

Comparison of nutritional status and dietary intake self-reported by elderly people of different birth cohorts (1936 to 1940 and 1946 to 1950): Health, Wellbeing and Aging (SABE) Study

Comparação do estado nutricional e da ingestão alimentar referida por idosos de diferentes coortes de nascimento (1936 a 1940 e 1946 a 1950): Estudo Saúde, Bem-Estar e Envelhecimento (SABE)

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ABSTRACT: *Introduction:* The aging process is characterized by several changes in individuals' life, including his or her nutritional status and food intake. To understand the trends of these changes, studies with elderly people who were born at different times are necessary. *Objective:* To compare the nutritional status and food intake of elderly people who participated in the Health, Well-being, and Aging study (SABE study), conducted in São Paulo, in 2000 and 2010. *Methods:* The nutritional status was identified by means of the body mass index (BMI) and was classified as underweight (BMI < 23 kg/m²), adequate weight (23 ≤ BMI < 28 kg/m²), or overweight (BMI ≥ 28 kg/m). Food intake was self-reported and was classified as the number of meals (≥ 3 / day), frequency of intake of dairy products (≥ 1 serving/day), eggs and beans (≥ 1 serving/week), fruits and vegetables (≥ 2 servings/day), meat (≥ 3 servings/week), and liquids (≥ 5 glasses/day). The prevalence ratio was calculated to compare the variables of the cohorts, using Poisson regression. *Results:* A total of 755 individuals of both the genders aged 60 to 64 years and who were born between 1936 and 1940 and between 1946 and 1950 participated in this study. Elderly people who were born between 1946 and 1950 presented higher prevalence ratio of overweight (PR = 1.19), number of meals (PR = 1.34), and liquids intake (PR = 1.18), but presented lower prevalence of intake of dairy products (PR = 0.87), meats (PR = 0.93), and fruits and vegetables (PR = 0.83). *Conclusion:* These results showed concerning scenarios of nutritional status and food intake for the most recent cohort (1946 – 1950).

Keywords: Aged. Aging. Anthropometry. Feeding. Nutritional status. Cohort studies.

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RESUMO: *Introdução:* O processo de envelhecimento é caracterizado por várias alterações, incluindo do estado nutricional e da ingestão alimentar. Para compreender a tendência dessas alterações são necessários estudos com idosos de diferentes épocas de nascimento. *Objetivo:* Comparar o estado nutricional e a ingestão alimentar de idosos participantes do Estudo Saúde, Bem-Estar e Envelhecimento (SABE), realizado em São Paulo, em 2000 e 2010. *Métodos:* O estado nutricional foi identificado pelo índice de massa corporal (IMC), considerando: baixo peso ($IMC < 23 \text{ kg/m}^2$); peso adequado ($23 \leq IMC < 28 \text{ kg/m}^2$); excesso de peso ($IMC \geq 28 \text{ kg/m}^2$); e a ingestão alimentar referida: número de refeições (≥ 3 / dia), frequência de laticínios (≥ 1 porção / dia), de ovos e leguminosas (≥ 1 porção / semana), de frutas, legumes e verduras (≥ 2 porções / dia), de carnes (≥ 3 porções / semana) e de líquidos (≥ 5 copos / dia). A comparação foi realizada por razão de prevalência, utilizando regressão de Poisson. *Resultados:* Participaram 755 indivíduos de ambos os sexos, de 60 a 64 anos, nascidos nos períodos de 1936 a 1940 e 1946 a 1950. Os idosos nascidos entre 1946 e 1950 apresentaram maior razão de prevalência para excesso de peso (RP = 1,19) e para número de refeições (RP = 1,34) e para líquidos (RP = 1,18), contudo menor razão de prevalência para laticínios (RP = 0,87), para carnes (RP = 0,93) e para frutas, legumes e verduras (RP = 0,83). *Conclusão:* Estes resultados mostram cenários alimentar e nutricional preocupantes para a coorte mais recente (1946 – 1950).

Palavras-chave: Idosos. Envelhecimento. Antropometria. Alimentação. Estado nutricional. Estudos de coortes.

INTRODUCTION

Aging process is characterized by a number of psychosocial changes that may affect the nutritional status and food intake and cause disabilities and the development of chronic noncommunicable diseases (NCDs). Consequently, quality of life worsens, risk of death increases¹⁻⁴, and health system costs rise. Therefore, aging process and the elderly population have aroused the interest of the scientific community and health care managers.

Nutritional panorama of the Brazilian population is characterized by a high prevalence of overweight (body mass index [BMI] $\geq 25 \text{ kg/m}^2$) in the adult population, resulting in a high frequency of this disorder among elderly people and contributing to modify the profile of morbidity and mortality in this population⁵.

Results of the analysis of different birth cohorts (1901, 1906, 1911, 1922, and 1930) showed that Swedish elderly who were born in 1930 had higher body weight and, consequently, higher BMI⁶. A research conducted in Finland, with elderly who were born at different times (1913 – 1917 and 1968 – 1972), identified higher average BMI among women in the most recent cohort⁷.

Research with this objective has been focused in other countries; however, in Brazil, this topic is still incipient. A Brazilian study, found in the literature review, analyzed two birth cohorts (1916 – 1926 and 1927 – 1937), with elderly who participated in the Bambuí Project (Minas Gerais). This study found a higher prevalence of overweight (BMI $\geq 27 \text{ kg/m}^2$) in men in the birth cohort 1927 – 1937⁸.

With regard to food intake, a research conducted in Sweden with different cohorts (year of birth: 1901, 1911, 1922, and 1930) found that those elderly who were born in 1901 or 1911 reported eating more fruits, vegetables, chicken, rice, and yogurt compared with those in the youngest cohorts⁹.

In Brazil, according to the Research on Family Budget (POF – 2002/2003 and 2008/2009), the Brazilian population, including the elderly, decreased their intake of fruits and vegetables¹⁰⁻¹². However, according to the data from these studies, the reported intake of sausage, bologna, sandwiches, and snacks was lower among the elderly subjects¹².

Therefore, studies assessing the elderly from different periods of birth are extremely important to understand the trends of population aging and the changes in the nutritional status and food intake, aiming at identifying possible emerging and future problems and establishing public policies and intervention strategies in the field of food and nutrition.

Health, Well-being, and Aging (SABE) study became in this context a major research on population aging in Brazil. SABE study has analyzed the status of health and nutrition in different cohorts of elderly people. Thus, the objective of this study was to compare the nutritional status and food intake of two cohorts of elderly participants in the SABE study, according to gender.

METHODS

This is a cross-sectional study that analyzed two cohorts of elderly people (cohort A and C) who participated in the Health, Well-being, and Aging (SABE) study, in the city of São Paulo (SP), in 2000 and 2010.

In 2000, cohort A consisted of 2,143 individuals aged 60 years or older who lived in the urban area of SP. Silva¹³ has already published the descriptions of the sampling, the questionnaire, and the data collection. In 2010, cohort C was composed of 329 individuals.

To compare the cohorts, those individuals who were born between 1936 and 1940 (aged 60 – 64 years) from the cohort A in 2000 (n = 426) and elderly people from cohort C (n = 329) who were born between 1946 and 1950 were selected. Thus, 755 elderly individuals of both the genders participated in this study.

The study variables were nutritional status and diet.

Nutritional status was evaluated by the calculation of BMI in kg/m². For the calculation, data related to the body weight (BW) and height (H), obtained from questions K05 and K11 (K section) of the questionnaire of SABE study were used. BW was measured with the elderly standing barefoot, using a portable SECA® brand scale with a capacity of 150 kg. Height was measured using a Harpenden® anthropometer, wall-mounted or fixed on the doorframe to obtain right angles to the floor of the residence. The elderly was measured barefoot, in an upright posture, leaning against the wall or doorframe.

With regard to the identification of nutritional status, the following classification recommended by the Pan American Health Organization¹⁴ was used in SABE study: underweight

(BMI < 23 kg/m²), normal weight for the height (23 ≤ BMI < 28 kg/m²), risk for obesity (28 ≤ BMI < 30 kg/m²), and obesity (BMI ≥ 30 kg/m²). In this study, the elderly people were analyzed according to three categories: normal weight (reference), underweight, and overweight (BMI ≥ 28 kg/m²).

Diet was analyzed according to the following variables: ≥ 3 meals/day, ≥ 1 serving of dairy products/day, ≥ 1 serving of eggs and/or vegetables/week, ≥ 3 servings of meat (beef, pork, poultry, and fish)/week, ≥ 2 servings of fruits and vegetables/day, and ≥ 5 glasses of liquids (water, tea, coffee)/day, according to the dichotomous response (yes or no) given by the elderly or respondents.

Data from diet variables were obtained from C section (C22a to C22g and C22_1 to C22_7) of the SABE study questionnaire.

Statistical tests recommended for survey studies were applied because of the complex sampling process.

The description of the population was presented according to the weighted relative frequency of elderly population in relation to nutritional status and diet variables. The Rao-Scott χ^2 test was used to verify statistically significant differences and/or similarities between the proportions of the elderly people in relation to the variables of the study. Poisson regression model with robust variance was used to compare variables between study cohorts, in which cohort A was considered as reference. Prevalence ratio (PR) and confidence intervals (CIs) were estimated, being considered a significant difference between the cohorts a result of $p < 0.05$. All calculations were performed using STATA 13.1 for Windows program.

RESULTS

The study included 755 elderly people (52% women). Of these, 426 elderly were from cohort A (56% men) and 329 elderly were from cohort C (57% women).

With regard to the nutritional status, a higher proportion of elderly people with normal weight (42.5%) and low weight (15.5%) was observed in cohort A, and a higher proportion (53.7%) of overweight was found in the cohort C ($p = 0.004$) (Table 1).

Nutritional status according to gender had similar results in cohort C, as a lower proportion of underweight women (10.2%) and a higher proportion of overweight women (59.5%), with a statistically significant difference ($p = 0.0000$) were found (Table 2). Similarly, a lower proportion of elderly with low weight (8.3%) and a higher proportion of overweight (46.1%) were found among men; however, this was not a statistically significant difference (Table 3).

With regard to diet variables, a higher proportion of the elderly in the cohort C mentioned ≥ 3 meals/day (88.3% in cohort C; 66% in cohort A) and ≥ 5 cups of liquid/day (61.2% in cohort C; 52% in cohort A), but a smaller proportion of the elderly reported intake of dairy products (69.2% in cohort C; 79.3% in cohort A), fruits and vegetables (67.4% in cohort C; 80.9% in cohort A), and meat (85.2% in cohort C; 92.1% in cohort A), with statistically significant difference ($p < 0.05$) (Table 1).

In the female population, statistically significant differences ($p < 0.05$) between the studied cohorts were found only in the number of meals and meat intake. In cohort C, the proportion of elderly women who mentioned ≥ 3 meals/day was higher than in cohort A (91.5 and 66.1%, respectively), and the proportion of those who reported ≥ 1 serving of meat 3 times a week was lower compared with cohort A (88 and 94.3%, respectively) (Table 2).

Table 1. Distribution of the frequency of elderly according to studied cohorts, nutritional status, and diet variables. São Paulo, Health, Well-being, and Aging Study, 2000 and 2010.

Variables	Cohort A		Cohort C		p-value*
	n	%	n	%	
Nutritional status					
Normal weight	176	42.5	120	36.9	0.0040*
Underweight	63	15.5	35	9.4	
Overweight	187	42.0	174	53.7	
≥ 3 meals per day					
Yes	283	66.0	289	88.3	0.0000*
No	142	34.0	38	11.7	
≥ 1 serving of dairy products/day					
Yes	341	79.3	226	69.2	0.0031*
No	85	20.7	103	30.8	
≥ 1 serving of eggs and/or vegetables/week					
Yes	405	95.3	316	95.6	0.8412
No	21	4.7	13	4.4	
≥ 1 serving of meat 3 times/week					
Yes	392	92.1	278	85.2	0.0050*
No	34	7.9	49	14.8	
≥ 2 servings of fruits and vegetables/day					
Yes	348	80.9	222	67.4	0.0001*
No	78	19.1	107	32.6	
≥ 5 glasses of liquids/day					
Yes	223	52.0	197	61.2	0.0182*
No	203	48.0	131	38.8	

*Rao-Scott χ^2 ($p < 0.05$).

Men showed significant differences ($p < 0.05$) between the cohorts in the following diet variables: number of meals, dairy products intake, consumption of meat, fruits and vegetables, and liquids. Smaller proportions of elderly in the cohort C reported intake of dairy products (66.8% in cohort C; 83.3% in cohort A), meat (81.4% in cohort C; 90.3% in cohort A), and fruits and vegetables (59.6% in cohort C; 83.9% in cohort A), and a higher proportion of elderly reported intake of ≥ 5 glasses of liquids (71.1% in cohort C; 49.3% in cohort

Table 2. Distribution of the frequency of women, according to studied cohorts, nutritional status, and diet variables. São Paulo, Health, Well-being, and Aging Study, 2000 and 2010.

Variables	Cohort A		Cohort C		p-value*
	n	%	n	n	
Nutritional status					
Normal weight	87	50.6	61	30.3	0.0000*
Underweight	31	18.0	23	10.2	
Overweight	53	31.4	125	59.5	
≥ 3 meals per day					
Yes	114	66.1	188	91.5	0.0000*
No	57	33.9	20	8.5	
≥ 1 serving of dairy products/day					
Yes	128	74.2	150	71.0	0.5194
No	43	25.8	59	29.0	
≥ 1 serving of eggs and/or vegetables/week					
Yes	166	97.2	200	96.0	0.3268
No	5	2.7	9	4.0	
≥ 1 serving of meat 3 times/week					
Yes	162	94.3	181	88.0	0.0442*
No	9	5.7	27	12.0	
≥ 2 servings of fruits and vegetables/day					
Yes	132	77.1	154	73.2	0.4147
No	39	22.9	55	26.8	
≥ 5 glasses of liquids/day					
Yes	96	55.3	112	53.8	0.7749
No	75	44.7	96	46.2	

*Rao-Scott χ^2 ($p < 0.05$).

A) and ≥ 3 meals/day (84.0% in cohort C; 66.0% in cohort A), with statistically significant difference ($p < 0.05$) (Table 3).

Elderly people in the cohort C showed higher PR for overweight (PR = 1.19), ≥ 3 meals/day (PR = 1.34), and ≥ 5 glasses of liquids/day (PR = 1.18), but lower PR for dairy products (PR = 0.87), meat (PR = 0.93), and fruits and vegetables (PR = -0.83), with a statistically significant difference ($p < 0.05$) (Table 4).

Table 3. Distribution of the frequency of men, according to studied cohorts, nutritional status, and diet variables. São Paulo, Health, Well-being, and Aging Study, 2000 and 2010.

Variables	Cohort A		Cohort C		p-value*
	n	%	n	n	
Nutritional status					
Normal weight	89	36.2	59	45.6	0.1567
Underweight	32	13.6	12	8.3	
Overweight	134	50.3	49	46.1	
≥ 3 meals per day					
Yes	169	66.0	101	84.0	0.0013*
No	85	34.0	18	16.0	
≥ 1 serving of dairy products/day					
Yes	213	83.3	76	66.8	0.0007*
No	42	16.7	44	33.2	
≥ 1 serving of eggs and/or vegetables/week					
Yes	239	93.7	116	96.0	0.4298
No	16	6.3	4	4.0	
≥ 1 serving of meat 3 times/week					
Yes	230	90.3	97	81.4	0.0266*
No	25	9.7	22	18.6	
≥ 2 servings of fruits and vegetables/day					
Yes	216	83.9	68	59.6	0.0000*
No	39	16.1	52	40.4	
≥ 5 glasses of liquids/day					
Yes	127	49.3	85	71.1	0.0004*
No	128	50.7	35	28.9	

*Rao-Scott χ^2 ($p < 0.05$).

Table 4. Comparison between cohorts studied, according to nutritional status, diet variables, and gender. São Paulo, Health, Well-being, and Aging Study, 2000 and 2010.

Variables	Total		Women		Men	
	A × C		A × C		A × C	
	PR	CI	PR	CI	PR	CI
Underweight	0.76	0.52 – 1.12	0.96	0.58 – 1.58	0.57	0.31 – 1.05
Overweight	1.19	1.02 – 1.39*	1.73	1.36 – 2.21*	0.86	0.68 – 1.10
≥ 3 meals per day	1.34	1.23 – 1.45*	1.39	1.23 – 1.56*	1.27	1.12 – 1.45*
≥ 1 serving of dairy products/day	0.87	0.79 – 0.96*	0.96	0.84 – 1.09	0.80	0.69 – 0.93*
≥ 1 serving of eggs and/or vegetables/week	1.00	0.97 – 1.04	0.98	0.93 – 1.02	1.02	0.97 – 1.08
≥ 1 serving of meat 3 times/week	0.93	0.87 – 0.98*	0.93	0.87 – 0.99*	0.90	0.81 – 1.00
≥ 2 servings of fruits and vegetables/day	0.83	0.76 – 0.92*	0.95	0.84 – 1.07	0.71	0.60 – 0.84*
≥ 5 glasses of liquids/day	1.18	1.03 – 1.35*	0.97	0.80 – 1.18	1.44	1.20 – 1.73*

Poisson regression model with robust variance; cohort A as reference category (value = 1.00); PR: prevalence ratio; CI: confidence interval.

In the cohort C, women showed higher PR values for overweight (PR = 1.73) and ≥ 3 meals/day (PR = 1.39), but lower PR (PR = 0.93) for meat consumption, with statistically significant difference ($p < 0.05$). With regard to men, PR values for ≥ 3 meals/day (PR = 1.27) and ≥ 5 glasses of liquids/day (PR = 1.44) were higher in cohort C and PR for intake of dairy products (PR = 0.80) and fruits and vegetables (PR = 0.71) were lower, with statistically significant difference ($p < 0.05$) (Table 4).

DISCUSSION

The results showed that the nutritional status and diet differed among elderly of the same age, but who were born at different times. Cohort studies are important as they provide valuable data to investigate the impact of habits and exposures of the past in current life. The group aged 60 – 64 years was chosen to allow comparing different cohorts of elderly people, but at the same age, presumably with similar characteristics.

The most recent cohort of elderly people (cohort C, born between 1946 and 1950) showed worse nutritional status and dietary intake compared with the oldest cohort (cohort A, born between 1936 and 1940).

There was a higher proportion of elderly overweight (19%) in cohort C and this result is consistent with those of other studies in the national^{8,15} and international^{6,7} scientific literature, which showed elderly of “older generations” might present better health and nutrition conditions.

Lahti-Koski and colleagues⁷ found higher prevalence of obesity and higher average BMI values, especially among the elderly who were born in the most recent cohort, when they analyzed two cohorts from Finland in the year 1972 and 1997 (1913 – 1917 and 1968 – 1972).

A study on Swedish cohorts of elderly people aged 70 years or older (in a time frame of 30 years) found changes in the prevalence of obesity, with higher overweight rates in the most recent birth cohorts⁶.

Brazilian study of birth cohorts (1916 – 1926 and 1927 – 1937) of the Bambuí Project (MG) also showed similar results. Firmo and colleagues¹⁵ found lower overweight prevalence among elderly who were born in older cohorts. Sales et al.⁸ analyzing anthropometric differences of the elderly in different cohorts found higher overweight rates among individuals in the youngest cohort.

Overweight and obesity among the elderly result from changes in lifestyle, especially in eating habits and physical activity, according to the data showed in the POF held in 2008/2009⁵.

It is worth noting that studies have shown a higher prevalence of these nutritional disorders in the adult population, which directly influence the higher rates among the elderly. Keyes et al.¹⁶ and Reither et al.¹⁷ analyzed the secular trends of obesity in adults and found higher prevalence in more recent birth cohorts.

Analyzing the differences in nutritional status by gender, a higher PR for overweight was observed among women in the most recent cohort (cohort C), which is a worrisome finding as this nutritional disorder can cause physiological, psychological, and social changes, such as insulin resistance, depression, and social isolation. Nutritional disorders may also contribute to the development of NCDs thus increasing the risk of premature death¹⁸.

Studies of cohorts conducted in Finland and Sweden also found higher prevalence of overweight and obesity in women who were born in more recent cohorts^{6,7}. In contrast, a Brazilian research (1916 – 1926 and 1927 – 1937) showed that overweight was higher among men, although the years of birth differ from this study⁸.

With regard to eating habits, individuals in the younger cohort had higher prevalence of ≥ 3 meals/day (increase of 34%), being higher in women (39%) than in men (27%). Although the proportion of elderly who reported having more than three meals a day in the analyzed cohorts increased, this can still not be considered a progress as the data do not allow concluding that quality improved. With regard to the dairy products intake, the most recent cohort had a lower prevalence, particularly in elderly men. Dairy products have a great impact on the health of the elderly because it is a source of

calcium, whose intake recommendation is higher for elderly because of the decreased bone mineral density and consequent risk of developing osteopenia, osteoporosis, and fractures, especially in case of falls. Special attention should be given to this food group for this population¹⁹.

Fisberg and colleagues²⁰ analyzed the national survey data from POF in 2009 on the food habits of elderly people and found that, among the minerals, calcium showed the highest prevalence of inadequate intake in all regions of the country for both men (84 – 98%) and women (94 – 98%) of the elderly population.

Eiben et al.⁹ analyzed, from data collected in 1971, 1981, 1992, and 2000, the trends on eating habits in cohorts of Swedish elderly aged 70 years and older, born in 1901, 1911, 1922, and 1930. They found that older cohorts reported higher intake of yogurt, cereals, fruits, vegetables, chicken, rice, and pasta. In this study, cohort C presented a lower proportion of elderly who reported intake of fruits and vegetables (67.4% in cohort C and 80.9% in cohort A) and meat (85.2% in cohort C and 92.1% in cohort A).

With regard to gender, a lower proportion of women in the cohort C reported eating meat (88% in cohort C and 94.3% in cohort A), and the same occurred for men in the intake of fruits and vegetables (59.6% in cohort C and 83.9% in cohort A). This may be due to the replacement of these foods for other types of food and/or difficulties with chewing, with acquiring food, or because of financial issues²¹.

Fisberg and colleagues²⁰ also observed that the consumption of fruits and vegetables reported by the Brazilian elderly people was insufficient, as the average food intake (in grams) of such foods represented approximately one-third of the recommendations from the Food Guide for the Brazilian population (≥ 400 g/day). These results require attention and more direct actions to encourage the intake of these foods, facilitating access to this population to reverse the current situation.

Despite the limitations of dietary survey of this study, comparisons of nutritional status and food intake of different birth cohorts over time are necessary and important in understanding changes throughout life and aging process.

CONCLUSION

According to these results, changes in the nutritional status and eating habits of the elderly population are evident, particularly in SP. The most recent birth cohort showed the highest prevalence of overweight and a lower intake of dairy products, meats, and fruits and vegetables. This situation harms the health status of this population and may lead to future development of chronic NCDs. This is a worrisome reality because the services and health professionals in the country are not yet prepared for the comprehensive care of this population, which requires urgent interventions and actions regarding food and nutrition.

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