ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Early life conditions and current health status as per the study "Health, Well-being and Aging" (SABE)

Condições pregressas e saúde no estudo "Saúde, Bem-Estar e Envelhecimento" (SABE)

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ABSTRACT: *Introduction:* Childhood conditions can influence some aspects of development of an individual and thus affect health in adult life. *Objective:* To evaluate associations between early life conditions and health, as reported by the survey SABE in 2000, 2006, and 2010. *Methods:* Early or previous conditions refer to the situations before 15 years of age of the interviewees, such as economic condition, famine, health assessment, medical conditions, and having lived in the countryside for over 5 years. The control variables were gender, education, and income. The outcome was self-reported health as "good" or "bad." This study focused on ages between 60 and 65 years. *Results:* Bivariate analysis showed significant associations of the individual's origin in all the three cohorts. Economic and famine conditions were also significant for cohort B (2006). Multivariate Poisson regression was used with prevalence ratio as an element of comparison. Rural origin was the only significant early condition in the initial model. The control variables — gender, cohort, and education — were also significant. In the final model, the significant variables in the initial model were included, plus relation between rural origin and the number of diseases. Cohorts, gender, education, and the number of diseases were still significant factors when individuals had rural origin, but were not associated with the outcome if their origin was urban. *Conclusion:* There were connections between early conditions of life and the health of the elderly, and this might be an important tool for health care for both the individual and the community.

Keywords: Aged. Diagnostic Self Evaluation. Child Health. Health of the Elderly. Rural Population. Cohort Studies.

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RESUMO: *Introdução:* Condições da infância podem influenciar peculiaridades individuais do desenvolvimento e assim afetar a saúde dos adultos. *Objetivo:* Avaliar associações entre condições pregressas e saúde, como informadas nas pesquisas SABE de 2000, de 2006 e de 2010. *Métodos:* Condições pregressas referem-se a situações anteriores aos 15 anos: a condição econômica, a fome, a avaliação da saúde, a presença de doenças e ter vivido em ambiente rural por mais de cinco anos. As variáveis de controle foram o sexo, a escolaridade e a renda. O desfecho é a autoavaliação da saúde nas categorias "Boa" e "Má". A análise abrangeu pessoas entre 60 e 65 anos. *Resultados:* A análise bivariada mostrou associações segundo a origem nas três coortes. Foram ainda significantes a condição econômica e ter passado fome, para os entrevistados em 2006. Na análise multivariada pela regressão de Poisson, o elemento de comparação foi a razão de prevalência. Origem rural foi a única entre as condições pregressas a apresentar significância no modelo inicial. As variáveis de controle — sexo, coorte, escolaridade — também apresentaram significância. No modelo final, foram consideradas as variáveis significantes no inicial e uma interação entre origem rural e número de doenças. Permaneceram significantes a coorte, o sexo, a escolaridade e o número de doenças quando o indivíduo teve origem rural. Este número não foi associado ao desfecho se a origem fosse urbana. *Conclusão:* Há conexões entre as condições pregressas e a saúde do idoso, o que constitui em importante instrumento para a atenção à saúde, tanto para o indivíduo como para a comunidade.

Palavras-chave: Idosos. Autoavaliação diagnóstica. Saúde infantil. Saúde do Idoso. População rural. Estudos de coortes.

INTRODUCTION

PREVIOUS HEALTH CONDITIONS

Finding a diagnosis as early as possible, preventing diseases, and avoiding adverse health conditions in the elderly have stimulated studies and research on the history of the diseases and its associations with consequent disabilities. The possible relationship between the context of the beginning of people's life and their health conditions during aging has been studied in an attempt to at least identify hypotheses to be tested.

Authors have confirmed a connection between childhood life conditions and functional performance in adult life, overall health, and mortality at older ages[1].

Barker and Bagby[2] indicated that a context of poverty in childhood, added to the individual factors of development, can increase vulnerability to certain chronic diseases in the old age. Blackwell Hayward and Crimmins[3] corroborated this theory by associating the conditions in early life stages with diseases in the elderly. They suggested that individuals who were exposed to unfavorable social and economic conditions as well as family conflicts and other situations in childhood were at a greater risk of becoming ill from chronic diseases. Some diseases that can cause disability to the elderly, such as cancer, lung disease, cardiovascular disease, arthritis, and rheumatism, could result from problems in the childhood. In addition, some authors wonder whether not considering health in the childhood when

analyzing chronic diseases could lead to an overestimation of the effects of socioeconomic status in the analysis of health in adult life[3].

One must consider that studies addressing the early times of life present some challenges because they are retrospective, the information obtained is influenced by the memory of the informant, life conditions are reported only by those who are still alive, and some important events may not be mentioned.

SELF-REPORTED HEALTH

Self-reported health status can replace more expensive tests for predictor factors of future disability, risk of hospitalization, and mortality, especially among the older people[4,5].

Even with subjective connotations, information about the actual health status has shown results similar to objective assessments and, therefore, is widely used in health research[6,7].

Self-reported health status is an important marker of overall life conditions, especially among the elderly. Thus, Lima-Costa, Firmo, and Uchoa[8] found associations between reports by interviewees with social support, effective health, and access to services. With regard to mortality, Maia, Duarte, and Lebrão[6] found that health self-rated as "bad" increases the risk of death by 2.69 compared with "good," "very good," or "excellent."

SELF-REPORTED HEALTH AND PREVIOUS HEALTH CONDITIONS IN THE STUDY HEALTH, WELL-BEING AND AGING (SABE)

In the SABE study, current health status questions were formulated in the classic format of five categories on a scale from "bad" to "excellent." Likewise, questions regarding the first 15 years of life of participants were applied to three samples of SABE. We can therefore evaluate the possible effects of previous health conditions on their self-reported health on each sample interview. For example, with information of the sample from the year 2000, Santos, Oliveira, and Lebrão[8] concluded that having tuberculosis during the first 15 years of life was associated with the elderly health self-rated as "bad," even according to age and gender[9].

Moreover, individuals aged 60 to 64 years in each survey can provide a clear picture of the different contexts in which they lived until 15 years of age, which is a rich opportunity to evaluate period effects. This study aimed at evaluating the possible effects of previous health conditions on self-reported current health status of a group of elderly people interviewed in the three waves of the SABE study, which has been held in São Paulo and had phases completed in 2000, 2006, and 2010.

METHODS

SABE AND COHORTS

SABE began as a multicenter study in seven cities of Latin America and the Caribbean. In Brazil, it had its first round held in São Paulo in 2000, when 2,143 people aged 60 years and above were interviewed, representing the elderly population of the municipality. A second wave of the interview was held in 2006 and a third wave in 2010. At each stage, "survivors" of the previous sample would be interviewed, and a new cohort aged 60 to 64 years would then be gathered, resulting in the object of analysis of this study. Three cohorts will be then studied (A, B, and C), and all members were found to be born approximately in the following five-year periods: 1935–1940, 1940–1945, and 1945–1950.

Each individual from each sample received the relative weighting of the sample design effects and poststratification, therefore being representative of the population of the municipality in the range of ages in the respective year. Samples totaled 426, 298, and 355 people in 2000, 2006, and 2010, respectively.

PREVIOUS CONDITIONS STUDIED

For the analysis of the context of early stages of life of the elderly, SABE assessed the conditions in their first 15 years of life by means of the matters mentioned below. After each question, the variable used in data processing was written down:

- Economy – "How do you describe the economic situation of your family during most of the first 15 years of your life?";
- Health before 15 – "Would you describe your health as excellent, good, or bad in most of the first 15 years of your life?";
- Type of disease – "Before turning 15 years old, do you remember having had any of these diseases?: Nephritis, hepatitis, measles, tuberculosis, rheumatic fever, asthma, chronic bronchitis";
- Confined to bed – "Did you ever stay confined to bed for a month or more because of a health problem in the first 15 years of your life?";
- Famine – "Would you say that there was a time in the first 15 years of your life when you would not eat well enough or went through famine conditions?";
- Rural – "From your birth until 15 years old, did you live in the countryside for 5 years or more?".

DEPENDENT VARIABLE

Dependent variable self-reported health corresponds to the information obtained by question C01 of survey SABE, that is, how the respondent assesses his/her current health status.

Possible answers were "Excellent," "Very good," "Good," "Fair," and "Bad," and these were dichotomized; the first three were grouped as "Good" and the last two as "Bad." Answers "Don't know/no answer" were excluded.

Possible effects of the early stages of life in the adult and elderly health status certainly influence an individual's trajectory, including school history, income at the time of interview, and gender. The very date of the interview may bring about effects of moments lived (present and past), and that is the importance of considering the cohort as a possible variable and trying to catch the so-called period effects.

INDEPENDENT VARIABLES AND COVARIABLES

Sociodemographic variables and the date of the interview (cohort) were taken as covariates; independent variables were gender, education measured in years of study, and income measured as the position/function of the respondent in distribution tertiles.

Independent variables related to previous conditions arose from the answers to the questions from SABE:

- Economy – economic situation until turning 15 years old;
- Health 15 – health assessment until turning 15 years old;
- Famine – famine conditions until turning 15 years old;
- Nephritis, hepatitis, measles, tuberculosis, fever, asthma, and bronchitis—history of any of these diseases until turning 15 years old;
- Confined to bed – confined to bed for at least a month.

In addition to direct responses, the variable "diseases" (number of diseases mentioned) was added.

ANALYSES

Analyses included a bivariate stage with the description of the samples by means of relative distributions of each variable observed in all surveys and the relative distribution of dependent variable according to covariates and variables inherent to previous conditions. Distributions were obtained by the expansion of the sample by relative weighting to the sample design and post-stratification. Thus, results of each cohort represented estimates of the true population values. Rao-Scott[10] tests were applied to demonstrate possible associations, and results were considered significant when the p-value was lower than the significance level set at 0.05.

Multivariate analysis was made with Poisson regression, which allowed direct estimation of prevalence ratios (PR)[11], with the self-reported health as outcome. For these regressions, the variables indicating the presence or absence of disease before the age of 15 years

were not considered; instead, the variable "number of diseases" was used. This was mandatory to avoid large error ranges in the estimates, as the number of events was often low. Tuberculosis, for example, was referred by six patients, four in cohort A and one in each of the other two cohorts. It happened because previous history events can really be scarce, and only one age group was considered in our study.

Two models were adjusted: an initial, with all variables (specific diseases replaced by the number of diseases) and a final one, which considered variables that were significant in the first regression. Possible interactions of the independent variables with the variable "rural" were studied, and the significant ones were also included in the final model.

Adjustments were also made by design and stratification weighting with robust estimation of standard errors[12].

RESULTS

Table 1 shows the distributions of each variable in the three waves of research. Important to note was the stability of the composition by gender between sociodemographic variables resulting from poststratification and the significant improvement observed from the first to the last cohort in the levels of schooling.

With regard to the context before 15 years of age, worse and significant differences were seen in the generation born during the World War II as to the economic conditions at 15 years of age and the number of diseases. The percentages that reflect the rapid urbanization at that period were also relevant, as they showed samples having smaller proportion of people from the countryside in every phase of the study. The proportion of people who reported having measles before the age of 15 years was also decreasing and significant and followed the temporal trend in the country.

The dependent variable also had bad assessment for the current health status among the generation born during the war, which suggested an association with the previous conditions reported.

Table 2 shows relations of dependent and sociodemographic variables. Association with schooling was significantly different in the three surveys, reproducing the well-known result of better health situation in higher levels of education. Difference between the genders was only significant in the last cohort, but males usually did a better self-evaluation than the females.

Better self-assessments of health were also systematic when it comes to the highest tertiles of income, but association was only significant in cohort A.

Relations between the health status and the previous conditions are shown in Table 3. Rural origin was the only variable with significant association in all the three cohorts. The effect of this variable can be more easily observed as the distribution of categories was more balanced. Furthermore, living at the countryside may lead to a higher probability of adverse conditions mentioned herein.

Table 1. Relative distribution of variables as per cohorts studied.

Variables	Cohorts				Rao-Scott (p)
	A (35–40) n = 426	B (40–45) n = 298	C (45–50) n = 355	Total n = 1,079	
Gender					
Female	55.9	56.3	56.7	56.4	0.980
Male	44.1	43.7	43.3	43.6	
Education (in school years)					
None	14.1	15.6	4.4	10.5	< 0.001
1–3	25.9	24.2	14.4	20.5	
4–11	53.9	52.1	68.0	59.3	
≥ 12	6.1	8.1	13.2	9.7	
Income (distribution tertile)					
First	33.7	33.9	33.9	33.8	0.991
Second	33.0	32.7	34.1	33.4	
Third	33.3	33.4	32.0	32.8	
Origin					
Urban	36.8	39.5	51.0	43.6	0.013
Rural	63.2	60.5	49.0	56.4	
Health before 15					
Good	93.2	92.1	93.6	93.0	0.776
Bad	6.8	7.9	6.4	7.0	
Economic status					
Good	68.0	72.7	64.5	68.0	0.035
Bad	32.0	27.3	35.5	32.0	
Famine					
No	75.5	78.8	73.8	75.8	0.316
Yes	24.5	21.2	26.2	24.2	
Confined to bed					
No	92.0	90.4	90.7	91.0	0.782
Yes	8.0	9.6	9.3	9.0	

Table 1. Continuation.

Variables	Cohorts				Rao-Scott (p)
	A (35–40) n = 426	B (40–45) n = 298	C (45–50) n = 355	Total n = 1,079	
Select diseases					
None	20.5	18.9	29.3	23.7	0.034
One	69.3	69.7	61.3	66.1	
Two or more	10.1	11.4	9.3	10.2	
Nephritis	1.6	1.4	1.6	1.5	0.956
Hepatitis	2.1	1.9	3.5	2.6	0.410
Measles	90.4	83.6	75.0	81.7	0.001
Tuberculosis	1.1	0.3	0.3	0.5	0.295
Rheumatic fever	2.1	1.5	0.5	1.2	0.100
Asthma	3.6	2.1	2.3	2.6	0.401
Chronic bronchitis	5.6	8.2	6.1	6.7	0.345
Outcome (self-reported health)					
Excellent/Very good/Good	51.1	42.6	57.6	51.1	0.002
Regular/Bad	48.9	57.4	42.4	48.9	

Economic and famine conditions before the age of 15 years had significance for the cohort born during World War II. It is interesting to note that precisely in this cohort the proportion of people in good economic conditions and not exposed to famine conditions before 15 years of age was higher, as seen in Table 1. Moreover, there were lower proportions of good health evaluation for the other category of each variable. In other words, the generation born during war assessed their health as "bad," and the difference between those who had or not had adverse conditions was also greater.

Interrelations between variables were grouped in the multivariate analysis. Table 4 contains the results of the initial model, with adjusted PR, standard errors with robust estimation, p-values, and respective 95% confidence intervals.

Considering only significant PR, one can conclude that: (a) there was a period effect in cohort C, the latest showing better health assessment compared with cohort A; (b) males evaluated their health better than females; (c) highly educated individuals (12 years of school or more) also rated their health as "good" in greater proportion; and (d) health was more assessed as "good" among those who did not spend at least 5 years of their lives in the countryside before 15 years of age.

Table 2. Percentages of elderly people who rated their health status as "good" in each cohort, according to sociodemographic variables.

Variables	Cohorts					
	A (1935–1940) n = 426		B (1940–1945) n = 298		C (1945–1950) n = 355	
	%	p	%	p	%	p
Gender						
Female	49.1	0.363	38.8	0.070	49.8	0.005
Male	53.6		47.5		67.7	
Education (in school years)						
None	28.3	*0.001*	24.4	*0.003*	51.8	0.002
1–3	38.7		34.6		45.1	
4–11	60.6		47.0		55.6	
≥ 12	72.8		67.0		82.3	
Income (tertile)						
First	42.4	*0.006*	35.8	0.166	49.9	0.061
Second	43.0		44.5		65.8	
Third	61.8		52.1		66.9	
Total	51.1		42.6		57.6	

Living in "rural" area is the only variable that presented significant prevalence ratio among all the other previous conditions reported. Again, it must be considered that this variable is the one with less scarce cases and that it may reproduce the effects of other conditions in the outcome. Thus, it was convenient to study its possible interactions with the other variables, and evaluate their significance. The only variables presenting significant interaction were "rural" and "number of diseases" (p = 0.009). For the adjustment of the final model, significant variables of the initial model were considered, and the variable "rural" was partitioned according to the number of diseases (Table 5).

In the final model, cohort C (the latest) no longer presented significant prevalence ratio, and cohort B showed significant prevalence ratio with the prevalence of health assessed as "good" being lower than that in the reference cohort A. Being a female has been related to lower prevalence of "good" health assessment compared with being a male, and education also stands out. There is a gradient in PR and people with more years of schooling had better self-rated health, with significant prevalence ratio in groups with 4 – 11 and 12+ education years.

Table 3. Percentages of elderly people who rated their health status as "good" in each cohort, according to previous health conditions.

Variables	Cohorts					
	A (1935–1940) n = 426		B (1940–1945) n = 298		C (1945–1950) n = 355	
	%	p	%	p	%	p
Origin						
Urban	66.9	0.002	65.5	< 0.001	63.7	0.030
Rural	41.9		27.6		51.2	
Health before 15						
Good	51.5	0.382	44.7	0.049	58.8	0.155
Bad	43.5		20.7		40.8	
Economic status						
Good	52.8	0.263	49.3	0.020	61.2	0.104
Bad	46.7		25.2		50.9	
Famine						
No	52.8	0.379	47.4	0.003	60.3	0.061
Yes	46.3		25.6		49.5	
Confined to bed						
No	52.3	0.322	44.2	0.151	57.7	0.891
Yes	43.3		29.6		56.4	
Select diseases						
None	58.5	0.185	50.9	0.300	56.9	0.922
One	49.2		41.7		58.3	
Two or more	48.9		34.2		55.1	
Nephritis						
No	51.2	0.786	43.1	0.350	57.3	0.228
Yes	55.9		19.5		30.9	
Hepatitis						
No	51.6	0.145	42.8	0.894	56.7	0.322
Yes	26.1		40.5		74.9	

Tabela 3. Continuation.

Variables	Cohorts					
	A (1935–1940) n = 426		B (1940–1945) n = 298		C (1945–1950) n = 355	
	%	p	%	p	%	p
Measles						
No	56.3	0.314	43.8	0.784	53.0	0.333
Yes	49.7		41.6		58.3	
Tuberculosis						
No	51.7	0.088	43.0	0.356	57.3	0.229
Yes	0.0		0.0		0.0	
Rheumatic fever						
No	51.1	0.816	43.7	0.062	57.6	0.109
Yes	54.1		0.0		0.0	
Asthma						
No	51.5	0.556	43.1	0.948	57.3	0.904
Yes	41.6		44.6		59.6	
Bronchitis						
No	51.2	0.686	43.5	0.372	57.5	0.825
Yes	48.1		33.9		54.3	

The interaction between the number of diseases reported before 15 years of age and people's origin was quite interesting. For those from urban areas, there was no significant difference in the number of selected diseases when compared with current health. But for those who came from the countryside, all categories differed significantly from the reference. And also, the PR increased along with the number of diseases, that is, the more diseases reported, the worse the evaluation of their current health.

DISCUSSION

This study has peculiarities that should be highlighted because of their unusual and relevant character to the evidence found. Three groups of individuals in the same age have been compared, all of them being born in the five-year periods that stand out in the history of the country: right before, during, and after the World War II.

Table 4. Poisson regression results for the variable self-reported health: initial model.

Dependent variable: Self-reported health.	Prevalence ratio	Standard error	T	P > |t|	95% Confidence interval
Cohort					
1935 – 1940	1.00				
1940 – 1945	1.12	0.07	1.88	0.064	0.99 – 1.27
1945 – 1950	0.83	0.06	-2.46	0.016	0.72 – 0.97
Gender					
Female	1.00				
Male	0.82	0.08	-2.07	0.042	0.68 – 0.99
Income tertile					
First	1.00				
Second	0.90	0.08	-1.16	0.249	0.74 – 1.08
Third	0.89	0.11	-0.97	0.334	0.70 – 1.13
Education (in school years)					
None	1.00				
1 – 3	0.96	0.10	-0.38	0.703	0.78 – 1.18
4 – 11	0.92	0.10	-0.77	0.443	0.74 – 1.14
≥ 12	0.58	0.15	-2.15	0.035	0.34 – 0.96
Health status at 15					
Good	1.00				
Bad	1.19	0.12	1.71	0.092	0.97 – 1.44
Select disease					
None	1.00				
One	1.00	0.10	-0.02	0.982	0.82 – 1.22
Two or more	1.18	0.14	1.42	0.160	0.94 – 1.48
Famine until 15 years					
No	1.00				
Yes	1.09	0.09	1.04	0.304	0.92 – 1.30
Economic status until 15 years					
Good	1.00				
Bad	1.14	0.11	1.26	0.213	0.93 – 1.39
Origin					
Urban	1.00				
Rural	1.43	0.14	3.69	0.000	1.18 – 1.74
Constant	0.56	0.10	-3.18	0.002	0.39 – 0.81

Table 5. Poisson regression results for the variable self-reported health: final model.

Dependent variable: Self-reported health.	Prevalence ratio	Standard error	T	P > |t|	95% Confidence interval
Cohort					
1935 – 1940	1.00				
1940 – 1945	1.18	0.07	3.02	0.003	1.06 – 1.33
1945 – 1950	0.98	0.06	-0.31	0.759	0.88 – 1.10
Gender					
Female	1.00				
Male	0.81	0.06	-2.89	0.005	0.70 – 0.94
Education (in school years)					
None	1.00				
1 – 3	0.92	0.09	-0.92	0.363	0.76 – 1.11
4 – 11	0.78	0.08	-2.51	0.014	0.64 – 0.95
≥ 12	0.47	0.11	-3.33	0.001	0.29 – 0.74
Origin and number of diseases					
Urban					
None	1.00				
One	1.11	0.19	0.58	0.563	0.78 – 1.56
Two or more	1.18	0.28	0.69	0.493	0.73 – 1.90
Rural					
None	1.51	0.28	2.21	0.030	1.04 – 2.19
One	1.57	0.26	2.78	0.007	1.14 – 2.18
Two or more	1.79	0.33	3.16	0.002	1.24 – 2.59
Constant	0.57	0.11	-2.98	0.004	0.93 – 0.83

This was when labor relations changed, trade unions became relevant and politically active[13], health care services was expanded[14], and public policies for education were established[15]. But the *locus* of these transformations had mainly been the city, and echoes in the countryside were not immediate.

Thus, the mechanisms that connect the previous health conditions to current health conditions of the elderly were expected to be more active and relevant in rural areas, as

urban areas were constantly subjected to transformation and modernization. There were five mechanisms that connect the early life context to the health of the elderly: nutritional status, specific diseases, recurrent infections, chronic stress and stressful situations, and poor socioeconomic conditions[16].

The mechanisms did not act homogeneously according to the region where the individual was raised and, therefore, the place where the person lived during the childhood had been identified as a predictor of diseases in adult life and old age [17].

According to Poel, O'Donnell, and Van Doorslaer[18], children in urban areas enjoyed better health conditions compared with children in rural areas of the developing countries. As a result and as predicted by the mechanisms mentioned, self-reported health of people who spent their childhood in rural areas would be worse than that of the people who had always lived in the urban areas, as assessed and pointed out in Table 3, with significant differences in all the three cohorts.

Important to note is that connections between the early life conditions and self-reported health of the elderly were established under the control of the main social variables such as gender, education, and income. Adjusted regression therefore presented associations regardless of the presence of diseases in rural children with poor evaluation of their current health. Some authors pointed out the origin of the elderly as a possible marker of health and mortality[19,20], as found in this article: the number of select diseases in the first 15 years of age was significant when assessing health as "bad" in advancing ages if the individual had lived in the countryside. Access to care, education, information, food, and other conditions of the urban area were good potential predictors of this condition.

On the protection of urban environment compared with the rural environment, the individual had a better health status and reported it as being better in old age; therefore, they seemed to have a lower risk for negative health outcomes and even mortality, as shown by Van den Brink et al.[21].

CONCLUSIONS

The analyses have shown the influence of previous health conditions as reported by the elderly respondents in the three SABE surveys. Individuals who spent more than five of their first 15 years of life in the rural areas rated their health as "bad" more often in all the three cohorts.

The occurrence of the selected diseases before 15 years of age in individuals who had lived for more than 5 years in the countryside during infancy has been identified as an associated factor. For the others, this association was not significant.

As self-assessment is an important marker of health, function, and survival of the elderly, identifying the most remote conditions becomes relevant for the care of this population, either individually or in group care programs.

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