing the results of STEPS Aruba 2006 to those of the health survey held in 2001, in 5 years, the percentage of participants reporting consuming whole grain products on a daily basis more than doubled.

6.1.2 Physical inactivity

There is international consensus about the major role of physical inactivity in the development of chronic health conditions, such as heart disease, type 2 diabetes and different types of cancer (WHO, 2003). During STEPS Aruba 2006, the amount of time individuals spend on physical activity was assessed in 3 domains of functioning:

- Work-related physical activity
- Transport-related physical activities
- Recreation-related physical activities

and on two levels of activity:

- Moderate level of activity
- Vigorous level of activity

In addition, the total amount of time spend on all levels of physical activity on all domains of functioning was used to calculate the amount of time individuals spend on high, moderate, and low levels of physical activity.

The results indicated that individuals reported spending, on average, 2 hours and 17.7 minutes per day on physical activities, of which one hour and 38.2 minutes on work-related physical activities, 28.0 minutes on travel-related physical activities, and 10.3 minutes on recreation-related activities. Statistical analyses showed that gender, age, country of birth, and employment status, were significantly related to the amount of time individuals reported spending per day on physical activities. Overall, those who reported spending significantly less time on physical activities per day were: women, individuals in the age category of 55 to 64 years of age, individuals born in Aruba, and individuals who were not employed.

Where work-related physical activities were concerned, those who reported engaging in significantly less work-related physical activities were professionals, technicians, associate professionals, and clerks. In addition, overall, significantly more time per day was spent on moderate rather than on vigorous levels of work-related physical activities (57.4 minutes and 40.4 minutes, respectively).

Furthermore, where transport-related physical activities were concerned, place of residence, employment status, and personal income were significantly related to the amount of time individuals reported spending on travel-related walking or cycling. Individuals who lived in the area of Paradera, those who were not employed and those with a high personal income reported spending significantly less time in transport-related physical activities.

Where recreation-related physical activities were concerned, women and individuals between 35 and 64 years of age reported spending significantly less time per day on recreation-related activities. In addition, more time was spent on moderate than on vigorous levels of recreation-related physical activities.

When taking into account the level of total physical activity participants engaged in, the results revealed that individuals engaged primarily in low and moderate levels of total physical activities, and spending the majority of their time on sedentary activities, including sitting and reclining at home, or with friends, and sitting at a desk.

However, one important comment must be made with regards to the lack of physical activity in individuals interviewed during STEPS Aruba 2006. The methodology used to assess physical activity/physical inactivity did not allow individuals who engaged primarily in low levels of physical activity, such as recreational walking, to indicate the amount of time they spend doing these activities (Collins, Miller & Marshall, 2007). On Aruba, a growing number of individuals engage in recreational walking on an individual basis or in organized walking groups. For prevention purposes, these individuals are a group of interest in that they could probably more easily be convinced to get involved in recreational activities that require moderate or high levels of physical activity compared to individuals who do not even engage in recreational walking.

6.1.3 Tobacco use

Tobacco use, and current daily smoking in particular, is another major risk factor for developing chronic health conditions, such as heart disease, different types of cancer, and respiratory diseases (WHO, 2007). Furthermore, individuals exposed to second-hand smoking are also at risk for the development of these chronic health conditions. Thus, during STEPS Aruba 2006 different aspects of tobacco use were assessed:

- Current smoking
- Daily smoking
- Second-hand smoking

The results indicated that the prevalence of both current smoking and current daily smoking in individuals interviewed during STEPS Aruba 2006 was relatively low, when compared to data from the United States (CDC, 2006) and The Netherlands (CBS, 2005), particularly where women were concerned. In addition, in the 5-year period between STEPS Aruba 2006 and the 2001 Aruba Health Survey, the prevalence of current smoking remained virtually the same (16.2 percent and 16.7 percent, respectively).

During STEPS Aruba 2006, the majority of current smokers reported smoking daily. Significantly more men than women reported being daily smokers (17.2 percent and 8.9 percent, respectively), and on average daily smokers reported smoking 14 manufactured cigarettes a day. Furthermore, the average duration of daily smoking was 24.5 years (for individuals interviewed who were between 25 and 64 years of age). In particular, men, and those who had completed a low level of education, reported having smoked daily for a significantly longer period of time, and thus being at relatively higher risk of developing tobacco related chronic health conditions.

Where second-hand smoking was concerned, less than 1 percent of individuals interviewed reported being exposed to second-hand smoking at their home and only 1.2 percent was exposed to second-hand smoking at their workplace.

6.1.4 Alcohol misuse

The beneficial effects of alcohol consumption on health and well-being notwithstanding, consuming more than 2 or 3 alcoholic beverages per day is associated with a higher risk of developing a number of chronic health conditions, such as heart disease, different types of cancer, liver cirrhosis, metabolic syndrome, and neuropsychiatric conditions. Furthermore, research has indicated that binge drinking or heavy episodic alcohol use is especially detrimental to individuals health (Arif & Rohrer, 2005; Bagnardi et al., 2008; Flowers et al., 2008; Marczinski, Harrison & Fillmore, 2008; O'Keefe, Bybee & Lavie, 2007; Okoro et al., 2004; Valencia-Martín, Galán & Rodríguez-Artalejo, 2008). During STEPS Aruba 2006, different aspects of individuals' alcohol use were assessed:

- Current drinking
- Frequency of alcohol consumption
- Amount of alcohol consumed
- Binge drinking
- Age at starting using alcohol

Of the total number of individuals interviewed during STEPS Aruba 2006, almost 40 percent fell into the category of current drinkers, significantly more men than women. However, when compared to data from the United States (CDC, 2006), the prevalence of current alcohol users in Aruba was relatively lower in both men and women and across all age categories.

Where the frequency of alcohol consumption was concerned, the majority of those interviewed (61.1 percent), and women in particular, reported using alcohol less than once a month or only on special occasions. However, when consuming alcohol, individuals reported on average consuming 5.4 alcoholic beverages a day, men consuming twice as many alcoholic beverages a day as women. In addition, the majority of those who reported having used alcohol in the month prior to STEPS Aruba 2006 could be categorized as being binge drinkers, in that they reported having consumed 4 to 5 alcoholic beverages on a single occasion. Although this group represented only 15.0 percent of the total number of men who participated in the survey and 7.8 percent of women, it deserves special attention because of the high risks involved for public health and well-being, including a higher risk of alcohol-related (car) accidents, alcohol-related (domestic) violence and vandalism.

Finally, as can be noticed when reviewing the results with regards to alcohol use/misuse, the only variable that plays a significant role in all the analyses performed was gender. Overall, the prevalence of alcohol (mis)use was significantly higher in men. There was also a gender difference in the age at which individuals reported having started using alcohol. On average, those interviewed reported having started using alcohol at a mean age of 19.5 years, men starting significantly earlier than women (at age 18.3, and at age 20.7, respectively).

6.2 Non-modifiable risk factors

6.2.1 Age

Most chronic diseases manifest themselves later in life as risk factors accumulate, which results in increased health expenditures as people age (WHO, 2007). In the light of the rapid ageing world population, a significant rise could thus be expected in the upcoming years in the prevalence of chronic health conditions and health expenditures.

The results of STEPS Aruba 2006 gave an impression of the influence of age on the prevalence of risk factors and of chronic diseases in Aruba. Where the prevalence of risk factors were concerned, age played a significant role in individuals' diet and in the level of physical activity they engaged in. Overall, the results showed that, as age increased, individuals tended to have a healthier diet in the sense that individuals in the age category of 54 and 64 years reported eating fruits more frequently and in larger quantities, consuming snacks and meals not prepared at home less frequently, and drinking less soda. On the other hand, as age increased, individuals reported spending less time on physical activities, in particular they reported spending less time on recreation related physical activities.

Where the prevalence of intermediate risk factors (raised blood pressure, raised blood glucose, raised total cholesterol, and overweight/obesity) was concerned, age was significantly related to the prevalence of raised blood pressure and raised total cholesterol. As age increased, the prevalence of raised blood pressure and raised total cholesterol showed a significant increase. Despite the fact that the prevalence of raised blood glucose and overweight/obesity also increased with age, the age differences were not statistically significant.

Finally, as age progressed, the self-reported prevalence of heart disease, stroke, and cancer, which are the leading causes of death in Aruba and in the rest of the world, showed an increase. The prevalence of heart disease in particular showed a steep increase as age progressed. However, neither the increase in the prevalence of heart disease, nor the increase in the prevalence of stroke, nor that of cancer with age were statistically significant. The self-reported prevalence of other chronic health conditions showed either an increase or a decrease as age progressed. Given that the prevalence of chronic health conditions was based on self-report, a valid argument could be made for including other measures of individuals' chronic disease status in further research.

6.2.2 Gender

It is a common misconception that chronic disease affects primarily men. Research has indicated that chronic diseases affect women and men almost equally. However, the results of STEPS Aruba 2006 showed that gender was significantly related to both the prevalence of important risk factors and to the prevalence of self-reported chronic health conditions.

Where the prevalence of risk factors was concerned, men reported having a less healthy diet (consuming significantly less fruits and vegetables, and consuming significantly more snacks and meals not prepared at home), using significantly more often tobacco on a daily basis and for a significantly longer period of time, and using significantly more alcohol (including using significantly more alcohol on a single occasion/binge drinking), than women. In addition, physical and biochemical measurements showed that the prevalence of high blood pressure, high triglyceride levels, and overweight and obesity was significantly higher in men than in women. In contrast, men reported spending significantly more time than women on activities requiring moderate to vigorous levels of physical activity. Gender differences in the prevalence of raised blood glucose, raised total cholesterol, and overweight/obesity were not significant.

Where the prevalence of self-reported chronic health conditions was concerned, women reported suffering from significantly more chronic health conditions than men. In addition, a significantly higher percentage of women, compared to men, reported suffering from constipation, chronic bladder infection, migraine, cancer, allergy, psychological problems, stroke, and varicose vein. On the other hand, a significantly higher percentage of men reported suffering from serious consequences due to an accident, when compared to women.

Again, the self-report nature of many of the assessments made must be taken into account when reviewing the results mentioned above. In fact, research has indicated that women tend to report more easily suffering from health conditions that men (Ladwig et al., 2000; Mendoza-Sassi & Béria, 2007).

6.2.3 Heredity

Genetic, environmental and lifestyle factors interact in very complex ways to the development of chronic diseases. Recently research has uncovered a number of genetic factors that play a role in the etiology of various chronic health conditions (Atchley et al., 2008; Florez, 2008; Klos et al., 2008; Loos & Bouchard, 2008; Moffatt, 2008). However, the exact magnitude of the contribution of genetic, environmental and lifestyle factors to the development of chronic diseases is still being heavily disputed and probably varies from one chronic disease to the next.

The results of STEPS Aruba 2006 indicated that more than 50 percent of those interviewed reported having one or more immediate relatives that had been diagnosed with high blood pressure, nearly 50 percent reported having one or more relatives that had been diagnosed with diabetes or high blood sugar, and some 30 percent reported having one or more relatives that had been diagnosed with high cholesterol or cancer/malignant tumor.

Taking into account the chronic disease situation of those interviewed, individuals with high blood sugar (measured via blood samples) reported significantly more often having one or more immediate relatives who had been diagnosed with diabetes or high blood sugar. In addition, those who reported suffering from cancer or having had a malignant tumor in the year prior to the survey reported significantly more often having one or more immediate relatives who had ever been diagnosed with cancer. The latter result must be viewed with some caution, given that no information was available about the types of cancer patients and/or their immediate relatives suffered from. Where other measured or self-reported chronic health conditions were concerned, no significant relationships were found between the chronic disease status of participants of STEPS Aruba and the chronic disease status of their immediate blood relatives (as reported by participants).

6.3. Raised Risk

Overall, the results of STEPS Aruba 2006 revealed that 60.2 percent of individuals who participated were at raised of developing chronic non-communicable diseases. These individuals had at least three out of five top risk factors assessed (current daily smoking, consumption of less than 5 servings of fruits and/or vegetables per day, engaging in low levels of activity, being overweight or obese, and having raised blood pressure). On the other hand, only 0.6 percent of those who participated were at low risk of developing chronic non-communicable diseases, in that they had none of the top five risk factors assessed. Important is emphasizing that no men were at low risk.

Furthermore, the results indicated that individuals who were at raised risk reported significantly more often than those not at raised risk and those at low risk, suffering from a serious heart condition, a chronic skin disease, and arthrosis of the joints, and having high and/or very high blood cholesterol levels and high triglyceride levels as measured by means of analyses of blood samples. In addition, individuals at raised risk reported significantly more often having a poor physical condition.

The statistical analyses conducted, showed that certain groups of individuals in particular were at raised risk of developing chronic non-communicable diseases:

- Men, particularly those between 25 and 44 years of age
- Women, particularly those who were not employed
- Individuals between 45 and 64 years of age
- Individuals born in Aruba

These groups of individuals should be kept in mind when planning intervention programmes directed at the prevention or control of chronic non-communicable diseases. When planning such intervention programmes it is important to bear in mind that rapid health gains can be achieved by tackling risky behaviors, such as tobacco use, unhealthy diet and physical inactivity. Research has indicated that even a 10 percent reduction of blood cholesterol levels in men aged 40 can lead to a 50 percent reduction of heart disease (Law, Wald & Thompson, 1994).

Programmes that have been implemented in other countries to reduce the prevalence of risk factors have resulted in rapid decreases in cardiovascular disease, myocardial infarction, type 2 diabetes, raised blood pressure, raised blood glucose, raised cholesterol levels and high triglycerides. Improving diet and physical activity has led, for example, to a 60 percent reduction of the incidence of diabetes in the United States and Finland and over 30 percent in China (Knowler, et al. 2002, Pan et al., 1997, Tuomilehto et al., 2001). In addition, in countries where effective programmes have been implemented, death rates from major chronic diseases have decreased dramatically (WHO, 2005).

Effective prevention strategies include population based interventions programmes as well programmes directed at individuals. Such intervention programmes should include both individuals at risk of developing chronic health conditions in order to prevent them form becoming ill, as well as individuals already suffering from chronic health conditions to prevent further exacerbations of their chronic health condition, promote well-being and improve quality of life.

Intervention programmes include, for example:

- Public awareness campaigns to inform the general public of important health issues
- Community-based interventions to reach the general population as well as specific priority populations in, for example, schools, workplaces, recreation areas, places of worship, etcetera.
- Screening to systematically test and identify individuals at risk of developing certain chronic diseases, such as cardiovascular disease, diabetes, and different types of cancer, including breast cancer.
- Clinical prevention programmes for individuals at risk (including drug therapy, surgery, and the like) to reduce the likelihood of disease onset and reduce complications of pre-existing chronic health conditions.

All intervention programmes are bound to put some pressure on public health resources, not only on monetary resources, but also on the available knowledge and personnel. However, intervention programmes can be highly cost-effective, in that reductions in the number of individuals at risk of developing chronic health conditions and in the number of complications experienced by individuals already suffering from chronic health conditions will unequivocally be accompanied by reductions in, among others, the use of health care services, which will trigger a reduction of health care costs, reductions in absenteeism from work, and ultimately reductions in premature death.

REFERENCES

References

Aldoori WH, Giovannucci EL, Rockett HR, Sampson L, Rimm EB, Willett WC. (1998). A prospective study of dietary fiber types and symptomatic diverticular disease in men. J Nutr;128:714-9.

Appel LJ, Moore TJ, Obarzanek E, et al. (1997). A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. N Engl J Med;336:1117-24.

Agudo A, Cabrera L, Amiano P, et al. (2007). Fruit and vegetable intakes, dietary antioxidant nutrients, and total mortality in Spanish adults: findings from the Spanish cohort of the European Prospective Investigation into Cancer and Nutrition (EPIC-Spain). Am J Clin Nutr;85(6):1634-42.

Arif AA, Rohrer JE (2005). Patterns of alcohol drinking and its association with obesity: data from the Third National Health and Nutrition Examination Survey, 1988-1994. BMC Public Health;5:126.

Atchley DP (2008). Clinical and pathologic characteristics of patients with BRCA-positive and BRCA-negative breast cancer. J Clin Oncol;26(26):4282-8.

Bagnardi V, Zatonski W, Scotti L, La Vecchia C, Corrao G (2008). Does drinking pattern modify the effect of alcohol on the risk of coronary heart disease? Evidence from a meta-analyses. J Epidemiol Community Health;62(7):615-9.

Bauman A, Craig CL (2005). The place of physical activity in the WHO Global Strategy on Diet and Physical Activity. Int J Beh Nutr Phys Act;2:10

Billson H, Pryer JA, Nichols R (1999). Variation in fruit and vegetable consumption among adults in Britain. An analysis from the dietary and nutritional survey of British adults. Eur J Clin Nutr;53(12):946-52.

Blanck HM, Gillespie C, Kimmons JE, et al. (2008). Trends in fruit and vegetable consumption among U.S. men and women, 1994-2005. Prev Chron Dis;5(2):1-10.

Bowman SA, Vinyard BT (2004). Fast food consumption of US adults: impact on energy and nutrient intakes and overweight status. J Am Coll Nutr;7:1089-96.

Central Bureau of Statistics (2004). Population Projections Aruba 2003-2023.

Centers for Disease Control and Prevention (2006). Fact sheet smoking and tobacco use: Secondhand smoke causes lung cancer.

Centers for Disease Control and Prevention (2006). Fact sheet smoking and tobacco use: Secondhand smoke causes Sudden Infant Death Syndrome.

Centers for Disease Control and Prevention (2006). Fact sheet secondhand smoke.

Centers for Disease Control and Prevention (2007). Fact sheet smoking and tobacco use: Secondhand smoke causes heart disease.

Central Bureau of Statistics (2004). Population Projections Aruba 2003-2023. Oranjestad, Aruba.

Collins BS, Miller YD, Marshall AL (2007). Physical activity in women with young children: how can we assess “anything that’s not sitting”? Women Health;45(2):95-116.

Deshmukh-Taskar P, Nicklas TA, Yang SJ, Berenson GS (2007). Does food group consumption vary by differences in socioeconomic, demographic, and lifestyle factors in young adults? The Bogalusa Heart Study. J Am Diet Assoc;107(2):234-6.

Devine CM, Wolfe WS, Frongillo EA Jr, Bisogni CA (1999). Life-course events and experiences: association with fruit and vegetable consumption in 3 ethnic groups. J Am Diet Assoc;99(3):309-14.

DeWit DJ, Adlaf EM, Offord DR, Ogborne AC (2000). Age at first alcohol use: a risk factor for the development of alcohol disorders. Am J Psychiatry;157:745-50.

Djousse L, Arnett DK, Coon H, Province MA, Moore LL, Ellison RC (2004). Fruit and vegetable consumption and LDL cholesterol: the National Heart, Lung and Blood Institute Family Heart Study. Am J Clin Nutr;79:213-7.

Duffey KJ, Gordon-Larsen P, Jacobs DR Jr, Williams OD, Popkin BM (2007). Differential associations of fast food and restaurant food consumption with 3-y change in body mass index: the Coronary Artery Risk Development in Young Adults Study. Am J Clin Nutr;85:201-8.

Estaquio C, Dreusne-Pecollo N, Latino-Martel P, Dauchet L, Hercberg S, Bertrais S (2008). Socioeconomic differences in fruit and vegetable consumption among middle-aged French adults: adherence to the 5 A Day recommendation. J Am Diet Assoc;108(12):2121-30.

Fan AZ, Russell M, Naimi T, et al. (2008). Patterns of alcohol consumption and the metabolic syndrome. J Clin Endocrinol Metab;Jul 15 [Epub ahead of print].

Florez JC (2008). The genetics of type 2 diabetes: a realistic appraisal circa 2008. J Clin Endocrin Metab;e-pub ahead of print.

Flowers NT, Naimi TS, Brewer RD, Elder RW, Shults RA, Jiles R (2008). Patterns of alcohol consumption and alcohol-impaired driving in the United States. Alcohol Clin Exp Res;32(4):639-44.

Forslund BH, Torgerson JS, Sjöström L, Lindroos AK (2005). Snacking frequency in relation to energy intake and food choices in obese men and women compared to a reference population. Int J Obes (Lond);2005:29(6):711-9.

Friel S, Newell J, Kelleher C (2005). Who eats four or more servings of fruit and vegetables per day? Multivariate classification tree analysis of data from the 1998 Survey of Lifestyle, Attitudes and Nutrition in the Republic of Ireland. Public Health Nutr;8(2);159-69.

Haag M, Dippenaar NG (2005). Dietary fats, fatty acids and insulin resistance: short review of a multifaceted connection. Med Sci Monit;11(12):RA359-67.

Hingson RW, Heeren T, Winter MR (2008a). Age at drinking onset and alcohol dependence: age at onset, duration, and severity. Arch Pediatr Adolesc Med;160:739-46.

Hingson RW, Heeren T, Winter MR (2008b). Age of alcohol-dependence onset: associations with severity of dependence and seeking treatment. Pediatrics;118:e755-e63.

Howard G, Bartram J (2003). Domestic water quantity, service, level and health. World Health Organization.

Hung HC, Joshipura KJ, Jiang R, et al. (2004). Fruit and vegetable intake and risk of major chronic disease. J Natl Cancer Inst;96:1577-84.

International Labour Office. ISCO-88: International Standard Classification of Occupations. Geneva, 1990.

Irala-Estévez JD, Groth M, Johansson L, Oltersdorf U, Prättälä R, Martínez-González MA (2000). A systematic review of socio-economic differences in food habits in Europe: consumption of fruit and vegetables. Eur J Clin Nutr;54(9):706-14.

Nationaal Prevalentie Onderzoek (2005). IVO, Rotterdam.

Jacobs DR Jr, Andersen LF, Blonhoff R. (2007). Whole-grain consumption is associated with a reduced risk of noncardiovascular, non-cancer death attributed to inflammatory diseases in the Iowa Women's Health Study. Am J Clin Nutr; 85:1606-14.

Kamphuis CBM, Giskes K, De Bruijn GJ, Wendel-Vos W, Brug J, Van Lenthe FJ (2006). Environmental determinants of fruit and vegetable consumption among adults: a systematic review. Br J Nutr;96:620-35.

Keski-Rahkonen A, Bulik CM, Pietiläinen KH, Rose RJ, Kaprio J, Rissanen A (2007). Eating styles, overweight and obesity in young adult twins. Eur J Clin Nutr;61(7):822-9.

Kleiner SM (1999). Water: an essential but overlooked nutrient. J Am Diet Assoc;99(2):200-6.

Klos K, et al. (2008). APOE/C1/C4/C2 hepatic control region polymorphism influences plasma apoE and LDL cholesterol levels. Hum Mol Genet;17(13):2039-46.

Knowler WC, Barrett-Connor E, Fowler SE, et al (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med;346:393-403.

Koh-Banerjee P, Franz, M, Sampson L, et al. (2004). Changes in whole-grain, bran, and cereal fiber consumption in relation to 8-y weight gain among men. Am J Clin Nutr;80:1237-45.

Kreijl CF, Knaap AGAC, Busch MCM, et al. (eds.). Ons eten gemeten. Gezonde voiding en veilig voedsel in Nederland. Rapport Rijksinstituut voor Volksgezondheid en Milieu (RIVM). Bohn, Stafleu, Van Loghum. Bilthoven;2004:1-364.

Ladwig KH, Marten-Mittag B, Formanek B, Dammann G (2000). Gender differences of symptom reporting and medical health care utilization in the German population. Eur J Epidemiol;16(6):511-8.

Larsson SC, Bergkvist L, Wolk A (2006). Consumption and sugar-sweetened foods and the risk of pancreatic cancer in a prospective study. Am J Clin Nutr;84(5):1171-6.

Law MR, Wald NJ, Thompson SG. (1994). By how much and how quickly does reduction in serum cholesterol concentration lower risk of ischaemic heart disease? BMJ 308:367-372.

Loos RJ, Bouchard C (2008). FTO: the first gene contributing to common forms of human obesity. Obes Rev;9(3):246-50.

Ma Y, Bertone E, Stanek E, et al. (2003). Associations between eating paterns and obesity in a free-living adult population. Am J Epidemiol;158:85-92.

Macdiarmid JI, Vail A, Cade JE, Blundell JE (1998). The sugar-fat relationship revisited: differences in consumption between men and women of varying BMI. Int J Obes Relat Metab Disord;22(11):1053-61.

Malik, VS, Schulze, MB, Hu FB (2006). Intake of sugar-sweetened beverages and weight gain: a systematic review. Am J Clin Nutr;84:274-88.

Malinski MK, Sesso HD, Lopez-Jimenez F, Buring JE, Gaziano JM (2004). Alcohol consumption and cardiovascular disease mortality in hypertensive men. Arch Intern Med;164(6):623-8.

Manz F (2007). Hydration and disease. J Am Coll Nutr;26(5 Suppl):535S-41S.

Manz F, Wentz A (2005). The importance of good hydration for the prevention of chronic diseases. Nutr Rev;63(6):S2-S5.

Marczinski CA, Harrison EL, Fillmore MT (2008). Effects of alcohol on simulated driving and perceived driving impairment in binge drinkers. Alcohol Clin Exp Res;32(7):1329-37.

Marín-Guerrero AC, Gutiérrez-Fisac JL, Guallar-Castillón P, Banegas JR, Rodríguez-Artalejo F (2008). Eating behaviours and obesity in the adult population of Spain. Br J Nutr;Apr 1:1-7 [Epub ahead of print].

Mendoza-Sassi RA, Béria JU (2007). Gender differences in self-reported morbidity: evidence from a population-based study in southern Brazil. Cad Saud Publica;23(2):341-346.

Moffatt MF (2008). Genes in asthma: new genes and new ways. Curr Opin Allergy Clin Immunol;8(5):411-7.

Montonen J, Järvinen R, Knekt P, Heliövaara M, Reunanen A (2007). Consumption of sweetened beverages and intakes of fructose and glucose predict type 2 diabetes occurrence. J Nutr;137:1447-54.

Naska A, Vasdekis VGS, Trichopoulou A, et al. (2000). Fruit and vegetable availability among ten European countries: how does it compare with the "five-a-day" recommendation? Br J Nutr;84:549-56.

Newes-Adeyi G, Chen CM, Williams GD, Faden VB (2007). Surveillance Report #81. Trends in underage drinking in the United States, 1991-2005. Bethesda, MD: NIAAA, Division of Epidemiology and Prevention Research, Alcohol Epidemiologic Data System.

O'Keefe JH, Bybee KA, Lavie CJ (2007). Alcohol and cardiovascular health: the razor-sharp double-edged sword. J Am Coll Cardiol;50(11):1009-14.

Pan XR, Li GW, Hu YH, et al. (1997). Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance: the Da Qing IGT and Diabetes Study. Diabetes Care;20:537-44.

Park Y, Hunter DJ, Spiegelman D, et al. (2005). Dietary fiber intake and risk of colorectal cancer: a pooled analysis of prospective cohort studies. JAMA;294(22):2849-57.

Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2005 Revision.

Ritz P, Berrut G (2005). The importance of good hydration for day-to-day health. Nutr Rev;63(6):S6-S13.

Roos G, Johansson L, Kasmel A, Klumbiené, Prättälä R (2000). Disparities in vegetable and fruit consumption: European cases from north to south. Pub Health Nutr;4(1):35-43.

Rose DJ, De Meo MT, Keshavarzian A, Hamaker BR. (2007). Influence of dietary fiber in inflammatory bowel disease and colon cancer: importance of fermentation pattern. Nutr Rev;65(2):51-62.

Rosenheck R (2008). Fast food consumption and increased caloric intake: a systematic review of a trajectory towards weight gain and obesity risk. Obes Rev;Mar14 [Epub ahead of print].

Schulze MB, Manson JE, Ludwig DS, et al. (2004). Sugar-sweetened beverages, weight gain, and incidence of type 2 diabetes in young and middle-aged women. JAMA;292(8):927-34.

Schulze MB, Schulz M, Heidemann C, et al. (2007). Fiber and magnesium intake and incidence of type 2 diabetes: a prospective study and meta-analysis. Arch Intern Med;167(9):956-65.

Schatzkin A, Mouw T, Park Y, et al. (2007). Dietary fiber and whole-grain consumption in relation to colorectal cancer in the NIH-AARP Diet and Health Study. Am J Clin Nutr;85:1353-60.

Schröder H, Fito M, Covas MI, REGICOR investigators (2007). Association of fast food consumption with energy intake, diet quality, body mass index and the risk of obesity in a representative Mediterranean population. Br J Nutr;98(6):1274-80.

Statistics Canada (2006). Health Indicators. Catalogue no. 82-221;No.1:1-5.

Timm DA, Slavin JL. (2008). Dietary fiber and the relationship to chronic diseases. Am J Lifestyle Med;2(3):233-240.

Tuomilehto J, Lindstrom J, Eriksson JG, et al. (2001). Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med;344-1343-50.

Valencia-Martín JL, Galán I, Rodríguez-Artalejo F (2008). The joint association of average volume of alcohol and binge drinking with hazardous driving behaviour and traffic crashes. Addiction;103(5):749-57.

Verdurmen J, et al. (2006). Alcoholgebruik en jongeren onder de 16 jaar: schadelijke effecten en effectiviteit van alcoholinterventies. Trimbos-instituut, Utrecht.

Wakai K, Date C, Fukui M, et al. (2007). Dietary fiber and risk of colorectal cancer in the Japan Collaborative Cohort Study. Cancer Epidemiol Biomarkers Prev;16(4):668-75.

World Health Organization (2003). Diet, nutrition and the prevention of chronic diseases. Report of a joint WHO/FAO expert consultation

World Health Organization (2003). Global strategy on diet, physical activity and health: Physical activity.

World Health Organization (2003). Global strategy on diet, physical activity and health: Fruit and vegetables and NCD disease prevention.

World Health Organization (2005). Preventing chronic diseases: a vital investment: WHO global report.

World Health Organization (2007). Stop the untruths, WHO tells the tobacco Industry.

World Health Organization (2007). 10 facts on ageing and the life course.

World Health Organization (2008). World Health Statistics 2008.

World Health Organization (2008). Alcohol facts and figures at the website of the World Health Organization.

World Health Organization. Why is tobacco public health priority? Tobacco Free Initiative at the website of the World Health Organization.

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