

## Counting to 100: A First Look at Cuba's National Centenarian Study

By Gloria Giraldo, MPH

During the twentieth century, life expectancy rose significantly across the globe due to improvements in public health and overall living conditions.[1] By 1950, life expectancy in most of today's developed countries had increased by an average of 20 years. In 1900, Japan's life expectancy was 43 years; today that country boasts the highest in the world at 83. The United States entered the last century with a life expectancy of 47 years, today reaching 78,[2] the same as in Cuba, where life expectancy in the early 1900s was only 38 years.[3,4]

The baselines and rates of change are decidedly uneven around the world, influenced by social determinants, level of violence, specific disease patterns and the relative strength of health systems, among other factors. Thus, while average life expectancy in Latin America increased by 21 years over the last half century, sub-Saharan Africa's only increased by 11 years.[5] Nevertheless, in both rich and poor countries, people aged 80 and over (oldest old) constitute the fastest growing segment of the population. Worldwide from 2005 to 2050, the oldest-old population is expected to increase four-fold, from 88 million to 402 million. Over the same period, the population aged 80 years or older in Africa, Asia, and Latin America and the Caribbean is projected to increase at least six-fold.[6] And everywhere, the exceptional group of individuals who live to be 100 or more is also growing. In 2005, the United Nations estimated the population of centenarians throughout the world at 270,000, expected to reach 2.3 million by 2040.[2]

### Centenarian Studies

This remarkable increase in the number of people celebrating their 100<sup>th</sup> birthday has spurred interest in studying centenarians to find out if they have inherent or acquired characteristics in common that have enabled them to outlive peers who shared the same environments. More than a dozen studies have been conducted or are currently underway worldwide, examining centenarians' physical and mental health, genetic make-up, families and lifestyles in a quest to unlock the secrets of a long life. Most of these studies, however, are in high-income countries of the Global North.

Among the earliest organized research on "long-lived humans" was a study funded by *National Geographic* conducted in the early 1970s in the Caucasus region of the former Soviet Union, the Hunza Valley in Pakistan and the village of Vilcabamba in Ecuador. While this study found some healthy elderly persons, the ages of participants—some claimed to be older than 160 years—could not be verified or were proven inaccurate. Rampant age exaggeration and inaccurate records "cast a dubious shadow over research on exceptional human longevity," according to a recent review of such studies.[7]

Since this inauspicious start, researchers have been challenged to avoid methodological pitfalls involving age verification, sam-

### Elder Care in Cuba

In 1992, the Comprehensive Care Program for Cuban Elders was launched by the Cuban Ministry of Public Health to provide coordinated services for older adults in three settings: community-based care, institutional care and hospital-based care. Community-based care is centered at the local polyclinic where a Multidisciplinary Gerontological Care Team (EMAG, its Spanish acronym), formed by a doctor, social worker, nurse, and psychologist, all with geriatric training, treats fragile older patients. Older adults are examined by neighborhood doctor and nurse teams and classified according to Cuba's own fragility assessment tool, which measures psychosocial and physical functionality. Similarly, mental health assessments and care are coordinated through community-based mental health centers. (See *Cuba's Aging Pains (and Gains)* in Cuba Health Reports online: <http://www.medicc.org/cubahealthreports/chr-article.php?&a=1031>.)

pling methods, lack of appropriate control groups, and individual differences among centenarians. Although better study design and advances in epidemiological and genetic methods have improved data quality, research aimed at understanding key determinants of healthy aging is still jeopardized by age overstatement and other inaccuracies.[8] This problem was highlighted recently in the United States and Brazil. The US Census Bureau reported that the 1990 census recorded about 37,000 centenarians, but the actual figure is thought to be closer to 28,000, and a recent review shows a similar problem for the 2000 census.[2] In Brazil, researchers comparing census data from 2000 and 1991 determined that the number of centenarians reported in 1991 was overestimated by two-thirds.[9]

While age overstatement may be linked to pride in longevity among alleged centenarians, their families and communities,[10] estimates derived from census data and vital events records may also be incomplete. The UN Statistics Division estimates that only about 50% of all vital events in the world are even recorded.[11]

Very little is known about centenarians in low-income countries, as very few studies have been conducted in the Global South. A literature review revealed that only two countries in Latin America have launched efforts to study their oldest-old. In Costa Rica, the Study for Longevity and Healthy Aging is examining a representative national sample of 9000 people aged 60 and older, oversampling nonagenarians and centenarians.[12] In Cuba, four years of research ending in 2008 studied all verifiable centenarians in the country.

The Cuban study was a collaborative effort led by the Ministry of Public Health, involving the Center for the Study of Longevity, Aging and Health (known as CITED, the Spanish acronym for the Center's former name), the Medical University of Havana, the National Genetics Center, the Ameijeiras Hospital Nutrition Department, the Cuban Neurosciences Center and the network of family doctor and nurse teams in localities where centenarians lived.

### The Cuban Centenarian Study

Sixteen percent of Cuba's 11 million population is aged 60 years or older, and it is projected that 25% of Cubans will belong to that age group by the year 2025.[13] According to Dr Alberto Fernández Seco, director of the Ministry of Public Health's Older Adult Division, the increase in centenarians is the result of a baby boom in the early 1900s, a remarkable decrease in infant mortality and a decline in over-80 mortality.

The Cuban study was designed to overcome major methodological challenges, particularly age verification and sampling issues. "From the initial conceptualization of the study, we knew that age validation had to be very rigorous," stated Dr Jesús Menéndez, Deputy Medical Director of CITED. According to the research team, the age verification process was fundamental to determining the study universe. The first universe frame was obtained by generating a list of all individuals who reported being 94 years or older in Cuba's last census (2000); this census-derived list was then checked against another created from the national health system's family medical records.[14] Individuals that appeared on both lists were visited by community social workers who explained the scope of the study to potential participants. Age was verified by external certifiers from the National Statistics Bureau, who followed a protocol entailing personal identity document verification, along with a milestone assessment (marriage date, date of first born, subsequent birthdates of children, mother's death) and historical events questionnaire. Those individuals with a verified age of at least 100 became the universe for the study.

By assessing the total centenarian population in the country, the Cuban study avoided selection bias and other potential sampling problems. Convenience samples, for example, may be comprised primarily of healthier elders who can more easily participate in a study, thereby limiting valid generalization of the results.[8]

Research teams interviewed and assessed a total of 1,488 centenarians from 2004 through 2008. "Clearly, the number of centenarians in a country at any given time is a moving target; the study universe is always changing, since centenarians have a shorter life expectancy (average 6 months). When one person turns 100, another may pass away," Dr Menéndez explained. The cut-off point for inclusion in the study was the date when data collection began in each province. Therefore, 1,488 is the total number of centenarians identified consecutively in all provinces during the study period.

The Cuban study had three main goals; the first was to evaluate the centenarians' physical and mental health status, as well as their social conditions—the latter especially important in a developing country like Cuba, where broad economic constraints introduce a level of hardship. The second goal was to propose strategies to solve problems identified in the course of the study. For example, participants with previously undetected health prob-

lems were referred to appropriate local health care providers, and durable devices, such as glasses, canes and prostheses, were provided as needed. "In this respect, our centenarian study is also a type of action-research," Dr Menéndez explained, "because as we located the centenarians, we also tried to see that their needs were being met by the national health system." The third goal—still in progress—is to establish healthy aging indicators that can be used to plan and conduct population-wide health interventions in the future.

The wealth of data collected is still being analyzed, and some preliminary findings have been presented at various conferences, including Havana's Gerontoger 2008. There, the CITED team presented an overview and preliminary results on the centenarians' demographics, health status, functionality, medication

regimens, nutritional status, social support networks, work history, stress and coping mechanisms, and health services utilization. These findings revealed, for example, that the largest numbers of centenarians lived in the two largest cities: 258 in Havana and 184 in Santiago de Cuba. The majority—63%—were women, and 11% of the total were aged 105 or over. Racial composition was 59% white, 22% black and 17% mixed ("mestizo"). Ninety percent had been born in Cuba; of the 10% foreign-born, approximately half came from Spain and half from Haiti. Only 3% lived in an institution and 0.03% (48 persons) lived alone; 9% were married and living with their spouses, while 74% were widowed.


Centenarians had a lower educational level than Cubans over the age of 60 as a whole; most had a primary education but some were illiterate. Psychological assessments revealed 46% enjoyed a normal cognitive state. In terms of stress and coping mechanisms, the study found that, in general, the centenarians were quite

resourceful and had developed many life skills, independent of educational achievement. Life satisfaction was high, and they showed great resiliency in adjusting to losses they had experienced throughout their lives. Centenarians who have remained lucid and dementia-free are conscious that they are in their last stage of life and report living in the present and enjoying it.

Comments by a group of centenarians attending an international healthy aging conference in Havana in May 2007 illustrate some of these findings. After the closing session, several women and men in their "early 100s" sat together musing on the secret to a long life. By consensus, they agreed that it was good humor, optimism and staying active. "The ultimate secret is enjoying yourself, keeping a good outlook on life and being able to take whatever life gives you with a smile," said Flora López, aged 101, who excused herself to dance to a tune struck up by an elder-musician band from Mexico.



*Flora López at 101: taking what life gives you with a smile.*

As the results of Cuba's centenarian study are fully analyzed and their implications discussed in all their dimensions, they can help generate a better understanding of how such longevity is achieved in a context very different from the highly developed regions where nearly all studies of aging populations have been conducted. Such research can also become a tool for framing strategies to improve quality of life for Cuba's and the developing world's eldest citizens. 

### References & Notes

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14. A family medical record is kept by local doctor and nurse teams for each household in every neighborhood in Cuba.



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