

Health Status of Urban Medium-Low-Income Elderly at the Community

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Abstract

Background: Nonagenarians are uncommon in our population. The study aim was to profile physical mobility, declared health problems, hypertension and diabetes frequency, awareness, treated and good control in urban low-income elders. **Method:** The study had cross-sectional design in population sample. Subjects were urban men and women older than 59 years at the medium low income stratum at a developing country. Survey was carried out from October 2008 to October 2009. All elder dwellers in randomly selected houses were surveyed; clinical exam after consent. Good Control: Systolic/Diastolic <135/<85 mmHg, and HbA1c < 7% for diabetes. **Results:** There were 162 elders, 53 (32.7%) were male, 99 (61.1%) were younger than 70 years. Forty nine (30.2%) had impaired mobility; among them 20 (55.6%) were bed or home restricted, and 29 (44.4%) needed help to go out. Unstable health condition was found in 36 (22.2%), with significantly more men 19 (52.8%) vs 34 (27.0%), $X^2 = 8.5$, $df1$, $P < 0.005$; and impaired mobility 32 (88.9%) vs 17 (13.5%), $P < 0.001$; but similar age 69.2 ± 7.7 vs 68.3 ± 7.3 , $t = 0.62$, $df 160$, $P > 0.05$. The frequency, proportions for: known diagnosis, on treatment, and good control were 75 (69.4%), 55 (73.3%), 45 (60.0%) and 12 of 45 (26.7%) for hypertension; 53 (49.1%), 47 (88.7%), 42 (79.2%) and 9 of 42 (21.4%) for diabetes. The most frequent unstable conditions were cardiovascular. **Conclusions:** Data suggest unstable health no association with the oldest old. The small proportion in good control of Diabetes and/or hypertension could explain the large frequency of elders with unstable health and prevention of reaching nonagenarian age.

Keywords

Community Health, Elderly, Awareness, Treatment and Control of Hypertension and Diabetes Mellitus Type 2

1. Introduction

Increasing percent of nonagenarians is seen in developed countries; at US from 720 thousand in 1980 to 1.9 million in 2010 [1] [2]; in Sweden [3] the number of individuals reaching age of 100 years in 2009 was nine times the one in 1969. Aged population could be potentially challenged with increased medical expenses for chronic diseases (cardiovascular, cancer, dementia) if life expectancy increases without improving health [4]. More important than just longer life is functionality [5]. At Denmark a good proportion of remaining life time is spent in good health even for subjects over 90 years old [6]. At US the National Institutes of Health has observed that disease and disability are no inevitable consequences of aging; disability rates can be reduced, also decrease the probability of cognitive impairment at certain age [7]. Healthy long lifetime is determined genetically by 35% and modifiable environmental factors contribute most of this complex interaction. At US, programs are being developed and implemented to prevent disability such as lifestyle intervention and independence for elders [7].

The proportion of nonagenarians is meager [8] in our developing country despite available medical advances, health care and preventive programs [9]. As the prevalence of Hypertension as well of Diabetes at our population, spikes at 40 years of age and continues to rise with age [9]; thus, by the time a person reaches 60 years of age, complications of hypertension or diabetes could be present. Hypothyroidism frequency is also high in elderly; often undiagnosed because subjects confuse symptoms with normal aging changes thus no procure medical care [10]. Although our region was formally known to be goitrous, abated by iodinated salt, the hypothyroidism prevalence was unknown; the studies that glimpse hypothyroidism frequency were scarce and contradictory [11]. The population survey done to determine its prevalence is being presented elsewhere (Cardenas-Ibarra *et al.* submitted for publication). As serious illness could alter thyroid function; a survey to exclude subjects with serious illness was done first in our selected subjects to avoid confusion with non-thyroidal-illness alterations of TSH [12]. This provided the opportunity to answer the following Questions: How is the overall elder health? And what is the control level for diabetes and hypertension?

Objectives

The objectives were to profile elders' physical mobility level, declared health problems, frequency of diabetes and hypertension; and their proportions of being: aware, treated, and in good control.

2. Method

2.1. Design

Cross-sectional observations in elderly dwellers of randomly selected homes at an urban middle low-income community.

2.2. Place

Survey took place in a basic geographic statistic unit at Guadalupe, NL, MX, from October 2008 to October 2009, as part of a protocol to screen for hypothyroidism.

2.3. Subjects

All men and women over 59-year-old, occupant of the selected houses, were interviewed about their health and for the ones with stable health, obtained informed consent for medical exam and lab tests at a University clinic. Unstable health was defined for this study as having severe medical condition, or he or she was hospitalized for at least two days in the last six months, or severe behavioral impairment (dementia, alcoholism). Subjects with unstable health were included in the survey, their declared health conditions (cardiovascular, respiratory, renal, etc.) were compiled along with graded severity, treatment and level of mobility but not further exams were done to them.

2.4. Ethics

Protocol and informed consent were approved by the Ethics committee of the Medical School of University Autonomous of Nuevo Leon (EN08-028).

2.5. Variables

Variables were: number of elders per home, age (years), gender, mobility coded as follows: able to move around without assistance from someone = 0, requiring some assistance to leave home = 1, home restriction requiring assistance for daily basic activities = 2, bed confined = 3; List of subject's declared health problems (coding them according the International Classification of Disease 2010 (ICD-10)); Diabetes Mellitus type 2 (DMT2), and Hypertension (HTN) prevalence and proportions of being: aware, treated and in good control for each of them. General health was classified as stable and unstable as defined above.

2.6. Sample Size

At least 168 houses were needed to be surveyed to find 70% inhabited by an elder with a precision of 6.2% at a confidence level of $Z = 1.96$; and around 100 individuals would be enough to detect $20\% \pm 7.5\%$ of elders in good control or $40\% \pm 9\%$ both at a confidence level of $Z = 1.96$.

2.7. Procedures

Adult in-house members over 59 years old were listed. Direct interview for

mentally competent elders was done; otherwise a close adult relative was interviewed. Elder's physical mobility was observed by the interviewer, and measured: blood pressure, and capillary glucose. At least five interview attempts were done for subjects difficult to reach. After signing informed consent, an appointment to the clinic, was made for examination and blood draw (arm phlebotomy) for lab tests. Physical exam: Height and weight were measured in light cloths without shoes. Blood pressure was taken in a sitting position three times allowing time to relax between measurements (blood pressure was assessed at home and at the clinic).

Laboratory

Laboratory determinations: glycated hemoglobin A1c fraction by Immunoturbidimetric test (One-HbA1c FS) via Star-Dust MC15; both from Diagnostic systems international (DiaSys), its coefficient of variation was 1.6%. Lipids: triglycerides by and High Density Lipoprotein (HDL) cholesterol levels were determined manually with RANDOX reactive; GPO-PAP and precipitation with phosphotungstic acid/MgCl₂ respectively.

2.8. Criteria of Control

For diabetes HbA1c under 7% was considered good control [13]. For hypertension: if two out of three measurements were as follows: Systolic < 135 mmHg and Diastolic < 85 mmHg [14].

2.9. Analysis

Proportions and means are presented with confidence limits. Comparisons among groups were done by chi square and age by independent student-t for continuous variables. For this analysis, subjects with stable health who avoid the clinical exam were considered healthy to estimate condition prevalence. Alfa at 0.05 levels was the cutoff point to be considered significant. The number of elders in our city like our sample was estimated with data from 2010 census National Institute of statistics and Geography (INEGI by its name in Spanish).

3. Results

3.1. Selection

Sample selection is displayed in **Figure 1**. There were 841 homes listed in this selected typical urban low-income basic geographic statistic unit. A sample of 170 (20.2%) houses was randomly obtained. In 37 (22.0%) of the houses, inhabitants were younger than 60 years and 6 (3.5%) houses were vacant. In 127 (74.7%) houses had elder dwellers: 74.8% (95 houses) with one elder, and 25.2% (32 houses) more than one, for a total of 162 (100%) dwellers over 59 years of age; they were 53 (32.7%) male and 109 (67.3%) women; sixty one percent were under 70 years of age. The median age was 66.5 years. **Table 1** display the age distribution broken down into 5-years groups, also display 2010 census for the

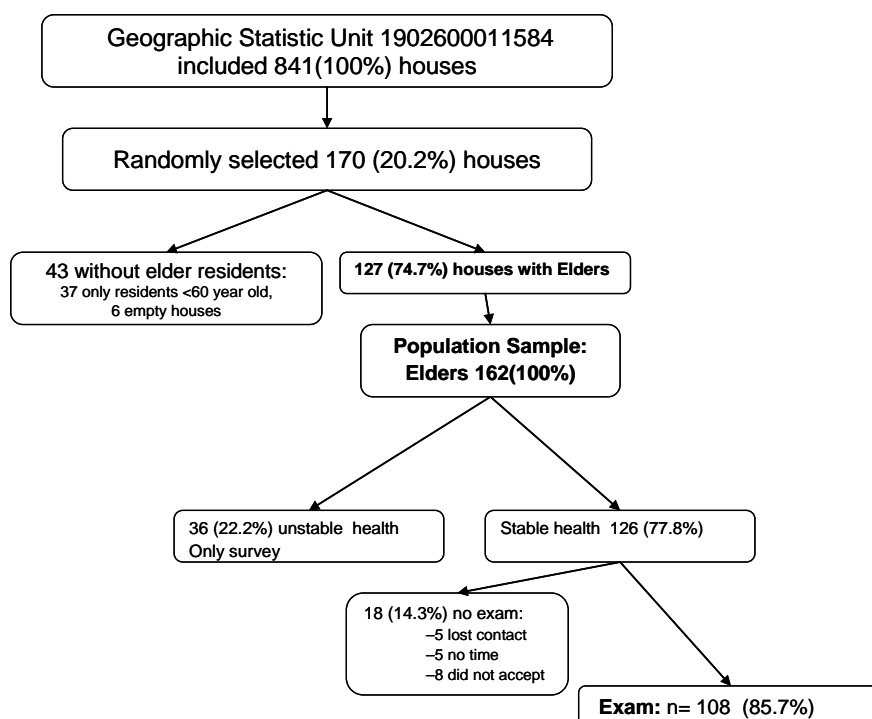


Figure 1. Patient flow. Unstable health: having a severe illness, prone to abnormal vital signs, had been hospitalized at least two days in the last six months, demented or heavy alcoholism.

Table 1. Age distribution of sample's subjects versus 2010 census at Guadalupe, MX.

Age Group	Frequency	Percent	*INEGI 2010 Guadalupe	INEGI 2010 %
60 - 64	61	37.7	22,778	34.8
65 - 69	38	23.6	15,827	24.2
70 - 74	30	18.5	11,746	18.0
75 - 79	19	11.7	7,236	11.1
80 - 84	9	5.6	4,511	6.9
85+	5	3.1	3,417	5.2
Total	162	100	65,515**	100

$X^2 = 2.3$, degrees of freedom 5, $P > 0.05$; *INEGI = Spanish acronym for "National Institute of Statistics and Geography". **The elder of Guadalupe represented the 10% of its population at 2010.

Municipality of Guadalupe, Nuevo León Mexico. Contiguous to Guadalupe is the municipality of Monterrey, Nuevo León, México (not shown); it also includes a large fraction of middle-low income elder population like our sample; data from 2010 census by INEGI (acronym in Spanish for National Institute of Statistics and Geography).

3.2. Mobility

Mobility and health stability is display in **Table 2**. Unstable health defined as severe health condition or still on treatment after had been hospitalized for more

than two days in the last six months or had a behavioral inadequacy (four due to heavy alcoholism, three had Alzheimer). It was found in 36 (22.2%) elders and 126 (87.6%) had stable health out of the 162 sampled elders. Mobility impairment was found in 32 of 36 elders with unstable health vs 17 of 126 elders with stable health $X^2 = 73$, $df1$, $P < 0.001$. Also, Men were overrepresented in the unstable health group 19 (52.8%) vs 34 (27.0%), $X^2 = 8.5$, $df1$, $P < 0.005$. In the other hand, age was found similar among groups of stability of health; mean age 69.2 ± 7.7 vs 68.3 ± 7.3 respectively, $t = 0.62$, $df 160$, $P > 0.05$; that is, similar percent were above 69-year-old 15 (41.7%) vs 48 (38.1%), $X^2 = 0.2$, $df1$, $P > 0.05$. However, older age associated with deteriorated mobility; 23 (23.5%) of the 98 under age 70, versus 26 (40.6%) of 64 above 69 years of age required assistance for mobility ($X^2 = 5.4$, $df1$, $P < 0.03$).

3.3. Morbidity

Morbidity is display in **Figure 2**, each dot represents one subject. Dots are distributed in and out three overlapping circles of DMT2, HTN, or Dyslipidemia

Table 2. Observed mobility by health stability.

Mobility help needed:	*Unstable health n = 36 (100%)	Stable health n = 126	Total 162
None	4 (11.1%)	108 (85.7%)	112 (69.1%)
-To go out	12 (33.3%)	17 (13.5%)	29 (17.9%)
-Basic daily tasks	5 (13.9%)	0	5 (3.1%)
-Bed restricted	15 (41.7%)	0	15 (9.3%)

*Unstable health: severe illness, prone to abnormal vital signs, being hospitalized for at least two days in the last six months, or dementia, or heavy alcoholism. Merging last three rows, deteriorated mobility was found in 32 (88.9%) with unstable health vs 17 (13.5%) stable health, $X^2 = 75.4$, $df = 1$, $P < 0.001$.

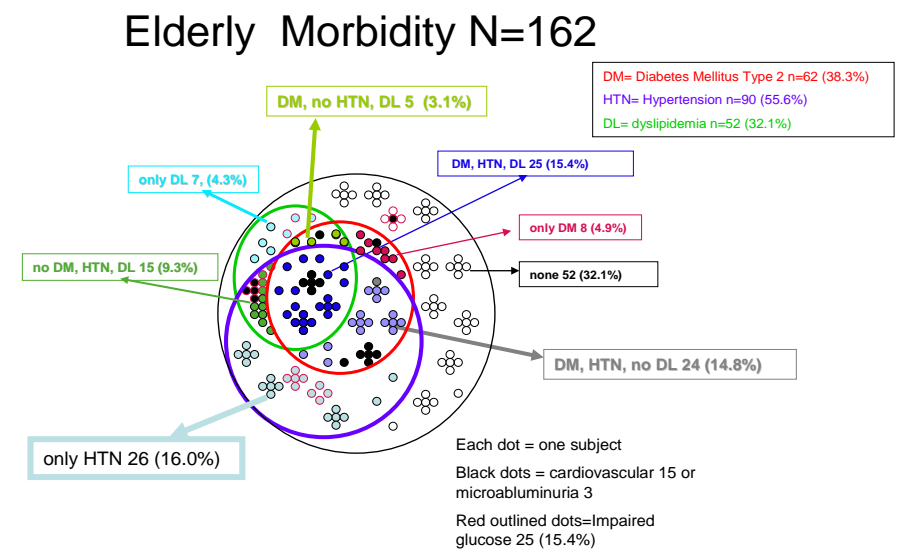


Figure 2. Morbidity in elders: each dot represents one subject, Largest circle is the sample 162 elders, Purple circle Hypertension, red circle diabetes, green dyslipidemia, red outlined dots impaired glucose, black dots cardiovascular or microalbuminuria.

(DL). The most prevalent was HTN 90 (55.6%) subjects, followed by DMT2 62 (38.3%) and Dyslipidemia was found in 52 (32.1%); but another 15 (9.3%) subjects had total cholesterol over 200 mg/dl (not shown in **Figure 2**); Also 25 (15.4%) subjects with impaired fasting glucose (depicted in **Figure 2** as red outlined dots). Thus, the overlapping circles show that twenty-five (15.4%) harbor the three conditions, forty-four (27.2%) had two of them; forty-one had one condition and fifty-two (32.1%) none of them. Blacked dots represent subjects with cardiovascular disease or microalbuminuria; as expected they were found associated to HTN 15 (16.7%) of 90 vs 3 (4.2%) of 72, $X^2 = 6.3$, $df = 1$, $P < 0.05$. But the association is stronger with DMT2 were 13 (21.0%) of 62 vs 5 (5.0%) of 100, $X^2 = 9.9$, $df = 1$, $P < 0.002$. Moreover, all the cardiovascular or microalbuminuria cases, stated above, were in elder who harbor hyperglycemic condition.

3.4. Morbidity Frequency

Table 3 shows the subjects declared health problems with confidence intervals of frequency; conditions with less than 3 observations were not included as the frequency's confidence intervals could not be reliably computed. Notice that if impaired fasting glucose is accounted, the prevalence hyperglycemic condition raises to 87 (53.7%, CI: 46.0 to 61.4%); and dyslipidemia plus those with total cholesterol over 200 mg/dl rises to 67 (41.4%, CI 33.8% to 48.9%). Cardiovascular co morbidity were associated to HTN and DMT2. Further the exam and tests revealed 15 cases more of mild cardiovascular conditions thus changing its prevalence to 30 (18.5%, CI: 12.5% to 24.5%) and sustain the associations with diabetes and hypertension, while total cholesterol >200 mg/dl associated just with coronary disease 8 (16.0%) vs 2 (3.8%) fisher's exact $P < 0.05$. Thyroid hypofunction is reported elsewhere, in short it was 32.4%, in 108 elders who underwent the lab tests and clinical exam. Adiposity was found as follows: only 1% were underweight (BMI < 20.0 K/m²), and 73.8 had BMI above 25.0 K/m²; as

Table 3. List of health problems reported in the 162 elders by survey.

Condition (ICD-10 version 2010)	N	Percent	CI _{95%} low-upper
<i>Diabetes Mellitus</i> (E11.8)	62	38.3	30.8 - 45.8
Hypertension (I10)	90	55.6	47.9 - 63.2
Dyslipidemia	52	32.1	24.9 - 39.3
Cardiovascular (I11.0, I20.9, I60.9)	15	9.3	4.8 - 13.7
Hospitalized ≥ 2 days last six months	13	8.0	3.8 - 12.2
Lung (EPOC) (J43.9, J44.9)	5	3.1	0.4 - 5.7
CA(C00), Epilepsy (G40.9), Gastric Ulcer (K27), AOH (F10), microalbuminuria, each:	4	2.5	0.1 - 4.9
Alzheimer (F00.9), Glaucoma (H40.9), Infectious (B96.8): each	3	1.9	* - 4.0

*= no reliable estimation. Morbidity with less than three observations is not included.

most of the subjects were overweight its association with HTN and DMT2 was not detected.

3.5. Care Outcome

A glimpse to medical care outcome at community level can be found in **Table 4**; it displays the frequency and proportions of being: aware, on treatment and in good control for Hypertension and Diabetes. Among the 108 elders with lab tests and clinical exam there were 75 (69.4%) elders with HTN; of them only 12 (16%) were in good HTN control; that is, they had both Systolic < 135 mmHg and Diastolic < 85 mmHg. Likewise, only 9 (17.0%) of 53 elderly with diabetes had HbA1c under 7%.

4. Discussion

These data, in not so old (median age 66.5 years) medium-low socioeconomic elders, show general poor health: high prevalence of HTN, DM or DL 67.9% with small proportion reaching good control, high proportion requiring major mobility assistance 30.2%, and advanced unstable health 22.2%. The age distribution point to representativeness of the sample with the elder population at Guadalupe [8], the second largest municipality of Monterrey city, Nuevo Leon, Mexico; the number of elders in the medium-low socioeconomic level at Guadalupe is 43 thousand and in Monterrey municipality 103 thousand [8]. The proportion of octogenarians in Guadalupe is smaller than the national estimation by ESANUT 2012 (12.1% vs 15.6%, $P < 0.001$); nevertheless, the proportion of octogenarians in the national estimation by ENSANUT 2012 is significantly smaller than the one reported [6] in developed countries also 15.6% vs 19.7% in Denmark, $P < 0.001$; and other European counties [3].

Unstable health was found in 36 (22.2%, CI 15.8% to 28.6%) subjects. Men were overrepresented in this group in agreement with reported statement men consistently have poorer outcome than women [3] and relates to lower proportion of men in oldest old age group. Also, unstable health associated with impaired mobility, but age was similar in both, unstable and stable health, thus severity of morbidity could be the motive for these elder's mobility impairment. Moreover, among the unstable health 14% were home restricted unable to perform basic daily care by themselves, other 42% were bed restricted, which suggest severe illness, and increase the risk of additional morbidity and sustained

Table 4. HTN and DMT2 control level by clinical exam and lab test on 104 elderly.

	Hypertension	DMT2
Frequency	75 (72.1%)	53 (51.0%)
Known dx	55 (73.3%)	47 (88.7%)
On Treatment	45 (60.0%)	42 (79.2%)
Good control*	12 of 45 (26.7%)	9 of 42 (21.4%)

*Systolic/Diastolic <135/<85 mmHg for HTN, and HbA1c < 7% for DMT2.

disability [9]; Gill *et al.* reported 55.3% developed disability after activity restriction, in 5 years follow up of elders over 70 years old at New Haven, Conn, US [9]. Other 29 (17.9% CI: 12.0% to 23.8%) of the whole sample required mobility assistance to leave home; Thus, there were 49 (30.2% CI: 23% to 37%) elders with immobility, which tend to be higher than the National health survey 2012 report lapse decrease mobility prevalence range from 15.0% to 27.0% in the older than 60 years ([9]: figure 1.6, pg 38), which partially overlap with the confidence interval in our studied.

The high prevalence for both hypertension and diabetes, in our adult population, has been observed previously in another medium-low income community at Monterrey municipality of Monterrey city, Nuevo León, México ([15] Cardenas *et al.*). One hundred and ten (67.9%) of our studied subjects had HTN, dyslipidemia or diabetes (95%CI: 60.7% to 75.1%); which is significantly higher than the reported in US veterans 59.1% Johnson *et al.* [16]; probably due to the much higher diabetes prevalence in our studied Mexican elders as pondered by Martorell in his essay [17]. In agreement with other studies Sowers J.R. *et al.* [18], cardiovascular morbidities were associated to hypertension, and diabetes; while elevated total cholesterol associated with coronary disease in agreement to Redondo *et al.* study [19].

The overall level of control of hypertension is very low 16.0%; which is lower than the level found on ambulatory elder patients of the University Geriatric clinic at Monterrey, it reported 32.9% in good control (S < 140 and D < 90 mmHg) [20]; probably due to lower proportion on treatment, in our studied, only 60% of hypertensive elders: 20 (26.7%) were unaware of having hypertension and 10 (13.3%) had not access to treatment. While in the geriatric outpatients, all were on treatment; so even they had room for improvement, since diuretics were underused [21]. Both, present study (on community dwellers) and in geriatric outpatients, are significantly lower than the national control of hypertension of 54% reported at US by CDC 2011 [22]. Furthermore, even for those on hypertension treatment, good control was low 26.7% while in the Canadian study on community elders with HTN reported 88.1% were on treatment and reaching good HTN control 42% [23].

The stats for DMT2 were better than hypertension on awareness and treatment 88.7% had previous diagnosis and 79.2% were on regular treatment; but reaching good glycemic control was low 21.4%, and in very poor glycemic control (blood glucose over 200 mg/dl) was 74.2%. Moreover: at US [22], poor glycemic control (HbA1c 9.0%) in Mexican-American subjects with known DMT2 was 19.6% and in Non-Hispanic White 9.5% at 2010, while 50% of our studied were at this poor control, too far high but similar to reports in early 80's in a low-income adults who received medical care at community centers of Harris County, TX, US [24]. We are at least 30 years behind than US on glycemic control. ENSANut2012 report that the prevalence of previously diagnosed DMT2 in adults incremented from 5.8% in 2000 to 9.2% 2010, interpreted as due to more

screening [9], thus improvement of diabetes awareness; our data showed good awareness on Diabetes too. Worth to notice is that, impaired fasting glucose was found in 22 (13.6%) elders; half of them had previous diagnoses of prediabetes and had been advised on diet but had no glycemic improvement. Five (22.7%) elders of those with impaired blood glucose presented cardiovascular morbidity, thus suggesting prediabetes requires more aggressive treatment; not necessarily with drugs as some studies report glycemic improvement in prediabetes with functional foods containing Aloe Vera [25].

5. Limitation and Strength

Subjects with physical exam and lab test had more time and effort to remember details of their previous diagnosis; plus, the lab tests results help to reveal the health state at that moment. Thus, estimations with survey data for the whole sample is conservative but avoid participation bias; and adding the lab results avoid undiagnosed bias. The transversal design of the study cannot address causality, but poor control, of these conditions, promotes deterioration of health and prevent reaching healthy octogenarian age.

6. Conclusions

These data suggest: 1) Unstable poor health did not associate with oldest old. 2) The population health care effort is being mostly placed in advanced deteriorated health. 3) The proportion reaching good control was very low only 1/4 of those on treatment for Hypertension and 1/5 of those on treatment for Diabetes; thus, high frequency of unstable health before seventy years of age. All these findings might prevent reaching active functional nonagenarian age.

7. Recommendations

It is estimated that the elderly (60 years and over) population fraction will reach 28.0% of national population by 2050, more than twice the current one; thus, in light of the findings in this study, it must become a priority for everyone (government, medical sector, citizens) to develop and implement strategies to constrain the burden of population aging.

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Conflict of Interest

Any of the authors has conflict of interest.

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