

MAURITIUS RESEARCH COUNCIL

*Survey of Centenarians
in the Republic of Mauritius*

Final Report

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List of Abbreviations

CSO	Central Statistics Office
OCS	Okinawa Centenarian Study
WHO	World Health Organisation
CHD	Coronary Heart Disease
CR	Caloric Restriction
NECS	New England Centenarian Study
SCS	Swedish Centenarian Study
GCS	Georgia Centenarian Study
PCP	Polish Centenarian Program
LHS	Life History Sheet
SPSS	Statistical Product and Service Solutions
ADL	Activities of Daily Living

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Preface

The Mauritius Research Council was solicited by the Ministry of Social Security, National Solidarity & Senior Citizen Welfare and Reform Institutions to conduct a survey on 'Centenarians in the Republic of Mauritius'. We are pleased to submit our report.

Dr Arjoon Suddhoo

Executive Director

Mauritius Research Council

10th June 2009

Executive Summary

Over the last decade there has been a 52.3% increase in the number of centenarians in the Republic of Mauritius. There are numerous explanatory factors for this longevity. This is reached when ageing is uniform and when all organs of the body are damaged at the same level and affected by the same level of functional impairment, avoiding the collapse of a single function. Factors that have been reported to explain their longevity include biological, psychological and sociological ones. The Mauritius Research Council has been solicited by the Ministry of Social Security, National Solidarity and Senior Citizen Welfare and Reform Institutions to investigate the different factors that are likely to impact on longevity of centenarians in the Republic of Mauritius.

Face-to-face home interviews were carried out with centenarians using a semi-structured questionnaire. The questionnaire comprised both close and open-ended questions and was elaborated to cover the main factors that could have contributed towards the longevity of the centenarians. The preferred methodology to study longevity in centenarians is multi-dimensional including home interviews, postal contact, physical examinations, blood testing and autopsies. This approach is complete as it allows for cross-validation of findings. The present study is a sociological one, based on home interviews of 49 centenarians and therefore based on self-reports. The present findings will therefore not be as complete and validated as those derived from more comprehensive approaches. Another limitation of the present approach is that the study probably underestimates health and functionality status of centenarians given that the sample consisted of relatively functional centenarians who granted the interview. Nevertheless the findings and factors contributing to longevity have been cross-checked with existing literature in the field to provide some degree of validity.

One important realization is that centenarians do not form a homogeneous group, with considerable inter-individual variability existing among them. They adapt to physical and social losses in various ways, depending on their immediate environment, functional reserves and coping styles. This study has also shown that it is not a single factor that can account for this state, but rather a mix of factors.

The gender superiority for women is apparent, but the ratio of 4.4:1 [woman to man] generally tallies with international statistics. But in the present sample there is not a large difference in the number of years that females and males live after 100. The genetic factor seems to be a fundamental determinant as there were long-lived subjects in centenarians' families. This concurs with findings from other centenarian studies. Social and environmental factors graft themselves on the genetic ones to contribute to longevity. Surveyed centenarians have kept a relatively healthy lifestyle. They frequently consumed dairy products, fruits, vegetables over their lifetime and decreased the consumption of meat and increased the consumption of chicken in their later years. Generally centenarians inadvertently went on a caloric restriction diet as they have aged, increasingly consuming more caloric-poor diets. But in the present study there is no evidence that this may have contributed to their longevity. Few centenarians smoked and most of those who did, stopped after 60 years old. This could have contributed to their successful ageing. Many centenarians have worked long hours during their active lifetime and many of them have remained active even after retirement, with the nature of activities obviously becoming less strenuous as they approached 100 years. Most of them thus remained functionally independent for most of their long lives, requiring assistance only in the latter years. Incidentally those centenarians tend to rate their physical health as normal. But it needs to be highlighted that as they age towards 100 years, they are increasingly witness 'decreasing functional reserve', thus requiring additional support. More than half of the centenarians claimed that they were not suffering from non-communicable diseases and had low cholesterol levels. These definitely contribute to successful ageing. An interesting factor is that many female

centenarians have given birth to their last child after the age of 40 and this could be linked to other factors that could have contributed to their longevity. Another contributive factor could be that the majority of centenarians were living with and being cared for by their family and relatives. Centenarians have their daily routines and living in the midst of their family permits them to perpetuate their habits, providing them a degree of warmth and safety. This provided them with some comfort, thus contributing to their well-being and also underlies the fundamental role played by the family in successful ageing. The majority of centenarians have a strong faith in God and this has brought them comfort in their everyday life and helped them to age successfully. Other mediating factors include support and financial resources, personal competencies such as personality and skills. These determine the coping ability of centenarians to deal with problems associated with old age. The existing state support system in terms of monthly pension allocation is appropriate as it ensures a guaranteed income for centenarians to cater for their needs.

The report concludes by providing some pointers that could inform policy making on issues relevant for centenarians. These include: an upgraded social support system, improved incentives for carers, the opportunity for a specialised private care home, the establishment of a private insurance scheme and amendment of existing legislations.

CHAPTER 1: INTRODUCTION

An ageing society, suffering from age-related diseases and disabilities poses serious challenges to existing support systems. There is therefore need to find ways to lessen this pressure and consequently improve the delivery of social services. One of the ways to do so is to promote 'successful ageing'. According to Rowe and Kahn's (1987) model, successful ageing comprise three components, namely avoidance of disease, maintenance of cognitive capacity and active engagement with life. Only those individuals that have high level of function in all these three domains are considered to be ageing successfully. Therefore it is critical for policy makers to understand what factors are associated with ageing well in order to formulate and implement policies that support successful ageing. Research into factors underpinning successful ageing can bring some indication as to its causal factors. According to Stathakos *et al.* (2005) a considerable proportion of centenarians seem to age successfully, without severe health disorders, with adequate personal autonomy and a positive attitude of well-being. Centenarians are individuals that have attained the age of 100 or more, that is have experienced remarkable longevity far beyond the life of their generation. Therefore a survey of centenarians and a study of the factors that have contributed to their longevity can provide pointers to guide public policy in promoting successful ageing. The present study focuses on the Republic of Mauritius¹ and tries to identify lifestyle and functional health determinants that have contributed to the longevity of its centenarians.

This report is structured as follows. Section 2.0 reviews the literature and provides the background to the study. Section 3.0 describes the methodology. Section 4.0 presents and discusses the findings and section 5.0 concludes.

¹ The study cover Mauritius and Rodrigues

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Given that there are no published studies about centenarians in Mauritius, this chapter therefore reviews the international literature to frame the subject under study. Sections 2.2, 2.3 and 2.4 respectively look into the ageing phenomenon and the number of centenarians in Mauritius and internationally. Section 2.5 presents the main research programmes on centenarians in the international context and subsequently depicts the main factors that have contributed to longevity.

2.2 Ageing in Mauritius

Developed countries and to a lesser extent middle-income countries are rapidly ageing. This phenomenon is characterised by a rise in median age of populations and a growing share of people above the age of 65. Two significant determinants of this demographic change are declining fertility and increasing life expectancy, owing respectively to improved education and health care. This expanding cohort of the elderly will increasingly impose a heavy burden on society and question existing welfare and health care policies and programmes. According to CSO (2000), there has been an increase in the elderly population from 37,600 in 1962 to 107,500 in 2000, implying an annual growth rate of 2.8%. This increase was caused following an increase in the number of total population from 514,700 to 1,178,800 during that period [an annual growth rate of 1.7%] and the concomitant improvement in health conditions owing to improved economic development. Life expectancy at birth by sex in Mauritius were 68.4 and 75.3 years for males and females respectively in the period leading to 2000 (CSO, 2005).

Presently, Mauritius has a total number of 88,119 individuals who are above the age of 65 years. This approximately represents 6.9% of the current total population. The CSO (2000) projected that the growth rate for elderly for the years 2000 to 2010 would be 2.8%. Based on this projection, elderly population for Mauritius will increase to nearly 350,000 in 2040, accounting for 23.5% of the population. The projections for the Mauritian population and the elderly are presented in figure 2.1.

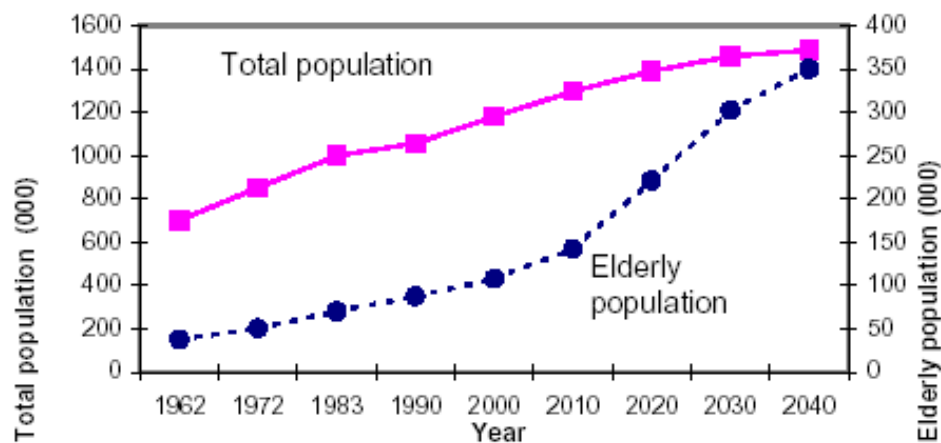


Figure 2.1: Evolution and forecast of the total and the elderly population, Republic of Mauritius from 1962 to 2040.

Source: Housing and Population Census 2000

In many European countries like Britain, France, Germany, Italy and Spain it is the population of the 'older old' which is now the fastest growing section of the population. The ageing phenomenon has also been characterised by an increase in the number of centenarians. Centenarians are individuals that have attained longevity far beyond the life expectancy limits of their generations. In countries with high life expectancies, the number of centenarians increases faster than any other age groups (Kannisto, 1994). Given that life expectancies in most countries are on the increase, centenarians as an age cohort will continue witnessing higher growth rates as compared to other age groups. Even in Mauritius the elderly are a fast-growing component of the population and it is assumed that the number of centenarians will also contribute to this growth.

2.3 Centenarians in the Republic of Mauritius

In the Republic of Mauritius, people living up to 100 years or more was a very rare occurrence until two decades ago. Mauritius has witnessed the ageing population phenomenon and this has led to a rapid increase in the number of centenarians. Mauritius and Rodrigues respectively have 63 and 4 centenarians, totaling 67 centenarians out of a total population of approximately 1.3 million. The evolution in the number of centenarians from 1999 to 2008 for both Mauritius and Rodrigues is presented in figure 2.2.

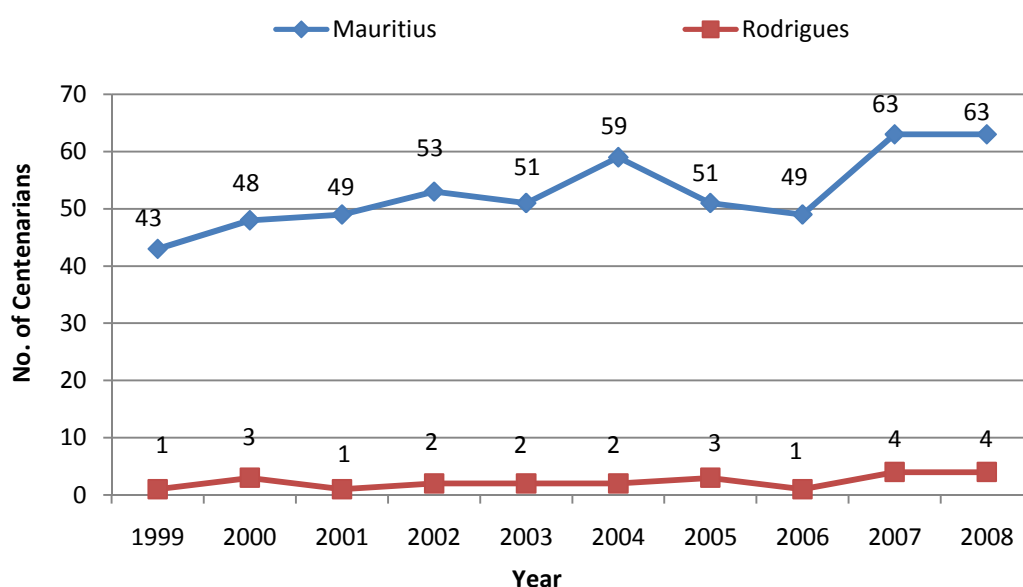


Figure 2.2: Centenarians in Mauritius and Rodrigues

Data source: Statistics Dept, Ministry of Social Security, National Solidarity and Senior Citizens Welfare & Reform Institutions, 2008

The data plotted show the total number of centenarians in Mauritius and Rodrigues as at June of each year. There has been a steady increase in the number of centenarians in the Republic of Mauritius in the last decade, representing a percentage increase of 52.3%. Based on 2008² figures the ratio of centenarians to elderly is 8:10,000 [63 centenarians for 88,000 elderly] and the ratio of centenarians to the total population is 4.8:100,000 [63 centenarians for 1,268,835].

² The population figures are as at July 2008.

The ratio of centenarians to whole population in Rodrigues is 10.6:100,000 [4 centenarians for 37,571]. This ratio is more than twice that of Mauritius, but this ratio should be interpreted with care as a small change in the number of centenarians in Rodrigues can significantly change the whole picture. The combined ratio for the Republic of Mauritius is 5:100,000 [67 centenarians for 1,306,406]. This is lower than the world average of 6.8:100,000³.

2.4 Growing number of centenarians worldwide

The increase in the number of centenarians in the Republic of Mauritius is not an isolated phenomenon. It is also being witnessed in both developed and to a lesser extent in developing countries. As previously mentioned, centenarians are the most rapidly growing population across the world. They represent approximately 450,000 out of a world population of approximately 6.6 billion, giving a ratio of 6.8:100,000.

The total number⁴ of centenarians for the years 1960, 1990 and 2000 are plotted for the following countries: Belgium, Sweden, Netherlands, Germany, Italy, England and Wales, France, Japan, US and Canada [figure 2.3].

³ Note of caution: The statistics used to compute the world average is an approximation, whereas data used to compute the Mauritian ratio is based on collected data.

⁴ It needs to be highlighted that there is no consolidated database on the number of centenarians worldwide. The plot is based on data collated from various sources. One major shortcoming is that data from developing countries have not been retrieved.

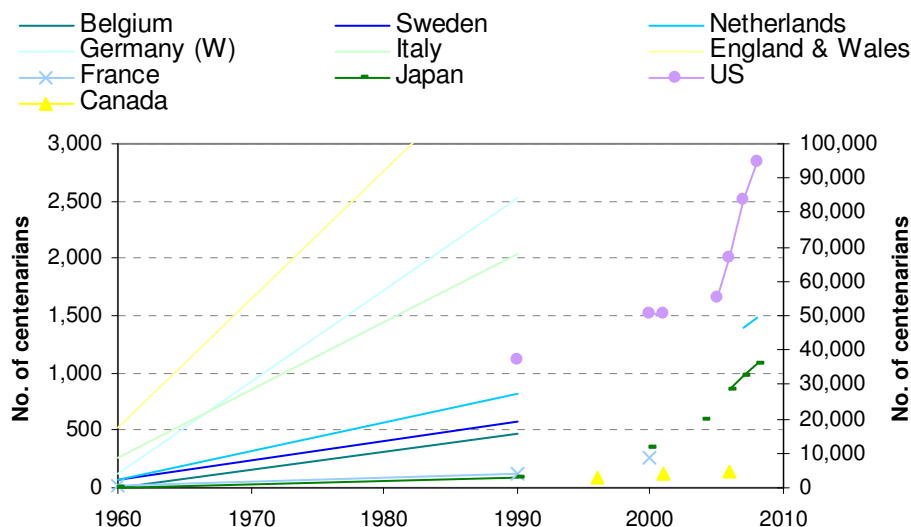


Figure 2.3: Evolution of centenarians in selected countries

The number of centenarians has been continuously increasing over the last four decades for all of the above countries, but some countries have witnessed higher than average rates of increase. For instance, in Japan, there has been a considerable increase in the number of centenarians from 3126 in 1990 to 11,546 in 2000. This corresponds to an increase of 270% as compared to 165% in Italy and 127% in France over the same period. Even though there has been a high growth in the number of centenarians over the last four decades, the growth from 1990 to 2000 has been more significant with an average growth rate of 96.6% for the list of countries listed in table 2.1. The nation with the greatest density of centenarians is Bulgaria with a ratio of 19.9: 100,000 (TIMSOC, 1997) whereas the greatest number of centenarians is found in the United States, with more than 50,000 centenarians, giving a ratio of approximately 10:100,000

Table 2.1: Proportion of centenarians in total population, 1960, 1990 and 2000

Country	1960	1990	2000
Iceland	3	17	25
Finland	11	141	246
Norway	73	198	423
Austria	25	232	453
Denmark	19	323	483
Switzerland	29	338	678
Belgium	0	474	893
Sweden	72	583	907
Netherlands	62	818	1,323
Germany (W)	119	2,528	4,925
Italy	265	2,047	5,438
England & Wales	531	3,890	6,320
France	371	3,853	8,752
Japan	155	3,126	11,546
United States		36,000	50,000

Source: Numbers of centenarians in selected nations, 1960, 1990 & 2000, Internet

There are many factors explaining the surge in the number of centenarians over the last decade. The next section reviews the literature and presents the main categories.

2.5 Major studies on centenarians

A number of countries have experienced the phenomenon of an ageing population, along with an increasing number of centenarians. This is a relatively new phenomenon, hence is becoming an important focus of gerontological research in some countries. The main objectives of these studies have been to understand the process of longevity and the factors contributing towards longevity. In this context research has been conducted in developed and to a lesser extent in developing countries. As described earlier the growth rates in the number of centenarians have been higher in certain countries, explaining why these countries have dedicated research programmes on centenarians.

Okinawa, a prefecture of Japan is the region that has the lowest mortality rates in the world, along with the world's longest life and health expectancies. The number of centenarians is also more concentrated in Okinawa as compared to any country or state in the world (Suzuki *et al.*, 2001). Subsequently Japan is the leading country in research on centenarians. The Okinawa Centenarian Study⁵ (OCS) is an ongoing population-based study, initiated in 1975 with Okinawan centenarians and other selected elderly most specifically in their seventies, eighties and nineties as its main focus. As principle objective, it aimed at exposing the genetic and lifestyle factors responsible for the remarkably successful ageing issue for the betterment of the health and lives of all the people in Okinawa. The ages of the people were validated through the Japanese family registration system and afterwards a full geriatric assessment was performed including physical examination and activities of daily living. In this respect, more than 900 Okinawan centenarians and other elderly have been examined. The initial study discovered an unusual number of centenarians who were in extraordinarily healthy shape; they were lean, very young as compared to their actual ages, energetic and had low rates of heart disease and cancer. After conducting the OCS over the seventies, eighties and nineties some interesting findings emerged. The OCS through its different sub-studies, has contributed to a great extent in identifying potential factors leading to increased longevity. Lessons learnt from the OCS are then siphoned into policies for the betterment of the health and lives of all people. Studies carried out under the umbrella of the OCS can be categorized under the following focus areas:

- Genetics, healthy ageing and longevity
- Caloric restriction, metabolic damage and ageing
- Cardiovascular health and ageing
- Cancer and ageing
- Osteoporosis and ageing
- Healthy cognitive ageing and dementia
- The role of physical activity in healthy ageing
- Women's health and ageing
- The endocrine system, hormones and ageing

⁵ More information on the Okinawa Centenarian Study can be obtained from: <http://www.okicent.org>

The following sections present the salient findings of some of the Okinawa studies. According to the WHO (1995), the three leading diseases responsible for death in most of the world population are coronary heart disease (CHD), stroke and cancer (Table 2.2). These diseases occur in Okinawa with the lowest frequency, with 18 people out of a population of 100,000 who die due to coronary heart disease as compared to 100 people out of 100,000 in the United States.

Table 2.2: Average life expectancy and death rates

Rank	Location	LE	Eating pattern	Death rates			
				CHD	Cancer	Stroke	All-causes
1	Okinawa	81.2	East-West Fusion	18	97	35	335
2	Japan	79.9	Asian	22	106	45	364
3	Hong Kong	79.1	Asian	40	126	40	393
4	Sweden	79.0	Nordic	102	108	38	435
8	Italy	78.3	Mediterranean	55	135	49	459
10	Greece	78.1	Mediterranean	55	109	70	449
18	United States	76.8	American	100	132	28	520

Notes: LE, average life expectancy world rank: CHD, coronary heart disease.

Sources: World Health Organisation, 1995; Japan Ministry of Health, 1995.

Several studies were initiated to investigate the reasons behind the amazing cardiovascular and overall health of the Okinawans and exceptional human longevity in Okinawans (E.g. Suzuki *et al.* (2001) and Wilcox *et al.* (2007a)). Willcox *et al.* (2006a) disclosed that families in Okinawa not only shared genes in common but they also shared common environmental habits. Willcox *et al.* (2007a) also conducted another study entitled: 'Ageing Gracefully: A Retrospective Analysis of Functional Status in Okinawan Centenarians'. The objective of the study was to retrospectively explore the late-life functional status of Okinawan centenarians. Activities of daily living were measured retrospectively at five time points (10, 5, 3, and 1 year prior to 2007 and in 2007) for 22 centenarians in relation to seven physical, two sensory and two cognitive functions using the Inoue Index. The study revealed high functionality for centenarians until their mid-90s. 82% of individuals were functioning independently at a mean age of 92 years

and almost two-thirds were functioning independently at a mean age of 97 years. Willcox *et al.* (2006b) investigated the relationship between caloric restriction and human longevity in Okinawa. The main objective was to find whether caloric restriction (CR) extends lifespan and lowers risk for age associated diseases in a phylogenetically diverse group of species. It was concluded that older Okinawans appear to have undergone a mild form of prolonged CR for about half of their adult lives. Age-adjusted mortality for specific age-related diseases, especially cardiovascular diseases, is extremely low in elderly Okinawans as compared to other age-matched Japanese or Americans. Willcox *et al.* (2006b) stated that though Okinawans did not consciously practice CR, they did develop cultural habits that led to prudent food choices that tend to maximize caloric density as would have been the favoured strategy for anyone who attempts a CR regime. The cultural context of successful ageing and the productive activity of older women weavers in Okinawan villages were also studied over a period of 4 years. Numerous visits were paid to elderly women and data were collected primarily through observation of a wide range of activities in which older women took part. These activities included those of the Old Person's Club, sports activities such as gateball, traditional dance, cooking and eating and basho-fu (*Musa liukiuensis*) weaving. In addition, a census was also carried out to gather maximum data, which was followed by semi-structured interviews to explore the role of basho-fu weaving in the lives of the elderly women. The different factors that were used to define success in this study included length of life, physical health, psychological health, cognitive abilities, social competence, life satisfaction, subjective well-being, personal control, active engagement with life and productivity. Willcox *et al.* (2007b) pointed out that lack of health and functionality was the most important factor detracting from a successful old age and leading to negative consequences for quality of life. These findings were also reported by Hashimoto (1996).

In addition to the numerous studies carried out on the Okinawans, there are other international studies. The New England Centenarian Study (NECS) was initiated by Farrer (1994) as a population-based study and focused on all centenarians living in 8 towns in the Boston area. It focused on unveiling how centenarians were able to noticeably delay or in some cases escape the Alzheimer's disease and other dementias. In this respect, the author performed detailed and annual neuropsychological examinations on centenarians living within 3 - 4 hours of Boston. The study also concluded that centenarians markedly delayed or even escaped age-associated diseases such as heart attack, stroke, cancer and diabetes. The study also revealed that 90% of the centenarians were on average functionally independent almost throughout all their lives until the age of 92 years.

The Swedish Centenarian Study (SCS), a multidisciplinary study of five consecutive cohorts at the age of 100 was conducted in Southern Sweden to describe the population from physical, social and psychological points of view, to characterise centenarians with various health conditions and diverse degrees of autonomy and life satisfaction and to identify factors that predict future survival (Samuelsson *et al.*, 1997).

Buono (1998) assessed the quality of life and longevity of Italian centenarians. The study focused on two particular aspects namely the antecedents of extreme old age and the psychophysical well-being of the very old. The author made use of two questionnaires to investigate the quality of life in elderly people and in this context, three groups of 38 elderly subjects were compared including centenarians and subjects aged between 75 and 85 years and 86 and 99 years. The main finding was that Italian centenarians complained less about their health though they affirmed having greater functional disability.

The Georgia Centenarian Study⁶ (GCS) originated from a study undertaken by the National Institute of Mental Health on 'expert survivors'. The GCS is a multi-disciplinary and multi-institutional study which builds on expertise from various fields. The study has been split into three distinct phases:

- Phase I: Examination of unique adaptational characteristics of elderly and centenarians
- Phase II: Assessment of longitudinal changes in adaptational capacity of elderly and centenarians
- Phase III: Study on identification and isolation of longevity genes, neuropathology and functional capacity of a sample of centenarians.

The Polish Centenarian Program (PCP) is a national multidisciplinary project, initiated in 2000 and dedicated to study longevity. It involved geriatricians, gerontologists, neurologists, immunologists, molecular biologists and other scientists. This is an ongoing project which contributes to European studies on centenarians.

Lilley (1996) investigated food choice, health and diet in a rural area in the UK. The main objective of the study was to find out the decisions and circumstances which influence the food choices of older people by assessing the influence of taste preference factors, micro-economic factors, personal and health status factors, practical considerations and the accessibility of food sources and selection of foods among the healthy elderly population. 350 interviews were conducted with individuals aged 65 years and above. The findings revealed that knowledge about "healthy foods" in this age group is good and that people often choose healthier foods in preference to alternatives despite finding the latter more palatable.

⁶ More information on the Georgia Centenarian Study can be retrieved from <http://www.geron.uga.edu/research/centenarianstudy.php>

2.6 Factors contributing towards longevity

Every individual is subject to a biological clock. The speed at which this clock ticks, depends on the interaction between genetic inheritance and the environment. A bad interaction between these two components can lead to an early death, whereas an optimum interaction will result in a natural death. According to Tafaro *et al.* (2008) longevity is reached when ageing is uniform and when all organs of the body are damaged at the same level and affected by the same level of functional impairment, avoiding the collapse of a single function. The next sections look at the different factors that are likely to impact on longevity either singly or in tandem. They are categorized under several headings.

2.6.1 Genetic Factors

Cutler (1975), Suzuki (1975) and Schachter (1998) opined that people live longer and healthier due to genetic variations that either affect the rate of ageing and/or that have decreased vulnerability to age-related diseases. Farrer (1994) reported in his study that at least 50% of centenarians have very close relatives and/or grandparents who achieved very old age and many among them have exceptionally old siblings. The latter also disclosed that many of the children of centenarians within the age range of 65 to 82 years appear to be following the footsteps of their parents with noticeable delays in cardiovascular disease, diabetes and overall mortality. He further revealed that male siblings of centenarians have an 11 times greater chance than other men born around the same time of reaching age 97 years and female siblings have an 8½ greater chance than other females also born around the same time of achieving age 100. He further inferred that exceptional longevity runs strongly in families and brothers and sisters of centenarians maintain half the mortality rate of other people born in the same time period, from age 20 to extreme old age and that the brothers of centenarians have a 17 times greater chance of living till 100 and the sisters have an 8 times greater chance which clearly indicates that their genes are responsible for extreme old age. Farrer (1994) pointed out that many centenarian women had a history of bearing children after the age of 35 and even 40 years. Studies proved that a woman who naturally has a child after the age of 40 has a 4 times

greater chance of living to 100 compared to women who do not. This in itself is an indicator that the woman's reproductive system is ageing slowly and that the rest of her body is as well.

Perls and Terry (2003) concurred on genetic predisposition and further added that some of the most promising genes seem to be those engaged in regulatory pathways such as insulin signaling, immuno-inflammatory response, stress resistance or cardiovascular function. Willcox *et al.* (2006a) also reported that genetic studies on the Okinawan population suggest that Okinawans are a genetically distinct group that has several characteristics of a founder population including less genetic diversity and clustering of specific gene variants, some of which may be related to longevity. They also acknowledged that support resources such as an adequate social support network, financial resources and personal competencies such as attitudes, skills or coping abilities contribute to the expression of genetic factors.

2.6.2 Nutritional factors

Lilley (1996) revealed that the elderly population in the United Kingdom have a good nutritional knowledge as they reported eating healthier foods. Their diets do not reflect their personal taste preferences as they consume semi-skimmed milk, low fat spreads and wholemeal bread despite finding them less tasty as compared to other alternative food stuffs. In addition, they also report to be taking high fibre intake as they strongly believe that fibre is of upmost importance in one's body to remain in good health. Furthermore, Perls (1999) identified that an early and consistent investment in diet, more specifically, a sensible eating habit and lifestyle can lead to more years of good health and later life.

It is reported that the Okinawan population had a low caloric intake and studies also showed that Okinawan school children consumed only 62% of the calories of other Japanese school children (Hokama *et al.*, 1967). Moreover, Kagawa (1978) confirmed low caloric intake (83% of Japan average) in the Okinawa adult population from the 1972 Japan National Nutrition Survey and documented anthropometric and morbidity data from older Okinawans that were consistent with CR. The latter also hypothesized that this may have been partly responsible for

the long and healthy lives of Okinawans. Furthermore, Fontana *et al.* (2004) further concluded that long term caloric restriction for periods of 3-15 years (average of 6 years) has shown CR to be highly effective in reducing the risk of atherosclerotic arterial disease, the leading cause of morbidity and mortality in Western societies, by changing key biochemical, hormonal and metabolic parameters. In addition, the aspect of CR has further been supported by Willcox (2006b) as he concluded that avoiding calorie-dense refined sugars, saturated fats and processed foods and replacing them with nutrient-dense but calorie-poor vegetables, fruits and vegetables leads to spontaneous weight loss through lower caloric intake. This also results in a vastly increased intake of health-enhancing phytonutrients including key vitamins, minerals and antioxidants flavonoids. They also pointed out that Okinawans do not eat to their full. Meyer *et al.* (2006) added that CR also appears to ameliorate the decline in diastolic heart function that occurs with human ageing.

With respect to the eating habits of the Okinawans, nutritional studies suggest that the traditional Okinawan diet, with its high intake of green leafy and yellow root vegetables, sweet potatoes as a dietary staple, and soy as a principle protein supplemented by small amounts of fish and meat, was adequate in most nutrients and particularly high in antioxidant vitamins (Willcox, 2005). Suzuki *et al.* (2001) also added that such diets aid in the minimisation of cardiovascular diseases through low cholesterol levels and minimal hypertension. Okinawans were also seen to consume anti-oxidant to a large extent especially flavonoids and carotenoids through a high vegetable (e.g. onion) and soy intake.

However, the CR aspect has also been contradicted to some extent by Phelan and Rose (2005) who argued that while CR is likely to be almost universal in its beneficial effects on longevity, the benefit to humans is likely to be small, even if humans restrict their caloric intake substantially and over long periods of time.

2.6.3 Medical factors

Suzuki (1994) disclosed that elderly Okinawans have relatively lower blood levels of free radicals which places them at lower risk for inflammatory and autoimmune diseases. Furthermore, Suzuki *et al.* (2001) revealed physiologically young arteries and well-compensated cardiac function among elderly Okinawans. They also reported that Okinawans have a healthy cardiovascular system, with minimal arteriosclerosis, good endothelial function and well compensated ventricular function at advanced ages and hence associated to a healthy lifestyle. The latter also reported that Okinawans have an extremely low-risk for hormone-dependent cancers including cancer of the breast, ovary, prostate and colon. Sakihara and Abe (1996) further added that the unique post-war public health care system that was provided to Okinawans after war was highly effective in eliminating endemic infectious disease and it proved to be a boon in eliminating disease in its early stages. Samuelsson *et al.* (1997) also revealed that the incidence of severe diseases was low in Swedish centenarians and according to them this very fact has contributed to the longevity of the Swedish elderly population.

2.6.4 Physical factors

Willcox *et al.* (2007b) found that almost every woman older than 70 in Okinawa had woven bashu-fu in their youth, and most still took part in one or another phase of the production process. The production process for weaving bashu-fu included cutting trees, taking out the fiber, hanging it to dry, cleaning the fibre, spinning it into thread-like yarn and finally weaving the bashu-fu. These elderly women have been busy working throughout their whole life and they are still interested to work. To this effect, it seemed clear that productive physical activity has played an increasingly important part in the process of successful ageing of elderly people (particularly women) in Okinawa and also throughout Japan. The authors also highlighted an extremely popular game called gateball, which is a major activity in Okinawa and which is promoted throughout Japan to keep elders active, healthy and socially engaged. Suzuki *et al.* (2001) also reported regular physical activities like farming and traditional dance among Okinawans. Farrer (1994) reported that few centenarians were obese and men, in particular, were nearly always lean throughout their entire lives. With older and older age, resistance

training becomes progressively more important for maintaining strength and muscle, as increased muscle tissue burns fat more efficiently and ultimately reduces the risk of heart disease and markedly enhances a sense of well-being (Perls, 1999). He also revealed that activities that entail coordination between multiple brain regions, for instance, dancing, painting, reading challenging books, learning a new language, sports and particularly practicing a musical instrument produce multiple benefits for the brain and hence elderly people develop the potential to resist traumas and chronic damages thus making it more likely for them to live up to 100 years or more.

2.6.5 Social and lifestyle factors

High social integration and social support for and between elderly adults, particularly among women have acted as a driving force for Okinawans to a great extent in enabling them to achieve such long lives (Goto *et al.*, 2003). Farrer (1994) reported that Italian centenarians gain greater satisfaction with their own, social and family life than do less elderly individuals. Substantial smoking history was rare in centenarians and this very fact might have acted as a positive factor for their longevity (Farrer, 1994).

2.6.6 Climatic conditions

Willcox (2007a) pointed out that Okinawa has a mild subtropical climate which encourages Okinawans to spend most of their time outdoors in the heavily forested mountains. This enabled them to breathe fresh air.

2.6.7 Economic Factors

Service *et al.* (2006) found out that centenarians in Okinawa had relative homogeneity with regards to the socio-economic status and lifestyle. In addition to moderate smoking and alcohol consumption, abundant and consistent physical exercise, similar dietary routines, similar access (or lack to access) to healthcare, centenarians had a relatively equitable distribution of wealth.

2.6.8 Cultural Factors

Religion and spirituality may be particularly important for Okinawan women as Okinawa remains the only contemporary society in which women actually lead the official, mainstream, publicly-funded religion (Matayoshi and Trafton, 2000). The importance of religion in longevity has also been highlighted by Willcox and Katata (2000) and Parker *et al.* (2002) who argued that elderly women's active engagement in religious roles may be playing a part in reducing depression and associated rates of suicide. Along the same line, Pritchard and Baldwin (2002) observed that rates of suicide for elderly Okinawan women have, for many years, been among the lowest in East Asia, a region known for high rates of suicide among older women".

Willcox *et al.* (2007a) observed that older people in Okinawa have an obligation to participate in social life and be productive, to the extent their present abilities allow them. This fact urges them to remain active and this in turn has become a culture for the elderly particularly for women. As a matter of fact, it has been pointed out that weaving basho-fu has always been part of the daily productive activity of the present generation of elderly women and it seemed that this culture played a major role in the lives of those women in helping them to attain such long lives. Basho-fu weaving can therefore be considered both as a physical and cultural factor.

2.6.9 Mental factors

Centenarians are better able to handle stress than the majority of people which gives them an edge over other individuals to lead longer lives. Buono (1998) further supported this point, as he reported a reasonably well preserved cognitive function among the centenarians and lower anxiety and depression levels as compared to elderly aged between 75 and 85 years and 86 and 99 years. Perls (1999) further stated that centenarians are natural stress-shedders and this in particular leads to additional years to their lives by improving their cognitive health since anxiety and depression have considerable harmful effects on brain function. The latter also recommended that there exists intensive and monitored programmes that teach stress reduction techniques such as progressive relaxation, biofeedback and physical-mental exercises like yoga for people who are subjected to high levels of stress.

No one factor listed above is solely responsible for the longevity of centenarians; rather longevity is a function of numerous factors, interacting under different environment. Even though the factors that contribute to longevity or that are that are reported to contribute to longevity in centenarians have been investigated in many countries, but such an exercise has not been conducted in Mauritius. The next chapter presents the methodology which has been adopted to carry out the study in Mauritius.

CHAPTER 3: METHODOLOGY

3.1 Introduction

It is a challenge to study centenarians and try to understand how they experience such longevity. Factors that have been reported to explain their longevity include biological, psychological and sociological ones. Different methodologies have been applied to study centenarians and to try to identify these factors. Most of these methodologies are multidimensional; Zheng *et al.* (1993) adopted a mixed methodology comprising, home interviews, postal contact, clinical observation, anthropometric assessment and autopsies to identify the factors associated with longevity and the causes of death of 160 centenarians in Shanghai. Other complementary approaches include physical examination and blood testing (Sikora, 2000, Bauco *et al.*, 1996). Most approaches are based on multidimensional questionnaires, complemented by clinical diagnoses and examination of functional abilities. The present study is based solely on a survey, focusing on the life styles and longevity factors as reported by Centenarians.

This chapter deals with specific details of how the present study was carried out with particular emphasis on the research objectives, research design, data collection, questionnaire design and data analysis.

3.2 Research objectives

The objectives of the study were derived from the Terms of Reference developed with the Ministry of Social Security, National Solidarity & Senior Citizen Welfare and Reform Institutions.

The specific objectives of this study were:

- to determine the factors that could have contributed towards the longevity of centenarians;
- to assess the perception of centenarians of their quality of life;
- to ask centenarians about existing support schemes; and
- to make recommendations that could improve the quality of life of centenarians in the Republic of Mauritius.

3.3 Research methodology

The methodology comprised three components:

- Analysis of life history sheets
- Survey of centenarians in Mauritius and Rodrigues
- Case studies of three centenarians [two in Mauritius and one in Rodrigues]

3.3.1 Study of life history sheets

Prior to conducting the survey, primary information was gathered from the respective Life History Sheets (LHS) of the centenarians. These sheets provided some background information on the history of the centenarians and in some cases facilitated the interview as some basic information was already available. Unfortunately life history sheets were not available for all centenarians and were not structured enough to be analysed more systematically.

3.3.2 Survey

Face-to-face home interviews were carried out with centenarians using a semi-structured questionnaire. The questionnaire was elaborated to cover the main factors that could have contributed towards the longevity of the centenarians. The questionnaire comprised both close

and open-ended questions. One note of caution here is that the present methodology is based on reported data and subsequently the veracity of responses have not been checked. In certain cases centenarians were not in a state to respond to the questions, under such circumstances their carers⁷ provided the relevant information. This method also introduced some bias into the study, but there was no other alternative to obtain information. Close-ended questions gave quantitative results which were amenable to some statistical descriptions, whereas open-ended qualitative questions allowed explanatory assessment of as yet undetermined issues or issues that necessitated more probing.

3.3.3 Case studies

A case study is a form of qualitative descriptive method which collects and presents detailed information about a particular interviewed participant. This in turn helps to draw conclusions based on the information obtained from that particular participant and only in the specific context of the study. Case studies were conducted on three centenarians. The choice of centenarians was arbitrary depending on the lucidity of the respondent and her/his ability to report her/his life experiences.

3.4 Population and sample size

The population size for this survey comprised centenarians in Mauritius and Rodrigues, and elderly who were to reach 100 years by 31st December 2008. Based on these criteria, the target population size for this study was 96, with 92 respondents in Mauritius and 4 in Rodrigues. Table 3.1 presents more information on the target population.

⁷ 25 carers replied to the questionnaire instead of the intended centenarians. In 14 cases both the centenarian and the carer replied to the questionnaire and the remaining 10 centenarians answered on their own.

Table 3.1: Target population

Gender	Mauritius		Rodrigues		Total
	Actual No. of centenarians (as at June 2008)	No. of elderly reaching 100 yrs old by Dec 2008	Actual No. of centenarians (as at June 2008)	No. of elderly reaching 100 yrs old by Dec 2008	
Male	9	7	1	-	17
Female	54	22	3	-	79
Total	63	29	4	-	96
	92		4		

Only 49 centenarians out of a possible total of 96 participated in the survey. Reasons for non-participation included ‘family reasons’, ‘health reasons’ and ‘no interest’. At the time of data collection in Rodrigues, one of the four centenarians had passed away. Consequently the remaining three were interviewed. Therefore 51%⁸ of the target population actually took part in the survey.

3.5 Questionnaire Design

Meticulous attention was paid while designing the questionnaire and the questions were structured in line with the specific objectives of the study. The questionnaire contained the following sections:

- Biographical details
- Household composition and family background
- Marital status
- Reasons behind longevity
- Interaction with family and society
- Daily activities and degree of autonomy
- Occupation
- Leisure and relaxation

⁸ Given that the sample is not representative of the population of centenarians, the findings are contained within sample.

- Income and sustenance
- Religion and religious practices
- Nutrition
- Health
- Accidents and medical surgeries
- Cognitive functions and mental balance
- Perception on quality of life

The clarity and phrasing of the questions were also taken into consideration to avoid any confusion or misinterpretation. The questions included in the questionnaire were phrased in English but the questions were asked in Creole. The translation of the questionnaire was done beforehand to avoid wasting time during enumeration and also to maintain some consistency during the interview.

A semi-structured questionnaire was designed consisting mainly of 2 types of questions, namely:

- closed format questions in the form of dichotomous questions (yes and no questions), multiple choice questions and scaled questions (Likert scale)
- open-ended questions.

This approach was chosen to provide the same form of quantitative data for all respondents and also leave some room for some exploratory flexibility. This flexibility is important given that no such study has ever been conducted before locally. The questionnaire consisted mainly of open-ended questions in order to provide maximum qualitative data.

The reasons for using a semi-structured questionnaire were:

- It helps in obtaining specific quantitative and qualitative information from the population;

- The survey can be conducted with a fairly open framework which allows for focused, conversational and two way communication between respondents and interviewers;
- It helps in obtaining general information relevant to specific issues;
- It helps in gaining a range of insights on specific issues;
- It allows flexibility to probe for details or discuss relevant issues;
- It assists in confirming what is already known and also provides the opportunity for learning.

3.6 Pretesting the questionnaire

The questionnaire was forwarded to the Project Monitoring Committee for views and suggestions. These were incorporated into the questionnaire prior to pre-testing it for collecting data. The purpose of pretesting a questionnaire is to refine it in an attempt to enable the researcher to obtain some assessment of the questions' validity and the reliability of the collected data. The pretest was carried out with several centenarians and their respective social security officers. Subsequently, the questionnaire was revised taking into consideration the suggestions proposed and ultimately a final draft of the questionnaire was produced before the actual survey was launched. A copy of the questionnaire is at Appendix A.

3.7 Mode of administering the questionnaire

The Ministry of Social Security, National Solidarity and Senior Citizen Welfare and Reform Institutions provided assistance in administering the questionnaires through the support of social security officers. Prior to conducting the interviews, the social security officers contacted the respective carers of the centenarians by phone to obtain their consent and simultaneously to fix an appointment. In this respect, interviews were carried out only with those centenarians who were prepared to be interviewed.

In the first place, an attempt was made to collect primary data from social security officers responsible for particular centenarians in order for the interviewer to obtain a first insight on

the centenarians before the latter could be interviewed. Once preliminary information was obtained, a detailed interview was carried out face-to-face with centenarians who were physically and mentally fit. However, for centenarians who no longer had the abilities to respond to the questions themselves, the questions were directed to their respective carers and/or family members.

Furthermore, the permission of the interviewees was sought for the purpose of using a digital recorder whereby all interviews were recorded so as not to omit or miss any precious information. In this view, all respondents were assured that all information thus collected would be used solely for the purposes of this study and would not be shared with a third party.

3.8 Data entry and analysis

Once the survey was completed, all the quantitative responses were coded and entered into a database. They were then analysed using the “Statistical Product and Service Solutions” (SPSS) package. It is the most popular programme for managing and analysing social data. Given that the distributions of the characteristics of the population under investigation are unknown⁹, non-parametric tests were therefore used¹⁰, namely the Chi square. Regarding the qualitative data, recordings were transcribed and entered in Microsoft Excel for further analysis.

3.9 Assistance received from the Ministry

In relation to this study, the Ministry of Social Security, National Solidarity & Senior Citizen Welfare and Reform Institutions provided the following assistance. Firstly, the ministry provided the research team with the Life History Sheets (LHS) of some 35 centenarians. These provided background information on the latter, prior to conducting the actual interview. The research team also received support from various social security officers in conduct and enumeration of questionnaires. The Ministry also provided transport facilities for the fieldwork.

⁹ It was assumed that the distributions were not normal.

¹⁰ Especially when variables were cross-tabulated.

3.10 Problems encountered during the survey

Any survey poses challenges to researchers, but one involving centenarians is more demanding in terms of ethics and understanding. Some problems encountered during the study are listed below:

- The interview was very time consuming as it took us approximately 1 hour to interview one individual due to the length of the questionnaire and also due to the fact that at times the same questions had to be repeated several times as some interviewees took time to understand the questions. Furthermore, some of the interviewees also had hearing problems whereas some could not fully concentrate for a prolonged period. In such cases the help of their respective carers was sought.
- At times, the elderly people were very moody and even got annoyed. This required extreme patience and diligence from the interviewers.

3.11 Limitations of the study

Before interpreting the findings of the study, the following points should be borne in mind. The sample size is not necessarily representative of the population of centenarians in Mauritius as the 49 centenarians surveyed were selected on the basis of availability, willingness to participate and ability to remember and respond. Therefore findings pertain to the centenarians surveyed and should not be generalised to the whole centenarian population living in Mauritius and Rodrigues.

CHAPTER 4: ANALYSIS AND FINDINGS

4.1 Introduction

In this chapter, the results obtained through the interviews of centenarians in Mauritius and Rodrigues are analysed and presented. As mentioned in the methodology chapter, two groups of people, namely existing centenarians and those who were to attain 100 years by the end of December 2008 were interviewed. As a semi-structured questionnaire was used as the main data collection instrument, both quantitative and qualitative analysis were carried out. However more emphasis was laid on qualitative analysis as the questionnaire consisted mainly of open-ended questions.

4.2 General findings

The findings presented here are based on what the centenarians have reported as being their lifestyles or claimed to be the factors that have contributed to their longevity. The veracity of such reports and claims has not been checked. Nevertheless the factors discussed below have been cross-checked with the relevant international literature. It is also imperative to note that the results presented in this chapter were drawn exclusively from the survey of 49 centenarians. Interpretation of results should be confined to the group of respondents and should not be construed to represent the population of centenarians in the Republic of Mauritius. Findings are presented under specific headings.

4.3 Biographical and demographic details

4.3.1 Age and gender

A total number of 49 respondents were interviewed. Their age distribution of interviewees and their gender are presented in table 4.1. Their age ranged from 99¹¹ to 106 years and 45 of the interviewees were centenarians. Most of the centenarians surveyed [37 out of 49] were aged between 100 and 102 years. The gender superiority for women is impressive, with 40 out of 49 respondents being female including the three respondents from Rodrigues. This gives a ratio of 4.4:1 [woman to man] and is in accordance with female/male ratio of: 3.3:1 for Greece, 3.6:1 for Denmark, 2:1 for Southern Italy and 4.8:1 for New Zealand [as reported by Stathakos *et al.*, (2005)].

Table 4.1: Number of individuals interviewed in Mauritius and Rodrigues

Age (yrs)	Mauritius		Rodrigues		Total
	Male	Female	Male	Female	
99	-	4	-	-	4
100	5	9	-	-	14
101	1	12	-	2	15
102	1	6	-	1	8
103	-	4	-	-	4
104	1	1	-	-	2
105	1	-	-	-	1
106	-	1	-	-	1
Total	9	37	-	3	49
	46		3		

The observed sex-difference in longevity is statistically significant¹². This finding points out that centenarian women are more capable for survival than men and this generally tallies with the literature.

¹¹ The respondents will also be called and counted as centenarians.

¹² Pearson χ^2 of 0.095.

4.3.2 Size of family at birth

Table 4.2 shows the family size of the centenarians. The majority of them (57.2%) came from families consisting between 3 to 8 brothers and sisters.

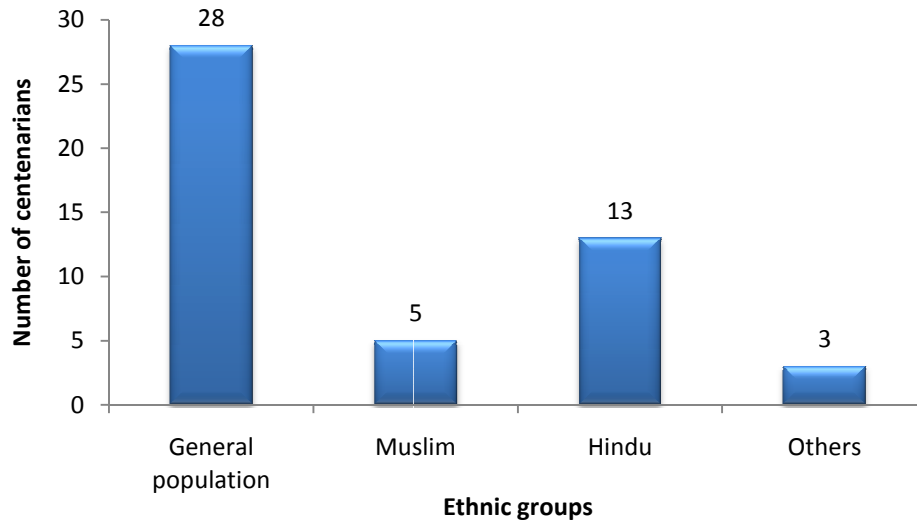
Table 4.2: Family size of centenarians

No. of brothers & sisters	No. of centenarians	%
0	2	4.1
1	4	8.2
2	2	4.1
3	5	10.2
4	8	16.3
5	2	4.1
6	4	8.2
7	4	8.2
8	5	10.2
9	2	4.1
10	3	6.1
11	1	2.0
12	1	2.0
13	1	2.0
27	4	8.2
Don't Remember	1	2.0
Total	49	100.0

4.3.3 Ethnicity

Of the 49 respondents, 28 belonged to the General Population category, 13 were Hindu, 5 were Muslim category and the remaining 3 were classified under others. The ethnic group distribution is presented in figure 4.1 below.

Figure 4.1: Ethnic group of centenarians

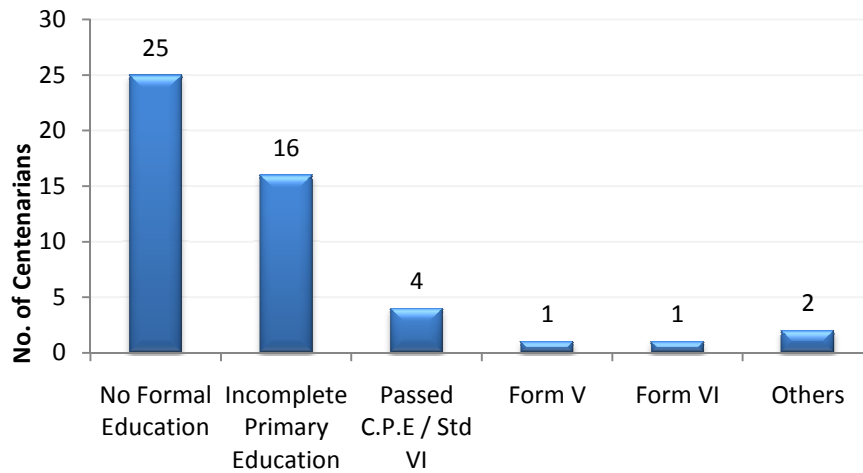


An interesting finding here is that the majority of interviewed centenarians are from General Population category, even though individuals from the General Population category account for 27% of the Mauritian population.

4.3.4 Level of education

25 centenarians individuals never went to school and therefore did not have access to any kind of formal education. 16 individuals did not complete their primary education; only 4 attended school up to standard VI or passed CPE, 1 studied up to form V whereas only 1 was able to complete her secondary education. Two centenarians therefore had completed 11 years of schooling. The relevant statistics are presented in figure 4.2 below.

Figure 4.2: Centenarians' level of education



Despite the disparity in schooling status, centenarians still show remarkable longevity. Darviri *et al.* (2008) reported a significant difference in education in centenarian men and women. This relationship was not found in the present sample.

4.3.5 Residential area

44.9% of respondents [22 out of 49] are presently living in rural areas. The same number of individuals are living in semi-urban areas whereas only 5 (10.2% of the sample) live in urban areas. Furthermore, it has also been found that 36.7% of the respondents have always lived in rural areas followed by 24.5% who have lived in both rural and semi-urban areas but have spent most of their lives in rural areas. Another 14.3% claimed to have lived most of their lives in semi-urban areas whereas 10.2% acknowledged having lived in both rural and urban areas but mostly in rural areas. It can be argued that even though 27 out of 49 respondents are presently living in semi-urban and urban regions, many of them lived most of their lives in rural areas.

4.3.6 Place of stay

The survey revealed that the largest number of centenarians (42.9%) presently live in their own homes together with their respective families as compared to 40.8% who do not own their homes, but live with their family members or carers. However, some 6.1% disclosed that they

reside in their own homes but separate from their families, against 4.1% who live in rental houses along with their family. One centenarian who participated in the survey was living in a private residential care home.

4.4 Genetic factors

The survey has revealed that 61.2% of centenarians that participated in the study had brothers and sisters that had lived up to more than 70 years. Likewise, some of the brothers and sisters of 46.9% of the respondents have lived up to more than 80 years whereas another 22.4% represent those centenarians whose brothers and sisters had lived up to more than 90 years. One of the respondents even had a sister who lived till 107 years. In addition to the relatively elevated longevity of the siblings of the centenarians, it has also been found that some grandparents, parents and close relatives of a number of centenarians (20 out of 49 representing 40.8% of the present sample) have lived till the age of 90 years or even more. 10.2% of respondents though could not recall whether they had or have relatives that have experienced prolonged longevity.

Furthermore, the children of the interviewed individuals also seem to be treading on the same path as for 63.8% of respondents, some of their children have already attained the age of 70 years or more. For 19.1% of the respondents, some of their children have already lived more than 80 years. The results tend to point that there is some genetic relationship explaining longevity in centenarians, but this longevity should also be attributed to other factors that are also usually shared among relatives. The present findings tend to concur with those of Farrer (1994) who reported that many centenarians also had close relatives/grandparents who achieved very old age.

4.5 Nutritional factors

With respect to the nutritional behaviour of sampled centenarians, it is necessary to categorise them into vegetarian and non-vegetarian to identify the types of food they consumed throughout their entire lives. 85.7% of interviewees classified themselves as non-vegetarian as compared to only 1 individual who claimed to be vegetarian, whereas 10.2% of respondents reported that initially they were non-vegetarian but afterwards shifted to being a vegetarian. Also, 1 individual stated that at first she was vegetarian but later she became non-vegetarian. Dietary habits did not differ much between men and women.

4.5.1 Consumption of vegetarian food

Table 4.3 below shows the frequency of consumption of dairy products, pulses, fruits and vegetables by our elderly people both in the past and at present.

Table 4.3: Frequency of consumption of vegetarian items

Items	Frequency of consumption	In the past		At present	
		No. of centenarians	%	No. of centenarians	%
Dairy Products	3-4 times per week	1	2.0	1	2.0
	Once a day	8	16.3	7	14.3
	2-3 times per day	40	81.6	40	81.6
	Not at All	-	-	1	2.0
Pulses	Rarely	4	8.2	8	16.3
	3-4 times per day	14	28.6	16	32.7
	Once a day	31	63.3	24	49.0
	Not at All	-	-	1	2.0
Fruits	Rarely	3	6.1	4	8.2
	3-4 times per week	4	8.2	5	10.2
	Once a day	41	83.7	38	77.6
	2-3 times per day	1	2.0	2	4.1
	Not at All	-	-	-	-
Vegetables	3-4 times per week	4	8.2	3	6.1
	Once a day	14	28.6	13	26.5
	2-3 times per day	31	63.3	31	63.3
	Not at All	-	-	2	4.1

4.5.2 Source of carbohydrates

Nearly all the interviewees responded that during their lifetime they consumed a lot of potatoes, sweet potatoes, manioc, violet and maize as sources of carbohydrates.

4.5.3 Consumption of non-vegetarian foods

Table 4.4 illustrates the frequency of consumption of non-vegetarian food such as egg, chicken, meat and fish by the centenarians both in the past and currently. The majority (81.6%) of individuals consumed dairy products 2 to 3 times per day throughout their entire lives. With regards to the consumption of pulses, there has been a slight change in consumption patterns. In the past pulses were consumed by 28.6% of respondents 3 to 4 times a week and by 63.3% of them once a day. At present 32.7% of respondents consumed pulses 3 to 4 times a week and 49% once a day. This shows that there has been a decrease (14.3%) in the number of

individuals who were consuming pulses only once per day whereas there has been a slight increase of 4.1% has been noticed in the number of elderly consuming pulses 3 to 4 times a day. However, the largest percentage of respondents (83.7%) has been initially consuming fruits at least once per day but there has been a slight decrease of 6.1% in centenarians with regards to their present daily consumption of fruits. The present findings also show that the same number of centenarians (63.3%) has been eating vegetables at least 2 to 3 times per day throughout their lifetime. Respondents generally claimed that they have been consuming all types of vegetables.

Table 4.4: Frequency of consumption of non-vegetarian items

Items	Frequency of consumption	In the past		At present	
		No. of elderly	%	No. of elderly	%
Eggs	On specific occasions	3	6.1	4	8.2
	Twice per month	1	2.0	3	6.1
	1 - 2 times per week	26	53.1	22	44.9
	3 - 4 times per week	16	32.7	15	24.5
	Not at All	3	6.1	8	16.3
Chicken	On specific occasions	2	4.1	4	8.2
	Twice per month	2	4.1	2	4.1
	1 - 2 times per week	39	79.6	28	57.1
	3 - 4 times per week	6	12.2	9	18.4
	Not at All	-	-	6	12.2
Meat	On specific occasions	3	6.1	5	10.2
	Twice per month	4	8.2	5	10.2
	1 - 2 times per week	36	73.5	23	46.9
	3 - 4 times per week	3	6.1	3	6.1
	Not at All	3	6.1	13	26.5
Fish	On specific occasions	1	2.0	4	8.2
	Twice per month	3	6.1	3	6.1
	1 - 2 times per week	37	75.5	30	61.2
	3 - 4 times per week	7	14.3	5	10.2
	Not at All	1	2.0	7	14.3

It is apparent that the percentage of respondents consuming eggs at a frequency of 1 to 2 times per week has reduced from 53.1 to 44.9. Similarly, the percentage of centenarians consuming eggs 3 to 4 times a week has also decreased from 32.7% to 24.5%. Likewise, the majority of people (79.6%) initially consuming chicken at an occurrence of 1 to 2 times a week has also reduced their consumption. Currently only 57.1% of interviewees are consuming chicken 1 to 2 times per week. Percentage of centenarians consuming chicken 3-4 times per week, has increased slightly from 12.2% to 18.4%. Centenarians have also decreased their consumption of meat. This is more apparent than for chicken. Currently only 46.91% of interviewees are consuming meat 1 to 2 times per week as compared to 73.5% in the past. At last, it has also been noticed that respondents consuming fish at an occurrence of 1 to 2 times a week has also known a fall of 14.3% from an initial percentage of 75.5% to a current percentage of 61.2%. It can be deducted that over the years centenarians had substituted meat with chicken.

4.6 Health¹³ and medical factors

4.6.1 Physical health

Respondents were asked to rate their physical health. Figure 4.3 presents the findings.

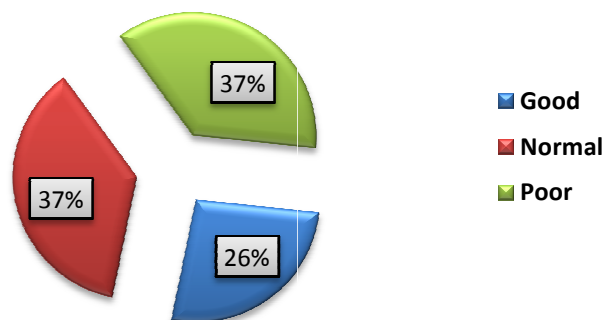


Figure 4.3: Reported status of physical health

¹³ Given that no clinical examination was carried out, there is the risk that the prevalence of health disorders is underestimated.

63.2% of them rated their physical health as normal to good, whereas 36.7% reported their physical health as being poor. It has been reported that self-reports by centenarians on their health is considered to be a good barometer of their true status.

4.6.2 Non-communicable diseases

Figure 4.4 presents the occurrence of the main non-communicable diseases as reported by centenarians. 8.16% of individuals had diabetes [4 individuals]. This compares with 6% in Greece and 7-11% in Denmark, Sweden and Finland. 8 respondents had alzheimer, 1 had dementia whereas 7 suffered from hypertension. Stathakos *et al.* (2005) reported that the prevalence of hypertension was 38.9% in Greece as compared to 14.3% in the present sample. It was also reported that out of the 49 centenarians, 29 did not suffer from any form of non-communicable or communicable diseases which proved that the majority of them enjoyed good health. Hence, this might be a possible reason behind their longevity. Those claiming not to suffer from the above-mentioned diseases represent 59.2% of the present sample and is almost four times higher than what was reported by Darviri *et al.* (2008) for a group of Greek centenarians suffering from age-related diseases like hypertension, diabetes and cardiovascular.

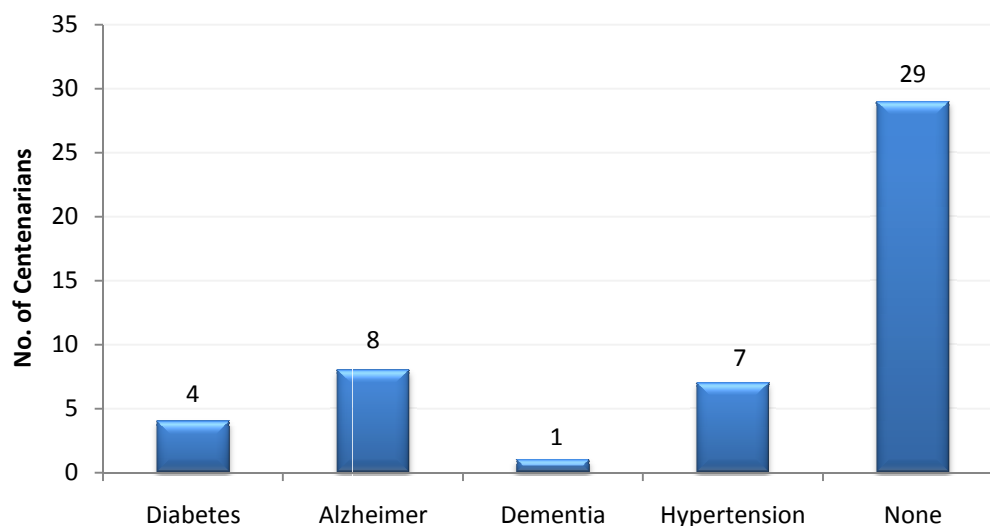


Figure 4.4: Non-communicable diseases

Moreover, it was also found out that 95.9% of respondents have never experienced high cholesterol levels and subsequently were not prone to serious health problems.

4.6.3 Usual treatment methods by centenarians

Surprisingly, 2 centenarians claimed that they have never fallen ill throughout their lifetime and have never consulted a doctor nor have been hospitalized. Additionally, 89.8% of the interviewees acknowledged that they seldom fell ill and in case it happened, they usually prepare their own medication using herbal plants, without necessarily visiting a medical doctor. This concurs with Darviri *et al.* (2008) who reported that the majority of centenarians have not visited a doctor over the year preceding their study. Respondents argued that herbal medicines were effective.

4.6.4 Major operations or surgeries

44.9% of surveyed centenarians has had recourse to surgeries, for instance, operation of the breast, removal of a cataract, implantation of a pacemaker, operation of the uterus, operation of the cyst, operation of the intestine, appendicitis, prostate and operation of the stomach and as a result these individuals argued that these operations enabled them to better live their lives. Therefore 55.1% of respondents never had an operation. This % is much higher than 25% which Darwin *et al.* (2008) reported for Greeks.

4.6.5 Quality of sleep

67.4% of respondents reported that they enjoyed normal sleep quality, averaging 7-8 hours daily, generally broken down into two periods. Respondents also reported that they have noticed a deterioration in their sleeping quality after the age of 95. 32.6% of them complained that they had poor sleep quality with frequent nocturnal and early morning waking. Four of them claimed that they were sleeping for an average of four hours per day. The main underlying reasons were stress, anxiety and leg pain. Tafaro *et al.* (2008) pointed out that stress

has negative influences on sleep of centenarians. This can subsequently affect their quality of life and reduce survival (Tafaro *et al.*, 2007).

4.6.6 Cognitive functions¹⁴ and mental balance

20.4% and 53.1% of centenarians respectively claimed that they had a very good and good memory, whereas 26.5% of them rated their memory as bad. But respondents felt that their memory did not stand in their way to live a decent life. It was also found out that 61.2% of respondents rated their attention level as normal as well as 55.1% who rated their level of concentration as normal. Additionally, the responses obtained also showed that 59.2% of interviewees rated their ability to judge as normal. Based on the above claims it can be said that the majority of centenarians have satisfactory cognitive functions, with only few of them being severely cognitively impaired. There is a strong evidence of the importance of a cognitive system and quality of life in old age (Kliegel *et al.*, 2004).

4.6.7 Stress, depression¹⁵ and personality traits

Respondents mentioned that they felt depressed, not because of clinical depression *per se*, but more because of its 'health status effect'. This effect is caused mainly by a loss in functional abilities which impact on their autonomy and on the maintenance of a social role, leading to social isolation. Tafaro *et al.* (2002) mentioned that physical illnesses, social and economic problems of the elderly cause depression and that elders themselves share this opinion. This occurs in individual of all ages but tend to occur more frequently in centenarians (Davidson *et al.*, 1994). They therefore tend to feel more depressed with an increasing worsening of their general status. Some centenarians from the present sample show a relatively low level of anxiety even if they experienced a progressive loss of autonomy. Tafaro *et al.* (2008) associated this to centenarians showing favourable personality traits and to their capability to adapt themselves to the stressing events of their lives. Surveyed centenarians showing a more

¹⁴ Here it is acknowledged that the approach used here is a primitive way to assess cognitive impairment. Most specific instruments to do so, include the Mini-Mental State Examination and the Global Deterioration Scale.

¹⁵ The depressive status of individuals is usually evaluated using a Geriatric Depression Scale. See Brink (1982) for an example. The present results are based on what centenarians have reported.

positive personality generally described themselves as energetic, dynamic and loquacious. Tafaro *et al.* (2002) also revealed that depression tends to prevail more in institutionalized patients. Only one respondent from the present survey lived in a residential care home and she did not feel depressed.

4.6.8 Coping styles

Respondents showed different coping behaviours. Most of them were prepared to acknowledge their problems and were likely to seek support from their family and carers. According to Tafaro *et al.* (2008) this translates into an optimistic view of life, allowing for the stressor to be considered as a stimulus. Surveyed centenarians seemed to cope relatively well, especially those who felt that they are being properly cared for.

4.7 Physical factors

4.7.1 Marital status and birth of children

As mentioned earlier in this chapter, out of a total of 49 interviewees, 40 were females and the remainder were males. Apart from 4 centenarians, all of them got married. 2 women lived in cohabitation and had children, while another 2 remained single due to personal reasons. Here, it is interesting to note that 13 female got married below the age of 17 years, representing 32.5% of surveyed females. 22.2% of them got married within the age group 18 to 25 whilst another 16.6% embarked into their matrimonial life after the age of 26. However, there were also some 25% who did not remember the exact age at which they got married but still claimed to have entered into their conjugal life at a very young age.

Based on the above findings it can be assumed that a high number of female centenarians got married at a very early age and it is likely that they must have given birth during the early years of their youth. Table 4.5 presents the number of children that centenarians have had during their lifetime. 55.1% of them have had between 4 to 8 children.

Table 4.5: Number of offspring of centenarians

Number of children	Number of centenarians	%
0	2	4.1
1	5	10.2
2	1	2
3	3	6.1
4	6	12.2
5	6	12.2
6	9	18.4
7	2	4.1
8	4	8.2
9	3	6.1
10	3	6.1
11	1	2.0
14	1	2.0
16	1	2.0

47.2% of female centenarians gave birth to more than 3 children, (from 4 to 6). Another 11.1% representing 4 centenarians had 8 children, 8.3% had 9 children, 5.5% gave birth to 7 children and 8.3% had 10 children, whereas 2.7% of surveyed centenarians gave birth to 14 children.

According to the above statistics, it is quite interesting to note that even though those centenarians became mothers at very young ages and gave birth to a significant number of children, they were still able to attain such longevity. This, as a result, provides some credence that they were very resistant people by nature and had great physical capacities which contributed to their longevity.

4.7.2 Age at which female centenarians gave birth to their last child

Another important point that supports the above argument is that 55.3% of female participants acknowledged having given birth to their last child above the age of 35 years. 31.6% gave birth to their last child when they were within the age group of 35 to 40 years whereas 18.4% stated to having given birth to their last offspring when they were aged between 41 and 45 years. Surprisingly, the survey also uncovered that 2 Rodriguan centenarians gave birth to their last child at the age of 47 years and 51 years respectively. This in itself provides evidence of the fact that those centenarians are physically strong as they delivered babies at extremely advanced ages without major medical complications. This findings correlates with Farmer (1994) who pointed out that women that naturally bears a child after the age of 40 has four times greater chance of living up to 100 as compared to a woman who does not.

4.7.3 Widowhood

It is reported in the literature that there is a sex-difference in widowhood (Darviri *et al.*, 2008). This is expected in the local context because of the higher survival of women in older age and also by the trend in the Mauritian society (in the last century) for men to marry much younger women. This subsequently reduces the probabilities of female centenarians to have their spouses alive. Even though it appeared that there is a sex-difference in widowhood, the difference was not statistically significant¹⁶.

4.7.4 Reasons to start working

Of 89.8% of our respondents who worked to earn an income, the majority (38.8%) started working below the age of 20. More specifically, 14.3% started working when aged between 7 to 10, 16.3% started working between the ages of 11 to 15 years and 8.2% started working between 16 to 19. In this respect, another 38.8% did not remember exactly the age at which they started working but they asserted that they started very young. Furthermore, 12.2% affirmed to have started working within the range of 25 years and 40 years whereas the remaining 10.2% never worked. The largest percentage (57.1%) disclosed that they had been

¹⁶ Based on a Pearson χ^2 value of 0.182.

ushered into an activity-oriented life to contribute to their household income as they did not come from rich family. Some 20.3% of respondents started working because of the following reasons: due to the death of their parents, failure at school, they liked working, never liked going to school, as an activity and to earn an income to raise their children. The exact percentage for each response is shown in figure 4.5 below.

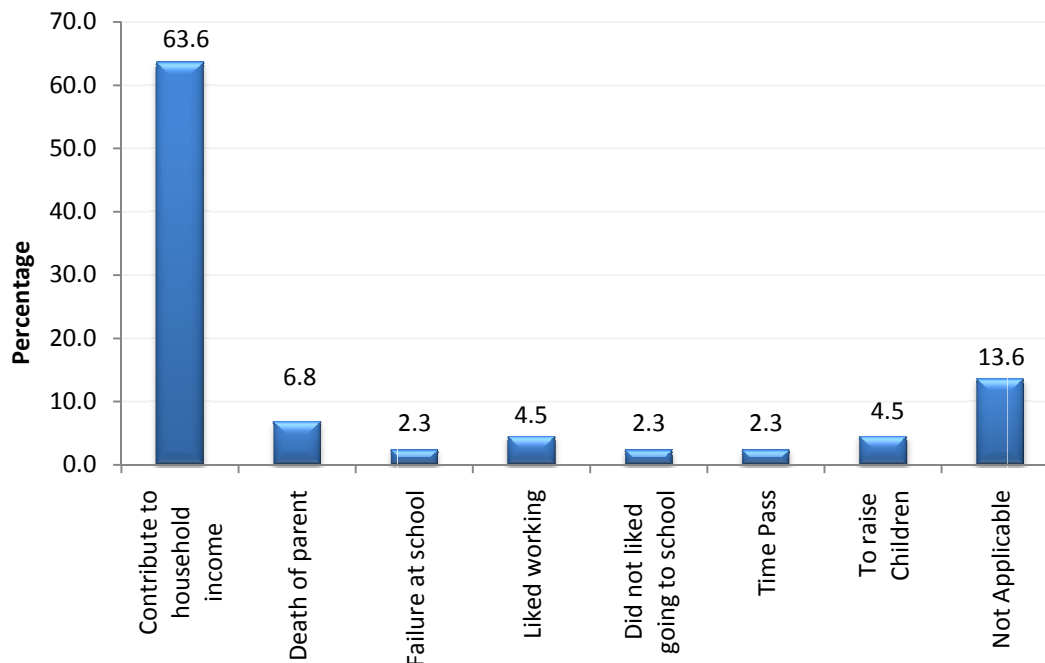


Figure 4.5: Reasons why centenarians started working

However, regarding the number of hours worked per day, the survey demonstrated that out of the 44 interviewees, 65.9% worked between 6 to 8 hours per day, 20.5% worked between 9 to 12 hours, 9.1% worked less than 5 hours daily while 4.5% worked between 13 to 16 hours. Moreover, 81.8% of the respondents pointed out that they used to work 5 to 6 days per week whereas some 15.9% even worked 7 days per week and only 1 individual (2.3%) did not remember the number of days she used to work per week. These statistics show that the majority of respondents worked for long hours on a daily and weekly basis. 75% of respondents pointed out that the work they were doing was strenuous whereas 25% did not find their work to be strenuous as it was in their culture to work hard.

Centenarians were also asked at which age they stopped working. The findings revealed that 52.3% continued to work even after the age of 60 years. 13.6% stopped working after the age of 85 years, 27.3% stopped working between the age range of 71 to 80 years, the majority of 43.2% stopped working within the range 60 to 70 years whilst 13.6% did not remember the age at which they stopped working. However, 1 individual (2.3%) stopped working at a young age of 40 years due to her poor eye sight. The above results clearly indicate that the majority of respondents started working at very early ages and continued to do so till extreme old ages. This provides some credence to the fact that centenarians remained physically active and this might have contributed towards their prolonged lives. This relationship between productive capacity and the process of successful ageing has also been reported by Willcox *et al.* (2007b).

4.7.5 Daily activities after retirement

Figure 4.6 illustrates the activities carried out by surveyed centenarians on a daily basis, after they retired. As the majority of the respondents were female, a considerable percentage (36.7%) continued to do their household chores; the same percentage had the responsibility for looking after their grand children which in itself requires a lot of physical energy and 8.2% claimed to continue to do some gardening such as the cultivation of vegetables for their own consumption. Also, some 12% of the respondents worked as part-time teacher, worked in their own shop, did sewing, used to clean the yard and reared animals. The detailed breakdown is presented below. Finally, the remaining respondents (6.1%) acknowledged that they did nothing after they retired from their jobs since they wanted to relax as they claimed to have worked really hard.

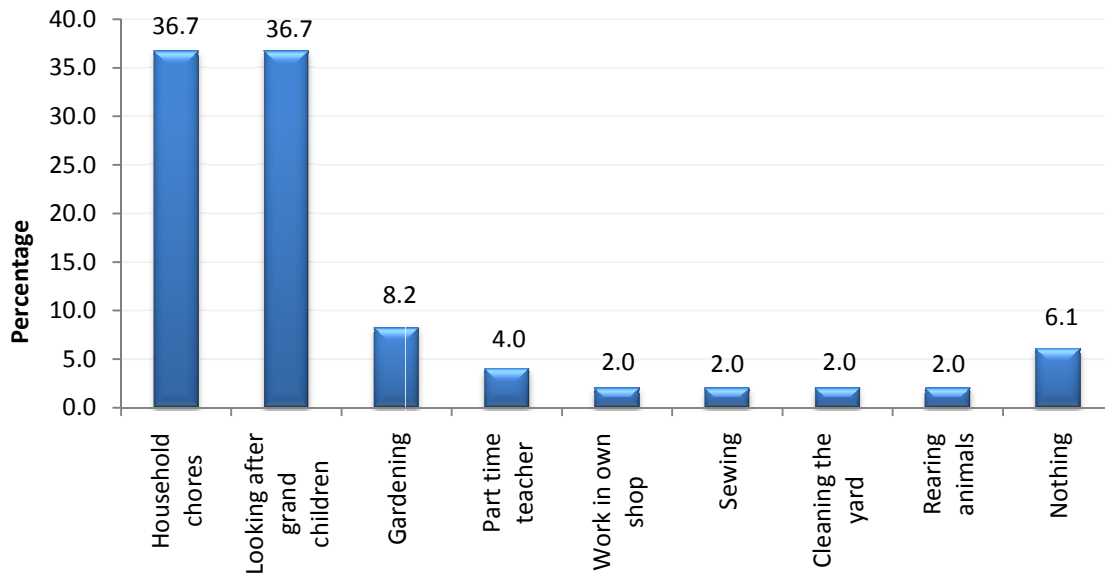


Figure 4.6: Daily activities after immediate retirement

Centenarians were also asked to provide some information on their current daily activities. Figure 4.7 provides a representation of the different activities in terms of percentage. 16.3% still have the ability to do their household chores on their own; some 8.2% like to walk some distance on a daily basis to keep them in good health; 6.1% indulge in gardening; 2% still sew clothes and another 2% look after their grand grand children or even great grand grand children. The majority of them though (65.3% of centenarians) does absolutely nothing due to lack of physical abilities. They remain at home watching television, listening to the radio or talking with their near and dear ones.

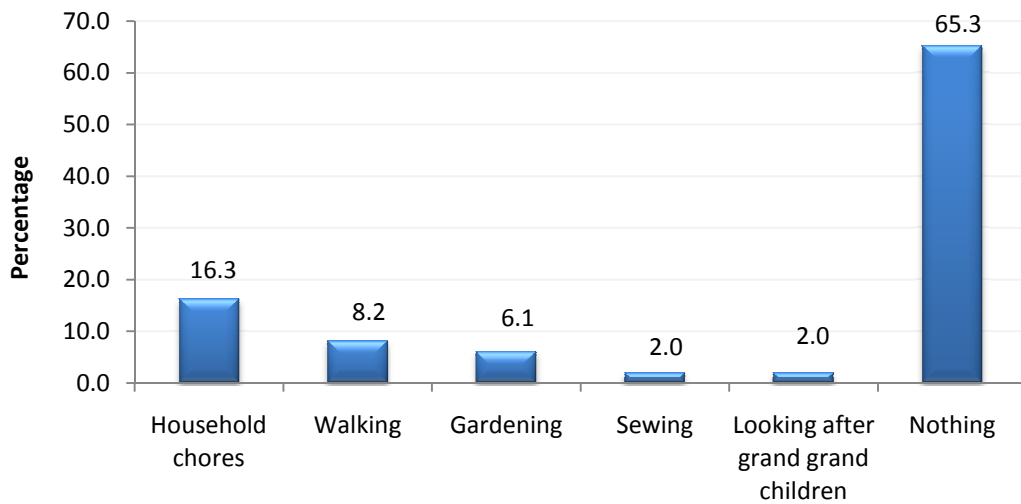


Figure 4.7: Daily activities presently carried out

Comparing figures 4.6 and 4.7 it can be inferred that centenarians have generally kept themselves active after retiring, but they have coped with their decreasing functionality by decreasing their activities. Nevertheless 34.6% of them are still involved in some form of activity.

4.7.6 Functional abilities

Centenarians were also asked about the age at which they were still autonomous in their ADL. Figure 4.8 presents the results. 6.1% responded within the range of 80 to 90 years. 53% of respondents were autonomous in their ADL till the age of 101, whereas 16% of them claimed that they are still autonomous to date. The present findings contrast with those of Antonini *et al.* (2008) who reported that the majority of centenarians from a survey in Massachusetts enjoyed a complete autonomy¹⁷, but do concur with Willcox *et al.* (2007a) and Farrer (1994) who reported that Centenarians had high functionality until their mid 90s.

¹⁷ These findings are from: Hitt, R., Young-Xu, Y., Silver, M. and Perls, T. (1999) Centenarians: the older you get, the healthier you have been. *Lancet* 354, 652.

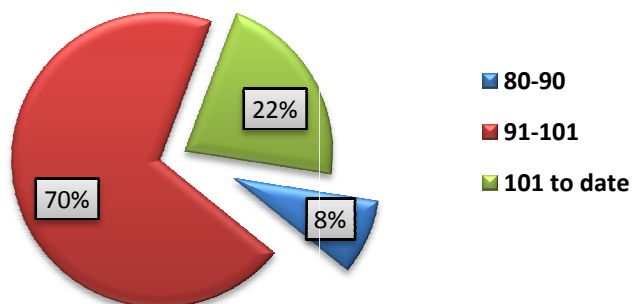


Figure 4.8: Age at which centenarians were autonomous in their ADL

8 out of the 49 centenarians are bed-ridden, they therefore need assistance for their day-to-day activities. They were also asked to report on their functional abilities. Table 4.6 presents the reported functional abilities and physical impairments of surveyed centenarians. 48.9% of centenarians have good to normal vision, 34.7% of them have poor vision and the remaining cannot see at all.

Table 4.6: Functional abilities of centenarians

Functional abilities	Good	%	Normal	%	Poor	%	Not at all	%	Total %
Vision	5	10.2	18	36.7	17	34.7	9	18.4	100.0
Hearing	4	8.2	12	24.5	28	57.1	5	10.2	100.0
Speaking	11	22.4	36	73.5	2	4.1	-	-	100.0
Accomplishment of daily usual chores	9	18.4	15	30.6	17	34.7	8	16.3	100.0

57.1% of respondents have reported to have poor hearing, whereas 10.2% do not hear at all. The remaining 32.7% claimed to have good to normal hearing abilities. 28.6% and 20.4% of respondents respectively made use of spectacles and hearing aids to cope with their poor eyesight and hearing inabilities. On the other hand, 97.9% of centenarians had the ability to speak normally. 34.7% of respondents rated their ability to accomplish their daily chores as poor, whereas 16.3% are completely dependent on their carers.

42.9% of centenarians have the ability to walk on their own but they can only cover very short distances. 44.9% of them need assistance to walk, while the remaining 12.2% have lost their ability to walk. 36% of our interviewees can still eat by themselves whereas 4% of them are entirely dependent on their carers to feed them. 51% of them can dress themselves without any help, whereas assistance needs to be provided to some 20.4% in doing so. 28.6% depend fully on their carers or close ones to dress them. 38.8% of respondents can take a bath on their own, a relatively small percentage of 18.4% require help from other individuals, whereas 42.9% are completely dependent on their carers for their bath. At least 40% of surveyed centenarians were self-sufficient in their activities of daily living (ADL¹⁸), with another 40% requiring assistance to carry out their ADL. According to Antonini *et al.* (2008) this relative conservation of their autonomy is often accompanied by a positive self-consideration of their own health condition. This is also observed in this present study where 31 centenarians reported their physical health as being as least normal.

In general, it can be argued that most of our respondents (73.4%) possess some degree of functionality till the age of 90, with some of them expressing higher levels. Those that are more physically impaired tend to be more stressed and claimed that they no longer want to live under such conditions. They also stated that they do not want to burden their families due to their physical incapacities. Other centenarians, even though they are not fully functional are not as stressed and felt that it is quite normal for them to encounter such physical problems which is due to their old age.

¹⁸ Four activities were counted as ADL, namely walking, feeding, dressing and bathing.

4.7.7 Sports activities

It was found that centenarians were not engaged in sports activities as such. The main reason was that they used to work really hard which resulted into tiredness and hence they could not find enough energy for such activities. However, our respondents disclosed that during their active lifetime, transport facilities were not available and therefore they had to walk very long distances on a daily basis to go to work or even to visit relatives. Nevertheless, 2 individuals were found to go for jogging occasionally when they were young, 4 individuals played football whereas 1 used to do simple exercises. The respondents argued that the need for sports was not felt in their respective lives as they were already doing strenuous jobs.

4.8 Social factors

4.8.1 Interaction with family

Figure 4.9 presents the findings about the level of interaction between centenarians and their respective family members, both in the past and at present. Our survey revealed that in the past 26.5% of the centenarians claimed to have had very good interactions with their family members whereas a considerable percentage of 57.1% (28 persons) acknowledged having had good relations within their respective family. Additionally, another 8% also revealed that they had normal relations with their kin in the past. Regarding present times, 22.4% of respondents claimed that they are enjoying very good relationships at their residence while 53.1% claimed to be having good relations with the family. On the other hand, 4.1% of centenarians affirmed to be presently going through a bad phase regarding to their interaction with their family and the remaining 4.1% declared to be having very bad relations with their kin. The findings are presented in figure 4.9 below.

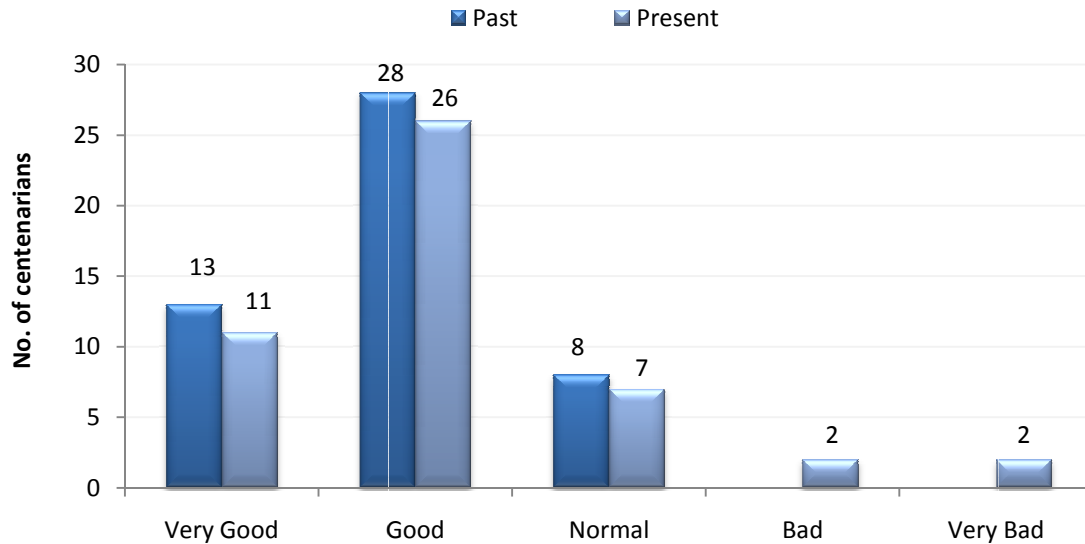


Figure 4.9: Interaction of centenarians with their family members

Overall, the above statistics show that the majority of the centenarians interviewed have been enjoying pleasant and comfortable relationships within their family throughout their lives and are happy to be living with them except for the 4 of them who are currently experiencing bad times. For these four individuals it seems that their relations with their family members have deteriorated over time. Good family interaction is considered to be the foundation for members of the family to be happy and our results give the impression that those individuals are given good treatment by their family members which in turn help them to remain happy and thus inspire them to live even longer in their midst.

4.8.2 Love and affection conferred to centenarians by their families

42.9% rated the love and affection conferred to them by their families as good, 55.1% rated it as satisfactory whereas the remaining 2% did not provide any response. Hence, it is clear that the majority of centenarians are satisfied with the affection showed by their respective families. One probable outcome of such affection and love, might be that centenarians may feel cherished and are buoyed to live even longer in the midst of their families.

4.8.3 Satisfaction with social ties and activities

After the age of 75 years, 45.7% of respondents have restricted their social circles to their neighbours or to their family members. In addition 50% of them revealed that age has not affected their social ties and that their social boundaries have more or less remained the same over their entire life. On the contrary, an insignificant percentage of 4.3% declared that they had to sever their social ties after they reached their 75 years due to their inability to go out alone. Furthermore, present results demonstrated that only a few individuals (14.3%) are members of old age associations or clubs but they do not visit these clubs or associations due to their reduced physical abilities. Nevertheless, most respondents (69.4%) tend to be satisfied with their present social ties, a few (10.2%) were very satisfied, some 18.4% were neutral whereas the remaining 2% were unsatisfied. One important point is that a large number of centenarians have limited their social circles, to try to focus on activities that give them more satisfaction.

The main hobbies of respondents are presented in table 4.7. 12 of them prefer to watch television and listen to the radio, 7 of them reported that chatting to friends and relatives as being their main hobby, whereas 15 of them claimed to have no hobby. The main reasons for not having a hobby are poor eyesight and hearing.

Table 4.7: Hobbies of respondents

Hobbies	Total
Watching TV & listening to radio	12
Chatting	7
Walking	5
Praying	3
Gardening	3
Sewing	1
Looking after grandchildren	1
Playing Domino	1
Singing	1
No hobby	15

4.8.4 Desire to live

7 of the respondents [representing 14.3%] acknowledged to have had a strong desire to live up to 200, with 4.1% of them revealing that they do not want to die. It can be argued that the desire and strong determination to live can be considered as a strong determinant of their longevity.

4.8.5 Stress in family life

A significant percentage of respondents (75.5%) revealed that they were not subject to stress over their lifetime as they lead very simple and decent lives and did not have any disproportionate ambition. 4.1% out of the 75.5% mentioned above did not get married and hence they stated that they were spared from the hassle of married life and as a result they were free to live their lives on their own terms. They argued that this gave them the opportunity to lead a peaceful life and therefore were not subject to stress. On the other hand, 24.5% of centenarians acknowledged that they felt stress due to regular family disputes. Nevertheless, it seemed that some of the centenarians experienced stress but they had the ability to cope. Some even appeared to be natural stress-shedders and hence this in particular may have determined their coping ability.

4.8.6 Addictive lifestyle habits

Two major addictive habits were disclosed during the study namely the consumption of alcoholic drinks and smoking. 63.3% of the respondents started taking alcoholic drinks at a very young age. Only 30.5% were still consuming alcohol. Those who stopped alcohol consumption did so after they reached 60 or more. According to respondents, the main reasons behind this decrease are health-related problems. Table 4.8 gives the percentage of centenarians presently consuming alcohol.

Table 4.8: Frequency of alcohol consumption by centenarians

Frequency of alcohol consumption	Percentage
Rarely/occasionally	12.2
1 to 2 pegs per week	2
3 to 5 pegs per week	6.1
1 to 2 pegs per day	10.2

18.4% of surveyed centenarians started smoking in the early years of their youth but presently all of them have quit. Here also, individuals stopped smoking after they reached the age of 60 years or more and the major reason was once again health-related. More centenarians generally consumed alcohol as compared to cigarettes, but they generally reduced or stopped consumption after they reached the age of 60.

4.9 Economic conditions

42.9% considered themselves to have belonged to a poor family, 26.5% of them considered themselves to be very poor; 20.4% considered themselves to belong to the lower middle class category; 8.2% felt they belonged to the upper middle class category whereas only 2% of them stated that they came from a rich background. Generally centenarians came from the modal working class. Hence the majority of interviewees (89.8%) worked in the past to contribute to their household income, while a small percentage representing 10.2% of respondents never worked. 89.8% of centenarians pointed out that the money they obtained as salary during their lifetime was sufficient for them with regards to food, shelter and clothing. They also added that they used to grow vegetables and rear animals for their own consumption which in turn enabled them to spend less money on food items and more on non-food items.

4.10 Cultural factors

4.10.1 Belief in God

95.9% of respondents acknowledged that they believed in God. Moreover, when centenarians were asked to rate their belief in god, the largest percentage (93.6%) confirmed to have strong faith in god, 2 individuals (4.3%) rated their faith as medium whereas 2.1% of respondents rated their faith as weak. Centenarians who believed in God, did their morning and evening prayers whilst some even kept praying the whole day and even made it a must to attend religious ceremonies. 70.2% of centenarians stated that their interest in their religion and the strength of their faith in God increased as they grew older. As a result, 85.7% of our respondents opined that their strong faith in God contributed to their increased longevity and many of them dedicated their long lives to God.

4.11 Social support services

Respondents were queried about the social support they get from the state. Table 4.9 presents the main findings. All respondents were receiving social pension from the state. Most of the respondents observed that they were fully dependent on the state pension to cater for their daily needs and expenditure on their health and carers.

Table 4.9: Satisfaction of centenarians (in %) vis-à-vis state social support.

	Very satisfied	Satisfied	Not satisfied	Not applicable
Pension		95.9	4.1	
Medicine allocation		69.4	24.5	6.1
Phone rental & free calls	4.1	87.8		8.2
Free wheel chairs, spectacles & dentures		61.2	8.2	30.6
Free domiciliary check-ups		61.2	8.2	30.6

They generally felt that this allocation was sufficient for their needs. 2 of the respondents also drew occupational pensions either by virtue of their past employment or through their spouse's past employment. One interesting feature of the existing scheme for centenarian is that it is a graduated system with increasing pensions for higher age bands, peaking with centenarians. This ensures that the later have a decent minimum income to cater for their needs. The majority of respondents were satisfied with the other support measures.

4.12 Reasons for longevity as reported by centenarians

Respondents were asked to subjectively enumerate in order of importance the factors that they felt contributed to their longevity. 9, 8 and 5 respondents respectively associated their longevity to three single factors, namely 'faith in God', 'hard work' and 'good eating habits'. On top of that, 6, 6 and 8 centenarians respectively felt that faith in God', 'hard work' and 'good eating habits' also accounted for their longevity, but in tandem with other factors, including low stress levels and good family environment. The three main factors are presented in table 4.10 below.

Table 4.10: Group of factors leading to increased longevity as per centenarians

Group of factors			Total	%
Faith in God			9	18.37
Hard Work			8	16.33
Eating fresh food/Good eating habits			5	10.20
Good family environment			3	6.12
No stress			2	4.08
Hard Work	Eating fresh food/Good eating habits		3	6.12
Faith in God	Eating fresh food/Good eating habits		2	4.08
Faith in God	Hard Work		1	2.04
Hard Work	Faith in god	No stress	1	2.04
Hard Work	Eating fresh food/Good eating habits	Walk a lot	1	2.04
Faith in God	No stress	Eating fresh food/Good eating habits	1	2.04
No stress	Good family environment		1	2.04
Faith in God	No stress	Eat a lot of vegetables	1	2.04
Eating fresh food/Good eating habits	Good family environment		1	2.04
Don't know			10	20.4
		Total	49	100.00

However, 20.4% of respondents reported that they are not aware of the factors that played a positive role in aiding them to live above 100 years.

4.13 Perception of centenarians of their quality of life¹⁹

The World Health Organisation (WHO) defined health as ‘a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity’. According to Luleci *et al.* (2008) this implies that assessment of health and healthcare should not only include traditional measures [like morbidity and mortality²⁰] but also a broader assessment of quality of life. It is apparent that different centenarians have lived different experiences. Hence it is quite natural that their perspective and perception on life are different. Perception not only depended on lived experiences, but also on their present abilities, health status and the way they are being currently treated by their carers. Therefore the common domains of quality of life have been health, memory, social relationships, ability to do things for oneself and overall life satisfaction.

It was found that those individuals currently enjoying a sound health²¹ and receiving good treatment from their families have the desire to live even longer and are quite content with their quality of life. They also claim that they are enjoying a life full of dignity and happiness. Some of them mentioned that their quality of life has remained the same as they have learnt to cope with age-related disfunctionalities. This is supported by Neugarten’s (1969)²² continuity theory which predicts that people’s attitudes to life and their behaviours tend to remain stable over time. Centenarians sharing this view tend to have a positive view of life.

On the contrary, those who lack physical abilities (especially bed-ridden people) believe that they are a burden on their children as they have to be looked after all day and night and want to die as they think that their close family members cannot live in peace as long as they are alive. They also believe that they have lived enough and now it is time for their children to enjoy their life. This is supported by Cumming and Henry’s (1969)²³ disengagement theory

¹⁹ There are specialised instruments to assess quality of life, including the Profile of Elderly Quality of Life (PEQOL) and the LEIPAD. Please refer to Buono *et al.* (1998) for more information.

²⁰ If quality of life equated only to health status and functionality, it would have been expected that centenarians would have reported low quality of life.

²¹ That is those that are not subject to any serious disease and still have their required abilities.

²² As cited in McCormack (2001)

²³ As cited in McCormack (2001),

which states that with increasing age centenarians would have gradually withdrawn from life, explaining a low quality of life.

Additionally, their carers argue that the centenarians receive pensions and thus they are financially-secured. Carers further disclosed that centenarians are properly taken care of as they are held in high esteem by their kin and neighbours. This provides them with a sense of importance in society. McCormack (2001) reported that self-rated memory appeared to be an important variable in quality of life of centenarians. 75.4% of centenarians who took part in the present study rated their memory as least as being good. It can thus be deduced that in general surveyed centenarians enjoyed a decent quality of life.

4.14 Case studies

This section presents 3 specific cases drawn from our interviews carried out with centenarians in Mauritius and Rodrigues in an attempt to provide an insight of the exact statements that have been given to us during the course of our interviews in view of being better acquainted with the state of mind and living conditions of our elderly. The case studies also reveal the perceptions of the centenarians on their quality of life as well as their views with regards to their longevity. In this respect, 2 cases have been taken from Mauritius against 1 case from Rodrigues as described below.

4.14.1: Case study 1

101 years old, Mauritius:

"I explain my longevity by my hard work and my faith in God"

She was born on the 12th of July 1907 in Port Louis and is 101 years old. She was the only child in the family but had no formal education. She has never known her father and soon after her birth her mother abandoned her. Her maternal grandmother brought her up till the age of 12. Afterwards, her uncle became her guardian till her wedding at the age of 15. She gave birth to 5

children and lost her husband. She had to remarry at the age of 38 years and 3 children were born out of her second wedlock. Her second husband died at the age of 54 years and she had to strive to look after her children. After retirement, she stayed in a private home and for the last 14 years she has been living with her granddaughter. Out of her 8 children, only 3 are presently living. She has 23 grand children, 33 great grand children, 16 great great grand children and 4 great great great grand children. She is a non-vegetarian and eats everything without any strong preference.

She states: 'I had never imagined that I would live till this age. I dedicate my longevity to my strong faith in god and to my hard work. I have a strong faith in god and I pray at least thrice daily. My faith in god has increased with age as I find greater solace in faith. Apart from household chores, I also worked very hard as maid servant in several houses concurrently. I belonged to a very poor family and so I started working at the age of 14 and I continued doing so until the age of 86 years. I used to do some gardening and I also reared chicken for my own family consumption. Even after retirement I used to do some small household tasks and I was also responsible for looking after my grandchildren. Even at this age I have all my mental and most of my physical faculties and I still do some petty household chores like washing dishes, sweeping the floor and combing the hair of my great great grand children. There has always been a very good interaction between me and my family members and I have always been receiving love and affection from my dear ones. I have never been subject to any kind of stress throughout my lifetime. I used to go to work on foot and as a result I used to walk a lot and this is the only sports activity that I have done in my life. Maybe that is why I do not suffer from any diseases. I do not want to live any longer because I do not like my present physical appearance and I also don't have the required physical abilities to walk long distances and go shopping alone. I believe that it is time for me to go now so that my dear ones can live in peace without having an obligation to look after me.

4.14.2 Case study 2

101 years old, Mauritius

"I have always enjoyed living"

This lady was born in the island of "Six Islands" situated near Peros Banos Archipelago and is now 101 years old. She was the fourth child of a family consisting of 13 children but she is the only one who is still living today. Her father was a cook whereas her mother worked as labourer in coconut plantations. She never went to school and therefore started working as labourer in a coconut plantation at the age of 10 years to contribute to the household income, until she came to Mauritius in 1966. She lived in a free union and gave birth to 3 children and later got civilly married to another person at the age of 25 years. Out of the second marriage, 6 children were born. Consequently her husband died and she had to take the responsibility of her family. She worked very hard till the age of 58 years and then retired due to lack of physical abilities but she does not suffer from any disease. She has been staying with her daughter since 1979.

She reports: I have worked very hard during my lifetime to sustain the livelihood of my family. However, I do not have any regrets because along with hard work I have also enjoyed life to its full. I have always been cheerful and I have always taken things lightly, thus I have never experienced major stress. I used to sing and dance a lot. I have always helped others as far as I could. I have strong faith in God and hence I believe that these have contributed to my longevity. Moreover, I used to eat healthily and on time. I cultivated vegetables in my own garden and reared chicken and ducks for my own consumption. I was very fond of fish and so I used to eat a lot of fish. One point to be noted here is that I have been able to do all my household tasks till the age of 75. But now I don't desire to live any longer as I experience functional difficulties and have to sit idle all day. I cannot even go for a walk or visit relatives on my own. The only thing that encourages me to keep on going is love from my great grand children's and great great grand children.

4.14.3 Case study 3

102 years old, Rodrigues

"I have been eating fresh food since my childhood and I think this has kept me alive"

She was born in a small village known as Papayes in the island of Rodrigues. She attended school up to the first standard and started working at the age of 10 years to meet the needs of a family consisting of 11 individuals. By profession, her father was a fisherman whereas her mother worked as a midwife. She got married at the age of 30 years and went to live at Mangues with her husband. Out of this wedlock, she gave birth to 14 children 8 of whom are still living today. Her husband died at the age of 70 years and afterwards she lived with her children. She continued to work till her late 60's and then retired due to the fact that all her children were grown up and they could manage on their own. As a matter of fact, she did not suffer from any disease till the age of 100 years but recently she has been suffering from hypertension. Currently, she is staying with her daughter and she is being taken good care of.

She laments: I have always been willing to live till very old age and today my dream has been realised. I am quite happy to have experienced the ups and downs of life and these have cemented my family ties. Even though I have lived till 102 years, I still have the desire to live longer. I reared animals such as pigs, chicken and goats and I also cultivated vegetables for my own consumption. These were also sold to supplement my family income. As a result, I always eat fresh food and maybe this is one factor that has helped me to live till this age. I also ate sweet potato, maize, manioc and pork a lot during my lifetime. I had never been subject to stress during my whole life but nowadays when I think of my deceased children, then I feel depressed. Nevertheless, I have the ability to cope. I also used to walk very long distances when I was young as at that time there were no proper transportation facilities in Rodrigues. I would like to highlight that I have never smoked in my entire life but I did consume alcoholic drinks occasionally. I also opine that my strong faith in God has also helped me to live till this age and if God is willing, I will live for many more years.

4.15 Factors contributing to the longevity of centenarians

This section summarises findings from both the survey and the case studies and summarises the findings on the way of life of surveyed centenarians and the probable factors that have contributed to their longevity.

Centenarians enjoyed a slow ageing of their apparatus. The process of 'successful ageing' is critical in explaining longevity in centenarians. This process comprises multiple components. According to Rowe and Kahn (1987) the model for successful ageing includes three components, namely avoidance of disease, maintenance of cognitive capacity and active engagement in life. Only people with high levels of function in all these domains are considered to have aged successfully. Baltes and Baltes (1990) put forward an alternative model, termed 'selective optimisation with compensation'. It posits that an individual's experience with ageing is subjective and unique and they can prioritise things that they consider important to them and use their abilities in one domain to compensate for weaknesses in others. Aspects of both models are used to shed some light on the longevity of centenarians in Mauritius.

One important realization is that they do not form a homogeneous group, as a considerable inter-individual variability exists in this group. They adapt to physical and social losses in various ways, depending on their immediate environment, functional reserves and coping styles. On top of that this study has showed that it is not a single factor that can account for this state, but rather a mix of factors. The gender superiority for women [in terms of number of centenarians] is apparent, but the ratio of 4.4:1 [woman to man] generally tallies with international statistics. But in the present sample there is not a large difference in the number of years that females and males live after 100.

The genetic factor seems to be a fundamental basis as there were long-lived subjects in centenarians' families. This concurs with findings from other centenarian studies. Social and environmental factors graft themselves on the genetic ones to contribute to longevity. Surveyed centenarians have kept a relatively healthy lifestyle. They frequently consumed dairy

products, fruits, vegetables over their lifetime and decreased the consumption of meat and increased the consumption of chicken in their later years. Generally centenarians inadvertently went on a caloric restriction diet as they have aged, increasingly consuming more caloric-poor diets. But in the present study there is no evidence that this may have contributed to the longevity of centenarians. Few centenarians smoked and those who did, stopped after 60 years old. This could have contributed to their successful ageing.

Many centenarians have worked long hours during their active lifetime and many of them have remained active even after retirement, with the nature of activities obviously becoming less strenuous as they got nearer to 100 years. Most of them thus remained functionally independent for most of their long lives, requiring assistance only in the latter years. Incidentally those centenarians tend to rate their physical health as normal. But it needs to be highlighted that they are increasingly witnessing 'decreasing functional reserve', thus requiring additional support. More than half of the centenarians claimed that they were not suffering from non-communicable diseases and had low cholesterol levels. These factors definitely contribute to successful ageing. An interesting factor is that many women centenarian have given birth to their last child after the age of 40 and this gives these respondents 4 times more chance of living till 100 years. Another contributive factor could be that the majority of centenarians were living with and being cared for by their family and relatives. Centenarians have their daily routines and living in the midst of their family permits them to perpetuate their habits, providing them a degree of warmth and safety. This provided them with some comfort, thus contributing to their well-being and underlies the fundamental role played by the family in successful ageing. The majority of centenarians have a strong faith in God and this has brought them comfort in their everyday life and helped them to age successfully. Other mediating factors include support and financial resources, personal competencies such as personality and skills. These determine the coping ability of centenarians to deal with problems associated with old age. The existing state support system in terms of monthly pension allocation is appropriate as it ensures a guaranteed income for centenarians to cater for their needs.

CHAPTER 5: CONCLUSIONS

5.1 Conclusions

It has been acknowledged that it is important to understand the factors that are associated with the longevity of centenarians in the Republic of Mauritius. First of all a clearer understanding of such factors can contribute towards improving the living conditions of centenarians and also to shaping public policy for successful ageing in general. There is a considerable cost associated with caring for the elderly including centenarians. Successful ageing must therefore be pondered as a viable strategy to improve the quality of life of elders and also to minimize the burden on the state social security and health budgets.

This study built on previous international evidence and made use of Mauritian data to try to understand longevity in centenarians. Centenarians are not homogeneous and their longevity is a function of multidimensional factors that interplay under particular circumstances.

Therefore it is difficult to identify specific factors and design 'programmed intervention' to increase longevity. Nevertheless it is acknowledged that the maintenance of health and functionality are important determinants of successful old age and quality of life. The following sections rather list areas/ sectors/issues that could help centenarians cope with loss of functionality and deteriorating health and contribute towards improving their quality of life. These policy pointers are based on and derived from feedback from centenarians, findings of the study and a review of centenarian programmes implemented internationally. They could be used as pointers in designing gerontological policies to improve the quality of life of centenarians and the elderly in general.

The preferred methodology to study longevity in centenarians is a mix of home interviews, postal contact, physical examinations, blood testing and autopsies. Such an approach is complete as it allows for cross-validation of findings. The present study is a sociological one, based on home interviews of 49 centenarians and therefore based on self-reports. The present findings will therefore not be as complete and validated as those derived from more comprehensive approaches. Another limitation is that the study probably underestimates health and functionality status of centenarians given that the sample consisted of relatively functional centenarians who granted the interview. Nevertheless the findings and factors²⁴ contributing to longevity have been cross-checked with relevant literature to provide some degree of validity.

5.2 Policy Implications

The study has shed some light on various aspects of the day to day living of centenarians in the Republic of Mauritius. With the ageing population, centenarians as a demographic group will increase in numbers and consequently issues surrounding their livelihoods are going to become more pressing. The following issues have been compiled mainly from feedback from respondents and from practices adopted internationally. The aim here is to propose the development of alternate models of care which could package some of the proposals listed below.

5.2.1 Role of family and society

The majority of centenarians have expressed their wish to live in the midst of their family. Given their increased disfunctionality and loss of cognitive abilities, their family members should be made aware of these disfunctionalities and how best to deal with them, given resources within the home. Programmes should be devised to enhance and coordinate more affectionate and effective family and community involvement in the caring of centenarians. This is important to ensure a stress-free relationship between centenarians and their family members. The

²⁴ As reported and claimed by centenarians.

participation of centenarians²⁵ to activities organised for the elderly should be encouraged and supported. Centenarians that are capable of contributing to society, either through their knowledge or their lived experiences, should be allowed to do so. This will contribute towards improving their attitude towards life.

Events on and around centenarians should be organized to raise national awareness of their past and present contribution to society. Their contribution and involvement in various spheres along with the specific problems and issues they face should be publicly discussed to gather suggestions on how to improve their living conditions.

5.2.2 Activities-based programmes

The present findings have indicated that there is a relationship between physical activity and successful ageing of elderly people. Programmes built around stress reduction techniques such as progressive relaxation, biofeedback and physical-mental exercises like yoga and taichi should be encouraged. Such programmes are being implemented by some local authorities, but there is need to reinforce, extend and promote these programmes nationally. Apart from keeping elders active and healthy, these activities also provide social engagement. Activities that entail multiple brain regions, for example dancing, painting, reading challenging books, practising a musical instrument and light sports. These activities can produce multiple benefits for the brain, hence the elderly can develop the potential to resist trauma and chronic damages thus increasing their longevity. Some of these programmes should also be designed for centenarians who are home-bound due to general lack of mobility.

5.2.3 Health education and promotion programme

Such programmes must be devised for the elderly, focusing on healthy lifestyles. An early and consistent investment in sensible diets, sensible eating habits, investment in light exercises can contribute to more years of good health. These can take the form of programmes run by local authorities, targeted for the elderly in general. These programmes should also include a

²⁵ Those who are functionally capable to do so.

component about the awareness of the elderly about depression. Centenarians who are still functional should take part in self-protection programmes to be instilled with the principles and possibilities of self-help. The Ministry should take initiatives to raise awareness among centenarians of the importance of walking for the betterment of their health. These programmes could be run on an individual basis or in groups, depending on the functional abilities of targeted centenarians.

5.2.4 Social support system

The state offers the necessary support to existing centenarians. This forms part of an enhanced package as compared to what is offered to other elderly. The present findings revealed a general feeling of satisfaction among centenarians. Some suggestions to improve the existing system and improve the quality of life of centenarians are provided below:

- Centenarians should be visited by geriatric specialists as well as by generalist doctors. In cases of emergencies, qualified para-medicals should attend to the centenarians at their place. As far as possible home-based care should be provided to bed-ridden centenarians.
- To set up a centenarian nutrition and pharmaceutical benefit scheme, whereby centenarians will have subsidized access to essential drugs, powdered milk and nappies among others.
- A scheme to subsidize the purchase of accessories and aids to enhance the home ecology of centenarians.
- Procedures for obtaining spectacles, hearing aids and wheelchairs are too lengthy and should be simplified and shortened.
- Social security officers should visit centenarians more often to assess the status so that they can promptly inform respective services.

5.2.5 Carers and incentives to care for centenarians

Most of the centenarians are looked after by their relatives. The latter should be provided a form of basic training in the main diseases, affecting centenarians and also how to do light

exercises (e.g. relaxation). Carers should be paid to look after their centenarian relatives. Caring for centenarians should be construed as a full-time job, being paid partly from the centenarians' pension and partly by the State²⁶. This should be embedded within the existing social support system, so that social security officers can check on carers to minimize abuse or non-delivery of care.

There is also room for a specialised service of carers. They would be trained carers who would look after centenarians in their home on a shift/part-time basis. Such carers would be trained to better assess cognitive and physical status and to gather some knowledge on diseases that affect centenarians (e.g. Parkinson disease, mental health, stroke, respiratory care, care of the older person,...) and be able to provide a more appropriate service in case of emergency.

5.2.6 Private care home

A minority of centenarians mentioned that they are not enjoying living with their relatives. Other centenarians could also choose to live out of their family if they had the choice. There is therefore room for a private care home for the elderly with a specialised unit which provides services to the oldest old. The Government can here intervene to by providing tax incentives to encourage the private sector to invest in such services. In the coming years, with the ageing of the population and the forecast increase in the number of centenarians, this service could be remunerative. Fees for such services could be covered by the state pension with a top-up from families of centenarians or from health insurance schemes.

5.2.7 Private insurance scheme

Insurance companies could devise specialised health schemes for centenarians to cover their expenditures or other private services that they could benefit from. It is acknowledged here that there is no critical mass for such a system to be sustainable. The state could intervene to tackle this market failure.

²⁶ Rs 1766 that is actually paid to carers is inadequate.

5.2.8 Legislation

There needs to be a new legislation (or new regulations as part of the Social Aid Act 2009 or the National Pension Act 1976) specific for centenarians which will provide a basis for implementation of existing and future programmes. This can help organize and ensure provision of services provided by both the public and private systems.

5.2.9 Final word

This is a preliminary study upon which other research can be drafted, to assess more specific aspects surrounding centenarians. More specialised tools to assess the different factors affecting longevity could be used, as well as multidimensional studies whereby findings from one approach could be cross-checked with alternative and complementary ones. This would permit a better understanding of longevity in centenarians and the identification of factors contributing towards longevity. There is also need to study the whole population of centenarians to better understand their living conditions and lifestyles and subsequently provide a real assessment of their status.

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APPENDIX I: QUESTIONNAIRE

Survey on Centenarians

A. BIOGRAPHICAL DETAILS

1. Name of Interviewee:

2. Gender: Male ☐ Female ☐

3. Date of Birth:

4. Where do you live?

Rural ☐

Urban ☐

Semi-Urban ☐

5. Have you always lived there? (Eski tou le temps ou fine res laba mem?)

6. Please indicate your ethnic group. (Dir nou ki religion ou été?)

- | | |
|---|---|
| <input type="checkbox"/> Hindu | <input type="checkbox"/> Sino-Mauritian |
| <input type="checkbox"/> Muslim | <input type="checkbox"/> No Response |
| <input type="checkbox"/> General Population | <input type="checkbox"/> Others |

7. Please indicate your level of education. (Ziska ki class ou fine aprane?)

- ☐ No Formal Education
- ☐ Incomplete Primary Education
- ☐ Passed C.P.E / Std VI
- ☐ Incomplete Secondary Education
- ☐ Form V
- ☐ Form VI
- ☐ Degree
- ☐ Others, (Please Specify)

8. (a) Where do you actually stay? (Dir nou Kotsa ou p rester asterla ?)

- ☐ Own home (Separate from family)
- ☐ Own home (With family)
- ☐ With your family/carer
- ☐ Rental House (Alone)
- ☐ Rental House (With family)
- ☐ Private Residential Care Home
- ☐ If others, please specify

Has this been the case after you retired from your active life? (Eski ou p reste lamem depi ki ou fine pran ou retraite)

B. HOUSEHOLD COMPOSITION AND FAMILY BACKGROUND

- 9.(a) How many brothers and sisters did you have in your family? (Dir nou komien frèr ek soeur ou ti ena en tou?)

Were you the eldest among your brothers and sisters? (Eski ou mem ou ti pli grand parmi ou bane frèr et sœurs?)

10. Were you responsible for taking care of your family (brothers and sisters) upon death of your parents? (Eski ou mem ti pran charge ou bane frèr et sœurs après ki ou mama et papa ine mort?)

- 11.(a) Do you have any brothers and sisters who are still alive? Please specify their respective age. (Eski ou ena kite frèrès ek sœurs ki enkor la mem ? Ou kapav dir nou ki lage zot ena?)

Relation	Age
1. ....	..... years
2. ....	..... years
3. ....	..... years
4. ....	..... years
5. ....	..... years

What was the age of your deceased brothers and sisters at their last birthday?
(Ou kapav dir nou ziska ki lage ou ban freres soeurs in vive)

Relation	Age lived
1. ....	..... years
2. ....	..... years
3. ....	..... years
4. ....	..... years
5. ....	..... years

12. Did any of your grandparents, parents or close relatives live up to 90 years or more? (Eski ou ena kit fami proche kin vive ziska 90 ans ou plis)

Relation	Age lived
1. ....	..... years
2. ....	..... years
3. ....	..... years
4. ....	..... years

C. MARITAL STATUS

13. Did you get married? (Ou kapav dir nou si ou ti marier?)

Yes ☐ No ☐

14. At what age did you get married? years (Ki lage ou ti marier?)

15. How many children did you give birth to? (Komien zenfant ou ti ena en tou?)

- 16.(a) State the number of children that are still living today. (Komien ou ban zenfant enkor lamem?)

Please indicate their respective ages. (Ki lage ou ban zenfant ena asterla?)

Relation	Age
1. years
2. years
3. years
4. years
5. years

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(c) No. of children passed
away:

17. At what age did you give birth to your last child? (Applicable for females only) (ki lage ou ti ena kan ou ti gagne ou dernier zenfant)

- 18.(a) Is your spouse still alive? (If yes, go to Q19) (Ou kapav dir nou si ou misier ou madam enkor lamem?)

Yes

☐

No

☐

If No, when did your spouse pass away? (Ou kapav dir nou kan li fin mort?)

- (c) How do you compensate for this loss? (ki ou fin faire pu ki ou pa senti ou tousel?)

D. REASONS BEHIND LONGEVITY

19. According to you, what are the factors that have led you to live till 100 years or more? (D'apres ou, ki bane zafair ki fin fair ou vive ziska 100 ans ou plis)

20. Till what age do you want to live up to? (Ziska ki lage ou envi vivre)

E. INTERACTION WITH FAMILY AND SOCIETY

21. How has been the interaction with your family over your lifetime?

	Very Good	Good	Normal	Bad	Very Bad
1. In the past	1	2	3	4	5
2. At present	1	2	3	4	5

22. Could you describe your role within your family after you retired from your active job? (Eski ou kapav dire nou ki ti ou role dan ou la famille apre ki ou fin pren retraite ousa apre ki ou fin arete travail?)

- 23.(a) How would you rate the love and affection presently conferred to you by your family? (If answer is “Not at All”, go to Q24) (Eski ou la famille bien content ou?)

Good	Satisfactory	Unsatisfactory	Not at All
1	2	3	4

- (b) How do they express this love and affection? (Kuma ou famille montré ou sipa zot content ou?)

- ☐ Care for you on a daily basis
- ☐ Take you out
- ☐ Pay for your medical bills
- ☐ Bring grand children/grand grand children to visit and spend time with you

- ☐ Pay you visits
- ☐ Others,
-
-

Frequency:

24. Are you part of a club or any other associations? (Eski ou ene membre dan kit club ou ban association?)

25. How satisfied are you with your social ties? (Eski ou satisfait ar ou la vie sociale?)

Very Satisfied	Satisfied	Neutral	Unsatisfied	Not satisfied at all
1	2	3	4	5

26. How has your social boundaries changed after you have reached 75 years? (Ou kapav dir nou kuma ou la vie sociale fin changer apre ki ou fin gagne 75 ans?)

- 27.(a) How would you characterise your engagement in your family? (Eski ou pensé ou famille p gagne kitchose a travers ou, par exemple, ban bon manieres?)

- ☐ Self Cultivation
☐ Cultivation of family

- (b) How would you characterise your engagement in society? (Eski ou pensé la société p gane kitchose a travers ou, par exemple, ban bon manieres?)

- ☐ Self Cultivation
☐ Cultivation of Society

Did you have any stress in your family life? (Eski ou ti p gane problem dan ou famille ek ou ti ena bocou traka?)

--

F. DAILY ACTIVITIES AND DEGREE OF AUTONOMY

- 29.(a) What have been your daily activities after retirement from your active job? (ki ban zafaire ki ou ti p fair tou le zour kan ou ti fek pran retraite? Ki ban zafair ki ou fair tou le zour asterla ?)

In the Past:

At Present:

--	--

- (b) Which of these activities do you enjoy doing the most? Explain. (Parmi sa ban zafair ki ou fair tou le zour la lakel ki ou pli content fair?)

- (c) Do you think that this has contributed to your longevity? (Eski ou penser ki sa ban zafair lamem ki fin fair ou viv longtemps?)

30. Please rate your present abilities/capabilities. (Please put a circle as appropriate)

	Good	Normal	Poor	Not At All
1.(a) Vision - Without Spectacles	1	2	3	4
(b) Vision - With Spectacles	1	2	3	4
2.(a) Hearing – Without Hearing Aids	1	2	3	4
(b) Hearing – With Hearing Aids	1	2	3	4
3. Speaking	1	2	3	4
4. Accomplishment of daily usual chores	1	2	3	4
5. Reading	1	2	3	4
6. Writing	1	2	3	4

31.(a) How do you carry out the following activities? (Please put a circle as appropriate) (If answer is “All Alone”, go to Q32)

	All Alone	With Help	Complete Dependence
1. Walk	1	2	3
2. Eat	1	2	3
3. Dress	1	2	3
4. Bathe	1	2	3

(b) Till what age have you been able to carry out these activities without help? (ziska ki lage ou ti p kapav fair sa ban zafair la san ki kiken aide ou?)

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Are you bed-ridden?

Yes ☐ No ☐

32. Please rate your instrumental activities of daily living.

	All Alone	With Help	Complete Dependence
1. Ability to cook	1	2	3
2. Ability to shop	1	2	3

3. Ability to travel by public transport	1	2	3
4. Ability to use the phone	1	2	3

33. Since when do you have a carer? (Depi kan ou ena ene kiken ki get ou?)

34. Describe your relationship with your carer. (Sa dimoune ki get ou la, kisanla sa pou ou?)

G. OCCUPATION

35. Did you work in the past to contribute to the household income or were you responsible for household duties (e.g. gardening, rearing of livestock, looking after children etc.) (Eski ou ti p travail avan ek ou ti p amene kas dan la kaz ou sa ou ti p fair travail la kaz, par exemple, plante legume, nourri vache, veille zenfant?)

36. At what age did you start working? Explain why? (Ki lage ou fin koumens travail ek kifer?)

Age started working: years

- 37.(a) What job(s) did you do to earn your living? (Ki ban travail ki ou fin fair pou ou amene ou la vie?)

- (b) Was it strenuous? (Eski travail la ti bien dure?)

38.(a) How many hours did you usually work per day? (**komier lertan ou ti p travail par zour?**)

Active Work

- ☐ Less than 5 hrs
☐ 6 – 8 hrs
☐ 9 – 12 hrs
☐ 13 – 16 hrs
☐ Don't Remember

Household Chores

- ☐ Less than 5 hrs
☐ 6 – 8 hrs
☐ 9 – 12 hrs
☐ 13 – 16 hrs
☐ Don't Remember

(b) How many days per week did you usually work? (**Komien zour par semaine ou ti p travail?**)

- ☐ 1 – 2 days
☐ 3 – 4 days
☐ 5 – 6 days
☐ 7 days
☐ Don't Remember

39. At what age did you stop working? Explain why? (**Ki lage ou fin aret travail ek kifer?**)

Age stopped working: years

40. As you have grown older, what have been the compensating mechanisms that you have used to help you deal with the ageing process? (**Eski d'apre ou, ou fin fair ban zafair ki fin empes ou vin vieux pli vite?**)

H. LEISURE AND RELAXATION

41. Did you practice any sport activities during your lifetime? **(Eski ou fin deza fair sport dan ou la vie?)**

42. Did you practice any relaxation activities (e.g, yoga, meditation, prayers etc.)? **(Eski ou fair ban activité ki aide ou pu relax kuma yoga, meditation ou la priere?)**

I. INCOME AND SUSTENANCE

43. Has your income (household income) always been sufficient to cater for your basic needs and those of your family? **(Eski la paye ki ou ti p gagner ti assez pou ou ek ou la famille?)**

44. Which type of family did you belong to? **(Ou sorti depi dan ene fami riche ou misere?)**

Very Poor	Poor		Lower Middle Class	Upper Middle Class	Rich	Very Rich
1	2	3		4	5	6

J. RELIGION AND RELIGIOUS PRACTICES

45. Do you believe in God? **(Eski ou croire dan bon dieu?)**

46. How would you rate the strength of your faith? **(Eski ou ena bocou la foi pu bon dieu?)**

Weak	Medium	Strong
1	2	3

47. Do you engage in religious activities and practices? **(Eski ou fair la priere?)**

--

48. Has your interest in religion and the strength of your faith increased as you have aged? **(Eski ou pli croire dan bondier asterla comparer ar avan?)**

--

49. Do you think that your faith has contributed to your longevity? **(Eski ou penser ki ou croyance dan bondier fine fair ou vivre bien osi longtemps?)**

--

K. NUTRITION

50. Do you classify yourself as vegetarian or non-vegetarian? Please comment. **(Eski ou ene vegetarian?)**

51. Did you drink your mother's milk? If yes, till what age? **(Eski ou rapel ki di lait ou ti p boire ken ou ti tibébé?)**

- 52.(a) Frequency of consumption of dairy products, fruits and salads **(IN THE PAST).**
(Please put a circle as appropriate)

	Not At All	Rarely	3-4 times/week	Once a day	2-3 times/day
Dairy Products	1	2	3	4	5
Pulses (grain sec)	1	2	3	4	5
Fruits	1	2	3	4	5
Vegetables (légumes)	1	2	3	4	5

(NB:- Dairy Products includes Milk, Cheese, Yoghurt, Dahi, etc)

- (b) Frequency of consumption of dairy products, fruits and salads **(AT PRESENT).**

(Please put a circle as appropriate)

	Not At All	Rarely	3-4 times/week	Once a day	2-3 times/day
Dairy Products	1	2	3	4	5
Pulses (grain sec)	1	2	3	4	5
Fruits	1	2	3	4	5
Vegetables (légumes)	1	2	3	4	5

(NB:- Dairy Products includes Milk, Cheese, Yogurt, Dahi, etc)

53. From where did you get your vegetables? Name the vegetables that you were/are consuming more often. **(Kotsa ou ti p gagne ou ban légumes? Dire nu avan ki ban légumes ou ti p manger bien souvent et asterla ki ban légumes ou manger bien souvent ?)**

54. How did you cook your vegetables? (cooked, medium cooked, curry, sauce, spicy) **(Kuma ou ti p cuit ou ban legumes?)**

- 55.(a) Frequency of consumption of Non-Vegetarian Food Items **(IN THE PAST)**.
(Please put a circle as appropriate)

	Not At All	On specific occasions	Twice per month	1-2 times/week	3-4 Times/week
Eggs	1	2	3	4	5
Chicken Preparation	1	2	3	4	5
Meat Preparation	1	2	3	4	5
Fish	1	2	3	4	5

- (b) Frequency of consumption of Non-Vegetarian Items **(At Present)**.
(Please put a circle as appropriate)

	Not At All	On specific occasions	Twice per month	1-2 times/week	3-4 Times/week
Eggs	1	2	3	4	5
Chicken Preparation	1	2	3	4	5
Meat Preparation	1	2	3	4	5
Fish	1	2	3	4	5

56. Which meat do you prefer? (You may tick more than 1 box.) **(Ki ban la viande ou content manger?)**

- ☐ Never consumed red meat
- ☐ Mouton
- ☐ Beef
- ☐ Goat
- ☐ Deer
- ☐ Pork
- ☐ Chicken
- ☐ Others, (Please Specify)

57. How did you more often cook your meat? **(Ki preparation ou ti pli content fair avek ou la viande?)**

- ☐ Grilled
- ☐ Curry
- ☐ Fried
- ☐ Roasted
- ☐ Others,

58. Which source of carbohydrates were you consuming more often?

- ☐ Potato
- ☐ Sweet Potato
- ☐ Manioc
- ☐ Rice
- ☐ Flour
- ☐ Others,
.....

59. Did you like sweets? If yes, how often did you consume it? **(Eski ou ti content mange bane zafair dou? Ou ti p mange sa bien souvent?)**

L. HEALTH

60. Describe the physical appearance of the centenarian. (e.g., tall/fat/lean) **(Avan kuma ou ti été e.g., gros, maigre etc.)**

61. How would you rate your overall physical health? (**D'apre ou, dir nou kuma ou trouve ou la santé physique?**)

Good	Normal	Poor
1	2	3

62. Which non-communicable disease do you suffer from? (the main one only) (**Dir nou ki ban maladie ou ena?**)

- ☐ Diabetes
☐ Cancer
☐ Heart Disease
☐ Alzheimer
☐ Dementia
☐ Hypertension
☐ Cardiovascular Disease
☐ Paralysis
☐ None
☐ Others

63. At what age did you start suffering from the above-mentioned diseases? (**A partir ki lage ou fine kumanse gagne sa bane malade la?**)

64. What was the usual treatment when you were ill? (**Ki bane tretment ou ti p fair kan ou ti malade?**)

- ☐ Remède Grandmère
☐ Tisane
☐ Visit to a doctor or hospital/dispensary
☐ Others,

65. Have you ever been overweight? Discuss please. (If the person is thin) **(Eski ou ti maigre ou gros depi tou le temps?)**

Weight
Height

66. Have you been suffering from high blood pressure during your lifetime? **(Eski ou ena problème tension?)**

67. Have you experienced high cholesterol level during your lifetime? **(Eski ou ena problème cholesterol?)**

68.(a) Did you take alcohol in the past? (If No, go to Q69.a) (Eski ou ti p pran lalcol avan?)

Yes ☐ No ☐

(b) If yes, when did you start? (Ou kapav dir nou kan ou ti komens boire?)

(c) At what frequency did you consume alcohol? (Eski ou ti p boire bien souvent?)

- ☐ Rarely/Occasionally
- ☐ 1 – 2 pegs per week
- ☐ 3 – 5 pegs per week
- ☐ 1 – 2 pegs per day
- ☐ 3 – 5 pegs per day
- ☐ Others, (please specify)

69.(a) Do you take alcohol at present? (If No, go to part C) (Dir nou si ou encore boire?)

Yes ☐ No ☐

(b) At what frequency do you consume alcohol? (Eski ou boire bien souvent?)

- ☐ Rarely/Occasionally
- ☐ 1 – 2 pegs per week
- ☐ 3 – 5 pegs per week
- ☐ 1 – 2 pegs per day
- ☐ 3 – 5 pegs per day
- ☐ Others, (please specify)

(c) If you stopped consuming alcohol, when and why did you do so? **(Si ou fin aret boire, kan ek kifer ou fin areté?)**

70.(a) Did you smoke **in the past?** (If No, go to Q71.a) **(Eski ou ti p fimer avan?)**

Yes ☐ No ☐

(b) If yes, when did you start? **(Eski ou rapel kan ou ti koumans fimer?)**

(c) How many cigarettes were you smoking per day? **(Komien cigarettes ou ti p fimer par zour?)**

- ☐ Rarely/Occasionally
- ☐ 1 – 2 cigarettes per day
- ☐ 3 – 5 cigarettes per day
- ☐ 6 – 9 cigarettes per day
- ☐ A packet of 10
- ☐ A packet of 20
- ☐ Others, (please specify)

71.(a) Do you smoke **at present?** (If No, go to part C) **(Eski ou enkor fimer?)**

Yes ☐ No ☐

(b) How many cigarettes do you smoke per day? **(Komien cigarettes ou fimer par zour?)**

- ☐ Rarely/Occasionally
- ☐ 1 – 2 cigarettes per day
- ☐ 3 – 5 cigarettes per day
- ☐ 6 – 9 cigarettes per day
- ☐ A packet of 10
- ☐ A packet of 20
- ☐ Others, (please specify)

(c) If you stopped smoking, when and why did you stop? **(Si ou fin aret fimer, kan ek kifer ou fin areté?)**

72. Do you have sleeping problems? **(Eski ou gagne problem sommeil?)**

73. Have you had any sleeping problems in the past? (**Eski ou ti p gagne problem
sommeil avan?**)

74. What do you do to avoid diseases? (**Ki ou fair pou ki ou pa gagne ban
maladies?**)

75. What do you do to uphold your cognitive abilities? **(Dir nou ki ou fair pou ki ou mémoire res bon?)**

M. ACCIDENTS AND MEDICAL SURGERIES

76. Have you ever been victim of a major accident? If yes, were you badly hurt or injured? Give details. **(Eski ou fin deza victime ene accident? Si oui, eski ou ti blessé bien grave ?)**

77. Have you ever been victim of a hip fracture? **(Eski ou fin deza gagne fracture ou probleme le rein?)**

Yes ☐

No ☐

78. Have you ever undergone any major operation or surgery? Give details. **(Eski ou fin deza fair ene operation?)**

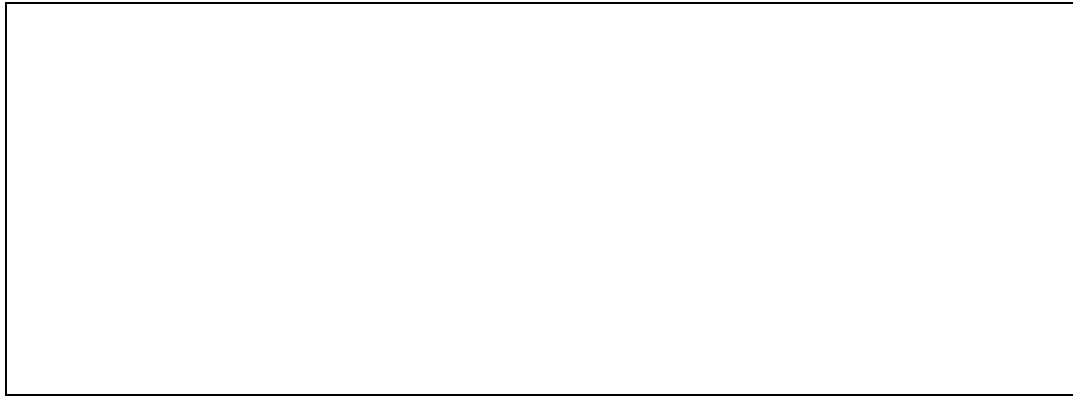
N. COGNITIVE FUNCTIONS

- 79.(a) Taking everything into consideration, how anxious do you feel? **(If answer is “Not at All”, go to Q80) (Eski ou gagne bocou traka?)**

Not at all	To a certain extent	To a greater extent
1	2	3

- (b) How much do your feelings of anxiety stand in the way of doing the things you want to do? **(D'apre ou, eski sa ban traka la empes ou fair ban zafair ki ou envi fair?)**

80. Do you have difficulty in concentrating? (Eski ou gagne problème pou concentré ?)



81. How good is your memory? (Eski ou pensé ou mémoire bien bon?)



82. How much do your memory problems stands in the way of your doing the things you want to do? (D'apre ou, eski ou ban problèmes mémoire empes ou fair ban zafair ki ou envi fair?)



O. ASSESSMENT OF MENTAL BALANCE

83. **For Official Use Only.**

(a) Mental Balance of the Centenarian	Very Poor	Poor	Normal
Attention	1	2	3
Concentration	1	2	3
Memory: Recent	1	2	3
Memory: Past	1	2	3
Judgement	1	2	3

(b) Orientation of the Centenarian	Very Poor	Poor	Normal	Good	Very Good
In time	1	2	3	4	5
In space	1	2	3	4	5
Of person	1	2	3	4	5

P. PERCEPTION ON QUALITY OF LIFE

84. How much your physical health problems (if any) stand in the way of doing the things you want to do? **(Ou kapav dir nou komien ou ban problèmès physique empes ou fair ban zafair ki ou envi faire?)**

85. Do you feel you have sufficient food, clothing and money for your personal use?
(Eski ou pensé ou ena assez manger, linge ek casse pou servi?)

86. Do you feel you can cope with an emergency situation with your present financial resources? (Eski ou pensé avec largent ki ou ena asterla, ou kapav dépane ou si ou gagne ene problème?)

87. Where do you get your income from? (Kotsa ou gagne largent pou servi?)

Source Of Income	%
Government Pension	.....
Children	.....
Personal Pension	.....
Others.....	.....

- 88.(a) How satisfied would you say you are with the social security support you get?
(Please tick as appropriate.)

	Support services currently offered by Government	Very satisfied	Satisfied	Not satisfied
1	Pension [including carer's allowance] – Rs 11,227 per month			
2	Rs 859/month for Medicines Purchase			
3	Rental & 50 local calls free/month (MT)			
4	Free wheel chairs, spectacles, dentures			
5	Free domiciliary medical check up/month			

- (b) If you are not satisfied with one or more of the existing support services, briefly explain why. (Dir nou kifer ou pa satisfait avec sa ban service ki ou gagner ar gouvernement la ?)

89. What other support services would you like the government to provide to all centenarians? (Ki ban lezot services ou envi ki gouvernement donne tou ban centenarians?)