

Methods and challenges for assessing health literacy in Brazilian cities: population survey



Métodos e desafios para a avaliação do letramento em saúde em municípios brasileiros: inquérito populacional

Métodos y desafíos para la evaluación de la alfabetización en salud en municipios brasileños: encuesta de población

Tatiane da Silva Dal Pizzol^{a,b}

Patricia Romualdo De Jesus^a

Tatiana da Silva Sempé^b

Regina Tomie Ivata Bernal^c

Liziane Maahs Flores^d

Edi Franciele Ries^d

Juliane Fernandes Monks Da Silva^e

Paulo Maximiliano Corrêa^e

Marcia Regina Martins Alvarenga^f

Rogério Dias Renovato^f

Ruberval Franco Maciel^g

Sotero Serrate Mengue^a

How to cite this article:

Dal Pizzol TS, De Jesus PR, Sempé TS, Bernal RTI, Flores LM, Ries EF, et al. Methods and challenges for assessing health literacy in Brazilian cities: population survey. Rev Gaúcha Enferm. 2025;45:e20250001. <https://doi.org/10.1590/1983-1447.2025.20250001.en>

ABSTRACT

Objective: To present the response rates and strategies to reduce the number of challenges from multi-center research on Health Literacy carried out in five Brazilian cities.

Method: Adults living in urban areas of cities in the states of Rio Grande do Sul (Porto Alegre, Santa Maria and Pelotas) and Mato Grosso do Sul (Campo Grande and Dourados) were interviewed between October 2023 and March 2024. Cluster sampling was carried out in three stages (census sector, block and household). Health literacy was assessed using the Brazilian version of the European Health Literacy Survey Questionnaire Short Form, and the *Teste de Letramento em Saúde*. The response rate for each city was obtained by dividing the number of interviews conducted by the number of households selected, and post-stratification weights were applied according to age, sex and education.

Results: From 150 census sectors initially drawn, 1,181 individuals from 136 census sectors were interviewed. The participating cities' household response rate varied from 33.04% to 58.09%. Different strategies were employed to reduce low response rates due to absent residents and number of refusals, identified as main challenges in data collection. Quality control was performed continuously, with direct supervision of interviewers, daily data analysis and telephone re-interviews.

Conclusion: Low response rates in face-to-face interviews, mainly due to absent residents and refusals, as well as in telephone re-interviews, suggest that strategies need to be expanded to address these challenges in household surveys.

Descriptors: Health literacy; Data collection; Cluster sampling; Epidemiologic methods; Brazil.

RESUMO

Objetivo: Apresentar as taxas de resposta e as estratégias para reduzir o número de recusas de pesquisa multicêntrica sobre Letramento em Saúde realizada em cinco municípios brasileiros.

Método: Foram entrevistados adultos residentes na área urbana de municípios do Rio Grande do Sul (Porto Alegre, Santa Maria e Pelotas) e do Mato Grosso do Sul (Campo Grande e Dourados), entre outubro de 2023 e março de 2024. Foi realizada amostragem por conglomerados em três estágios (setor censitário, quadra e domicílio). A avaliação do Letramento em Saúde foi feita por meio da versão brasileira do *European Health Literacy Survey Questionnaire Short Form*, e do *Teste de Letramento em Saúde*. A taxa de resposta de cada município foi obtida por meio da divisão do número de

^a Universidade Federal do Rio Grande do Sul (UFRGS). Faculdade de Medicina. Programa de Pós-Graduação em Epidemiologia. Porto Alegre, Rio Grande do Sul, Brasil.

^b Universidade Federal do Rio Grande do Sul (UFRGS). Faculdade de Farmácia. Programa de Pós-Graduação em Assistência Farmacêutica. Porto Alegre, Rio Grande do Sul, Brasil.

^c Universidade Federal de Minas Gerais (UFMG). Escola de Enfermagem. Programa de Pós-Graduação em Enfermagem. Belo Horizonte, Minas Gerais, Brasil.

^d Universidade Federal de Santa Maria (UFSM). Departamento de Saúde Coletiva, Programa de Pós-Graduação em Saúde Coletiva. Santa Maria, Rio Grande do Sul, Brasil.

^e Universidade Federal de Pelotas (UFPEL). Centro de Ciências Químicas, Farmacêuticas e de Alimentos, Curso de Farmácia, Pelotas, Rio Grande do Sul, Brasil.

^f Universidade Estadual de Mato Grosso do Sul (UEMS). Programa de Pós-Graduação Ensino em Saúde, Dourados, Mato Grosso do Sul, Brasil.

^g Universidade Estadual de Mato Grosso do Sul (UEMS). Programa de Pós-Graduação em Letras. Campo Grande, Mato Grosso do Sul, Brasil.

entrevistas realizadas pelo número de domicílios sorteados, e foram aplicados pesos de pós-estratificação de acordo com idade, sexo e escolaridade.

Resultados: A partir de 150 setores censitários, inicialmente sorteados, foram entrevistados 1.181 indivíduos, provenientes de 136 setores censitários. A taxa de resposta de domicílios variou de 33,04% a 58,09% entre os municípios participantes. Diferentes estratégias foram empregadas para reduzir as baixas taxas de resposta devido a moradores ausentes e recusas, situações identificadas como os principais desafios na coleta de dados. O controle de qualidade foi realizado continuamente, com supervisão direta dos entrevistadores, análise diária dos dados e reentrevistas por telefone.

Conclusão: As baixas taxas de resposta nas entrevistas presenciais, devido sobretudo a moradores ausentes e recusas, bem como nas reentrevistas telefônicas, sugerem que é necessário expandir as estratégias para enfrentar esses desafios em inquéritos domiciliares.

Descritores: Letramento em saúde; Coleta de dados; Amostragem por conglomerados; Métodos epidemiológicos; Brasil.

RESUMEN

Objetivo: Presentar las tasas de respuesta y estrategias para reducir el número de rechazos en una encuesta multicéntrica sobre Alfabetización en Salud realizada en cinco municipios brasileños.

Método: Se entrevistó a adultos residentes en el área urbana de municipios de Rio Grande do Sul y Mato Grosso do Sul) entre octubre de 2023 y marzo de 2024. El muestreo por conglomerados se realizó en tres etapas (sector censal, manzana y hogar). La evaluación de la alfabetización en salud se llevó a cabo utilizando la versión brasileña del *European Health Literacy Survey Questionnaire Short Form* y el *Teste do Letramento em Saúde*. La tasa de respuesta de cada municipio se obtuvo dividiendo el número de entrevistas realizadas entre el número de hogares seleccionados y se aplicaron pesos de post-estratificación según edad, sexo y educación.

Resultados: De 150 sectores censales inicialmente seleccionados, se entrevistaron 1.181 personas, procedentes de 136 sectores censales. La tasa de respuesta de los hogares osciló entre el 33,04% y el 58,09% entre los municipios participantes. Se emplearon diferentes estrategias para reducir las bajas tasas de respuesta debido a la ausencia de residentes y el número de negativas, identificados como los principales desafíos en la recopilación de datos. El control de calidad se realizó de forma continua, con supervisión directa de los entrevistadores, análisis diario de datos y reentrevistas telefónicas.

Conclusión: Las bajas tasas de respuesta en las entrevistas cara a cara, debido principalmente a residentes ausentes y negativas, así como en las nuevas entrevistas telefónicas, sugieren que es necesario ampliar las estrategias para abordar estos desafíos en las encuestas de hogares.

Descriptores: Alfabetización en salud; Recolección de datos; Muestreo por conglomerados; Métodos epidemiológicos; Brasil.

■ INTRODUCTION

Health Literacy (HL) is related to people's knowledge, motivation, and skills to access, understand, evaluate, and apply health information⁽¹⁾. In wars, pandemics, and natural disasters, these skills are even more essential due to the scarcity of available resources⁽²⁾. Adverse conditions and the disruption of basic services hinder health care, resulting in greater risks for the population⁽³⁾.

Among the health information sources used by the population, the internet stands out, as its access is facilitated by its convenience^(4,5). However, understanding information online requires access to reliable sources, highlighting the importance of HL to avoid misinformation^(6–8).

The field of HL study has grown significantly since the 2000s, with many publications from the USA and Australia^(2,9). In Latin America and the Caribbean, especially in Brazil, there is also expansion, but most studies occur in health services, with few population-based studies⁽¹⁰⁾.

There are still many gaps regarding the level of HL in Brazil. Most studies were conducted in health services or in population subgroups with specific age ranges, or in individuals with chronic diseases⁽¹⁰⁾. Differently from countries where the topic has been explored for a longer period^(11–13), we did not locate any multicenter population-based studies in Brazil assessing the prevalence of HL among the general population. Household studies with representative samples of the population are essential to understanding HL and its associated characteristics. Similarly, it is important to review studies that describe the methodological aspects and challenges encountered in conducting a multicenter population-based study in the current context. These studies may be useful for future research in the field of HL, focusing on the general population, especially in developing countries like Brazil.

The objective of this study was to present response rates and strategies to reduce the number of refusals in a multicenter survey on HL conducted in five Brazilian cities.

METHOD

Research team

The project team consisted of researchers from public universities in the Southern region: Federal University of Rio Grande do Sul (UFRGS), Federal University of Santa Maria (UFSM), and Federal University of Pelotas (UFPEL); and from the Central-West region: State University of Mato Grosso do Sul (UEMS). In each city, local coordinators were responsible for selecting and training interviewers and monitoring data collection. Overall coordination was provided by researchers from UFRGS, with regular meetings with local teams to align procedures, resolve questions, and evaluate data collection.

Study Design and Population

A cross-sectional, population-based study comprised five cities selected for convenience, including two state capitals (Porto Alegre, RS, and Campo Grande, MS) and three inland cities (Santa Maria, RS; Pelotas, RS; and Dourados, MS). The study population consisted of Brazilians who were 18 years old or older, literate, and living in permanent private households in the urban areas in the aforementioned cities. The five cities were grouped for sample planning purposes, allowing for combined estimates for cities, age groups, and education levels. Thus, the five cities were considered a single study domain, and the data will allow for estimates for all cities, age groups, and education levels.

A private household was one used exclusively for housing and, on the reference date, was intended to house one or more people. Residents were defined as those who habitually resided in the household selected for the survey.

Sample size

A total of 1,600 interviews were defined for the five cities, with 380 interviews in the capitals and 280 in the other cities. The sample size to estimate the proportion of low HL was calculated from the algebraic expression:

$$n = \frac{p \cdot (1 - p)}{(d/z)^2} \cdot deff \rightarrow d = \sqrt{\frac{p \cdot (1 - p) \cdot z^2 \cdot deff}{n}}$$

where $p = 50\%$ is the expected proportion of low HL, $d = 3\%$ is the sampling error to be tolerated, $z = 1.96$ is the value of the normal curve corresponding to a 95% confidence interval, and $deff = 1.5$ is the predicted design effect. Table 1 presents the sample sizes and their respective coefficients of variation according to different P values and sampling error. The coefficients of variation of the estimates of proportions to be obtained with the different sample sizes defined will be less than 20% for almost all estimates. The exceptions refer, for the most part, to estimates of proportions less than 0.10. The values of the coefficients of variation were obtained considering the smallest estimates of proportions (provided they are greater than 0.10) and using the expressions:

$$n = \frac{(1 - p)/p}{cv(p)^2} \cdot deff \rightarrow cv(p) = \sqrt{\frac{(1 - p) \cdot deff^2}{p \cdot n}}$$

where p indicate the proportions indicated in Table 1 and $deff = 1.5$.

Sampling and Enrollment

The census sectors of urban areas in the 2021 Census comprise the records used for the sample draw. The draw was made by cluster in three selection stages, the first two with probability proportional to the cluster size and the third obtained by simple random sampling. In each city, 30 sectors (and 5 reserve sectors) were drawn, two blocks in each drawn sector, and between 9 and 13 households per drawn block (Table 2). The primary sampling unit was the census sector, the secondary unit was the block, and the tertiary unit was the household.

The primary and secondary units were randomly selected using probability proportional to size, using the number of permanent private households from the 2021 Census.

Table 1. Sample size and coefficient of variation (CV), according to proportion (P) values and sampling error, considering deff=1.5. Brazil, 2024.

P	Sampling error															
	0,03		0,04		0,05		0,06		0,07		0,08		0,09		0,1	
	n	CV ^a (%)	n	CV (%)	n	CV (%)	n	CV (%)	n	CV (%)	n	CV (%)	n	CV (%)	n	CV (%)
0,5	1.601	3.7	900	5.0	576	6.3	401	7.5	294	8.7	225	10.0	179	11.2	144	12.5
0,4	1.536	4.7	864	6.3	554	7.8	384	9.4	282	10.9	216	12.5	171	14.0	138	15.6
0,3	1.344	6.3	756	8.3	485	10.4	336	12.5	248	14.6	189	16.7	150	18.7	122	20.8
0,2	1.025	9.4	576	12.5	369	15.6	257	18.7	188	21.9	144	25.0	114	28.1	92	31.4
0,1	576	18.8	324	25.0	207	31.3	144	37.5	107	43.6	81	50.0	65	56.0	53	62.1
0,5	1.601	3.7	900	5.0	576	6.3	401	7.5	294	8.7	225	10.0	179	11.2	144	12.5

^aCV – coefficient of variation

Table 2. Size of the sample drawn, by city. Brazil, 2024.

Unit of the Federation	City	Sample draw			
		Sector	Block by sector	Households ^a	Interview
		a	b	c	n=(a*b*c)*TR
Mato Grosso do Sul	Campo Grande	30	2	12.7	380
	Dourados	30	2	9.3	280
Rio Grande do Sul	Pelotas	30	2	9.3	280
	Porto Alegre	30	2	12.7	380
	Santa Maria	30	2	9.3	280
Total	150	–	–	1600	

^aHouseholds corrected for response rate (RR) de 50%.

The sampling fractions corresponding to this plan were as follows, in each city:

$$f = \frac{a \cdot M_i}{M} \cdot \frac{b}{M_i} \cdot \frac{c}{b} = \frac{a \cdot b \cdot c}{M}$$

in which a was the number of census sectors drawn, b was the number of blocks drawn in each drawn sector, c was the number of households drawn, M_i was the number of households in the i -ish sector, and M was the total number of households in the city, according to the 2021 Census.

Sectors with fewer than 20 households were excluded, and those with more than 400 were split. In total, 0.94% ($\frac{32}{3390}$) of the population was excluded of the RS sectors and 1.52% ($\frac{27}{1775}$) from MS. Sectors with more than 400 households accounted for 4.82% ($\frac{162}{3358}$) and 1.09% ($\frac{19}{1748}$) in RS and MS, respectively.

During the inventory process, the randomly selected blocks in each census sector were surveyed to identify permanent private households. Based on the complete list of addresses of eligible units in the block, a simple random sampling of 13 households in the capital cities and 9 in other cities was conducted.

At each household, a single resident was interviewed. The profile of the individuals available at the time of the interview was verified, in terms of gender, age, and education. If more than one resident was available for interview, younger men with higher education levels were prioritized, due to the greater difficulty in finding them in the households.

Research instrument

A structured questionnaire was developed and administered using smartphones using the REDCap® app. The digital version, cards, and text of the *Teste de Letramento em Saúde* (TLS)¹ were also available in printed format during the interviews. The questionnaire consisted of four sections, described below.

Sociodemographic data

The following variables were included: gender (female, male); age (in full years); self-declared race, according to the IBGE classification (white, black, yellow, mixed race, indigenous); education (grade and level of

studies completed), according to the National Survey on Access, Use and Promotion of Rational Use of Medicines in Brazil (PNAUM)⁽¹⁴⁾; economic class (A, B, C, D, E), according to the Brazilian Economic Classification Criteria of the Brazilian Association of Research Companies⁽¹⁵⁾; marital status (lives or does not live with a partner); number of residents in the household; reference person in the household for health-related issues.

Health-related information

The general health condition of individuals was measured by self-reporting the presence or absence of chronic diseases (high blood pressure, diabetes, other), having a health plan (yes, no), continuous use of medications (yes, no), and self-perceived health (very good, good, fair, bad, very bad).

Health literacy

The HL was measured using two instruments that measure distinct domains of the construct: the *Teste de Letramento em Saúde* (TLS)⁽¹⁶⁾, with adaptations; and the European Health Literacy Survey Questionnaire Short Form (HLS-EU-Q6) in its validated version for Brazilian Portuguese⁽¹⁷⁾.

The TLS assesses an individual's reading and numeracy skills in health-related texts, information, and instructions. The original version was validated using a paper questionnaire, and the modified version was adapted for the REDCap® app. Based on the results obtained in pre-tests on REDCap®, changes were implemented to improve the instrument's response time and application. In the adapted version, the instrument was reduced to three cards with six questions and a reading passage. Based on the respondent's score, the HL is classified as inadequate, limited, or adequate.

The HLS-EU-Q6 assesses the domains of health promotion, disease prevention, and healthcare through six self-reported questions. Questions are scored as very easy, easy, difficult, and very difficult. Based on the total score obtained, the HL level is classified as inadequate, problematic, or sufficient⁽¹⁷⁾.

Using the Internet to obtain health information

The questions included the experience and perception of using the Internet to search for health information, with questions about access, means and types of health information, and self-perception about the

¹ This is a Brazilian test for Health Literacy. We have chosen to use its original name as this is a well know instrument in our country.

obstacles to searching for it on the Internet (very easy, easy, neither easy nor difficult, difficult and very difficult).

Pilot Study

The pilot study took place in a census sector in Porto Alegre, which was not part of the final data collection. In the pilot study, we tested the sampling procedures, approach techniques, identification of inconsistencies, instrument suitability, and the functionality of the REDCap®. Five field visits were conducted on different days of the week and at different times, totaling eight interviews. A total of 26 households were contacted in the two blocks (13 households per block). Ten households refused to participate, and eight households were unable to contact the residents.

Selection and training of interviewers

Local coordinators in each city selected the interviewers, who received in-person and online training on concepts, HL tests, and the importance of the topic. Short videos were created to present the field research steps. Data collection procedures were detailed, including the location of selected households, inclusion criteria, conduct and attire, approaching residents, and use of the REDCap® application (installation and login, recording interviews, tools, and data submission). The interviewers simulated the administration of the questionnaire among themselves. Support materials were made available through the Moodle platform, including the Field Interview Manual, the Inventory Manual, the tutorial for installing and using REDCap®, and instructional videos.

Project disclosure

Several outreach strategies were adopted to ensure credibility and trust before and during data collection. The project's visual identity and logo were developed, and outreach activities were promoted on social media and in local media outlets. Informational leaflets and posters, vests, eco-bags, and badges with the university and CNPq logos were created. The project website (<http://www.ufrgs.br/letramentoemsaude>) provided general information, along with the research team and

interviewers from each city. The teams visited Basic Health Units (UBS) and presented the project at plenary sessions of the Municipal Health Councils.

Data collection

Data collection took place between October 2023 and March 2024. Interviewers went to the first address selected, presented the survey, and invited one resident to participate. If they met the criteria, the inclusion criteria were verified. If the resident did not meet the criteria, another eligible resident, available at the time, was invited to participate. The interview began after clarifying any questions and signing the Informed Consent Form (ICF).

Interviewers conducted fieldwork on different days and times, seven days a week, in pairs or with a support person, to increase the chances of finding residents at home, optimize collection procedures, and ensure safety.

At least three attempts were made at each household, on different days and times of the week, including weekends. If, after three contact attempts, no resident was found at the selected household, the collection was considered a loss. At the end of each journey, the data collected in REDCap® offline was synchronized with the server.

Quality control

Quality control was achieved through direct supervision of the interviewers, daily analysis of the database, and telephone reinterviews. When blank fields, duplicates, or inconsistent responses were identified, the interviewers were contacted to resolve these inconsistencies.

Telephone interviews occurred throughout the data collection period, with random reinterviews for preventive quality control using key questions and reinterviews to check for inconsistent data. These were conducted in cases where it was not possible to resolve the inconsistencies with the interviewers and in cases where there was a high rate of inconsistent data across multiple sections of the questionnaire. During the reinterview, key questions were re-administered, which had been previously selected by the research

team, considering those with the highest number of inconsistencies. Telephone contact was also made to confirm that the interview address matched the selected household.

Any adjustments to the database were made based on the reinterviews.

Statistical analysis

The response rate obtained in each city was calculated using the formula:

$$\text{Response rate} = \frac{\text{Number of interviews}}{\text{Number of households drawn}}$$

For this calculation, vacant households were excluded. To minimize selection bias in the survey, post-stratification weights were applied according to age, gender, and education level prior to data analysis. This procedure minimizes response and selection biases due to the low response rate.

The rake method uses the gender, age, and education variables available in the sample and the reference population to calculate the post-stratification weights. This way, this weight equalizes the distribution of the sample with that of the population. Population data for the capital and the interior of RS and MS were extracted from the Continuous National Household Sample Survey for the fourth quarter of 2023⁽¹⁸⁾. These

weights were calculated in STATA, using the SURVWGT package, with the sample design weight used to execute the package⁽¹⁹⁾.

Ethical aspects

The project was approved by the Research Ethics Committee of UFRGS (CAAE number: 52872721.0.0000.5347, opinion 6.214.696) and by the Ethics Committees of the co-participating institutions UFSM, UFPEL and UEMS. The research fully followed the Resolutions of the National Health Council – CNS 466/2012 and 510/2016. The participants signed the ICF in two copies, containing information about the study and the contact details of the responsible researchers.

RESULTS

From 150 census sectors initially drawn, 1,181 individuals from 136 census sectors were interviewed. The average household response rate ranged from 33.04% to 58.09% (Table 3).

Table 4 presents the unweighted sample, the reference population, and the post-weighted sample, by city, according to gender, age, and education. The post-weighted sample shows a predominant age between 30 and 59 years and a high level of education (>12 years), with the exception of Dourados, where the predominant level of education is 9 to 11 years.

Table 3. Number of sectors covered by city according to response rate measures. Brazil, 2024.

City	Sectors	Response rate (%)				
		Minimum	Mean	Standard deviation	Maximum	CV ^a (%)
Campo Grande	24	7.69	33.04	14.61	69.23	44.2
Dourados	30	11.11	58.09	24.31	100.00	41.8
Pelotas	25	11.11	35.67	18.66	88.89	52.3
Porto Alegre	27	7.69	42.53	24.24	92.31	57.0
Santa Maria	30	11.11	53.64	22.33	100.00	41.6

^aCV= coefficient of variation

Table 4. Unweighted sample, reference population, and post-weighted sample, according to gender, age, and education. Brazil, 2024.

		Reference population (PNADC ^a 2023)	Unweighted sample (n=1.181)		Post-weighted sample
		%	n	%	%
Campo Grande (n=189)					
Gender	Female	48.54	98	51.9	48.54
	Male	51.46	91	48.1	51.46
Age	18-29 years	25.88	35	18.5	25.88
	30-59 years	52.29	92	48.7	52.29
	≥ 60 years	21.82	62	32.8	21.82
Education	0-8 years	19.05	41	21.7	19.05
	9-11 years	12.35	77	40.7	12.35
	≥12 years	68.6	71	37.6	68.6
Dourados (n=307)					
Gender	Female	49.28	194	63.2	49.28
	Male	50.72	113	36.8	50.72
Age	18-29 years	23.79	66	21.5	23.79
	30-59 years	56.11	165	53.7	56.11
	≥ 60 years	20.1	76	24.8	20.1
Education	0-8 years	23.79	102	33.2	23.79
	9-11 years	56.11	115	37.5	56.11
	≥12 years	20.1	90	29.3	20.1
Pelotas (n=122)					
Gender	Female	51.35	86	70.5	51.35
	Male	48.65	36	29.5	48.65

Table 4. Cont.

		Reference population (PNADC ^a 2023)	Unweighted sample (n=1.181)		Post-weighted sample
		%	n	%	%
Age	18-29 years	23.66	18	14.8	23.66
	30-59 years	53.53	63	51.6	53.53
	≥ 60 years	22.81	41	33.6	22.81
Education	0-8 years	31.72	52	42.6	31.72
	9-11 years	15.57	47	38.5	15.57
	≥12 years	52.71	23	18.9	52.71
Porto Alegre (n=282)					
Gender	Female	53.35	172	61.0	53.35
	Male	46.65	110	39.0	46.65
Age	18-29 years	24.28	56	19.9	24.28
	30-59 years	47.77	135	47.9	47.77
	≥ 60 years	27.95	91	32.3	27.95
Education	0-8 years	15.78	52	18.4	15.78
	9-11 years	12.46	162	57.4	12.46
	≥12 years	71.76	68	24.1	71.76
Santa Maria (n=281)					
Gender	Female	51.35	159	56.6	51.35
	Male	48.65	122	43.4	48.65
Age	18-29 years	23.66	48	17.1	23.66
	30-59 years	53.53	156	55.5	53.53
	≥ 60 years	22.81	77	27.4	22.81

Table 4. Cont.

		Reference population (PNADC ^a 2023)	Unweighted sample (n=1.181)	Post-weighted sample	
		%	n	%	%
Education	0-8 years	31.72	60	21.4	31.72
	9-11 years	15.57	124	44.1	15.57
	≥12 years	52.71	97	34.5	52.71

^aPNADC – Continuous National Household Sample Survey

Regarding sex, the distribution between men and women is approximately 1:1, with small variations between cities.

Among the challenges of data collection, the following stand out: residents' absence during repeated visit attempts, difficulty accessing homes due to the absence or non-functioning intercoms/doorbells or the fact that interviewers were not allowed into housing complexes, interviewees' insecurity about providing personal data, hectic daily routines, and a lack of experience participating in population surveys.

The main reasons for refusals identified in the five cities were mainly residents' lack of time, insecurity about meeting the interviewer, fear of providing socio-economic data or signing the informed consent form, lack of interest in the research, family illness, mobility difficulties, or even reading difficulties.

Regarding strategies to increase the response rate and reduce refusals in the field, the following measures were adopted, in addition to the previously mentioned project promotion in various locations and media:

- Distribution of leaflets containing information about the project and the interviewer's name and contact phone number;
- Publicizing the project's online communication channels, listing the research team, the names of the research group members, and the interviewer's name, institution, and contact phone number;

- Offering free pens and the possibility of scheduling interviews at convenient times for the resident;
- At least three contact attempts on different days and times;
- Including weekends and evenings in attempts to contact residents who were absent or unable to be reached during the weekdays and daytime;
- Prior contact with administrators of territories with a concentration of selected households (buildings, housing complexes) to publicize the accuracy and importance of the research;
- Contacting janitors, building managers, and neighbors to identify times most likely to find residents in selected households;
- Mediating local coordinators to access specific locations and schedule interviews.

Regarding telephone reinterviews, 625 telephone attempts were made, of which 496 were random reinterviews for preventive quality control based on key questions, and 129 were conducted to check inconsistent data. Approximately one-third of the telephone attempts were answered (183 of 625 attempts). Most unsuccessful attempts were due to phones programmed to not receive calls, nonexistent numbers, or unanswered calls. From the answered calls (183), it was possible to conduct 127 reinterviews, and the data of 38 (3.2% of the final sample) were adjusted. The remaining interviews were maintained due to the concordance of the data obtained in the in-person interview with

the telephone reinterview. Two interviews were excluded due to the large number of missing data in the in-person interview, which could not be confirmed in the reinterview attempt.

■ DISCUSSION

Although the topic of HL was introduced decades ago in developed countries, research in Brazil is recent. According to our knowledge so far, this project is the first multicenter population-based survey in Brazilian cities. Even without national coverage, it represents a major advance in knowledge about the HL of Brazilians. This is due to the choice of a household sample, allowing us to identify the general population, rather than specific subgroups, such as health service users or those with a disease. Affiliation with health services or the use of complex services may be associated with a different level of HL than the general population.

In a systematic review on the prevalence of low HL in Latin America and the Caribbean, of the 84 studies analyzed, the majority ($n=70$) were conducted in health services⁽¹⁰⁾. Studies involving regular health service users may distort the HL characteristics of the general population, which includes those who access services regularly, infrequently, or never. The systematic review identified seven studies conducted with household samples: six in Brazil^(6,17,20–23) and one in Jamaica⁽²⁴⁾. Among the Brazilian studies, two used population-based samples^(22,23), one using a probability sample from the city under investigation⁽²³⁾. The remaining studies consisted of samples of individuals enrolled in the Family Health Strategy, residents near health facilities, or were validation studies^(6,17,20,21).

Population-based samples like ours, although limited to cities in two Brazilian states, provide more representative estimates of the HL of the general population, whose estimates are unknown.

These estimates are essential for formulating public health and education policies, as well as planning, implementing, and evaluating programs. Our research sought to increase sample size and diversity with the collaboration of researchers from five Brazilian cities and a sampling plan that encompassed diverse population segments.

However, household surveys face challenges, especially related to financial costs, time, and low response

rates⁽²⁵⁾. During planning, we anticipated logistical difficulties and adopted strategies to address them.

Regarding the aforementioned strategies to reduce refusals, we achieved partial success when comparing response rates with those of other studies. Compared to population-based studies on HL, we found that the rates obtained in Brazilian cities were slightly lower than those of the HL study conducted in Germany (64%)⁽²⁶⁾, but close to those of another study conducted in England (42%)⁽²⁷⁾. We did not locate household surveys on HL conducted in Brazil for comparison. High nonresponse rates are also reported in Brazilian health surveys⁽²⁸⁾.

The decline in response rates over the past three decades has been observed globally, with rates below 50% in many surveys⁽²⁹⁾. An analysis of national surveys conducted on probability samples of the general population in 36 European countries between 1999 and 2018 identified a steady decline in response rates for in-person surveys and changes in data collection methods over the period: from in-person and telephone interviews conducted by interviewers to self-administered surveys via the web and mail⁽³⁰⁾.

Among the various reasons cited for this reduction in response rates, demographic changes stand out, such as the composition of household residents and people's disinterest in participating in surveys. This disinterest may be due to both the increase in the number of surveys, including marketing surveys and product and service evaluation surveys, and concerns about data privacy^(29,31).

Differences between the blocks of the selected census sectors and those found in situ were minimized by two strategies: 1) use of Google Street View for an updated view; 2) adjustments to the inventory by interviewers, who listed and classified all buildings. These strategies were sufficient in most sectors, but when the discrepancy between the maps and the on-site findings was significant, a reserve sector was used.

Regarding the refusals identified in the field, it was noteworthy that in some cities, especially in the capitals, we observed dual insecurity: among residents regarding the reliability of the survey and of the interviewers, especially in vulnerable areas, such as more peripheral areas or those with high crime rates. Scam attempts during the pandemic and the IBGE census increased people's fear of opening their doors to interviewers⁽³²⁾.

It is also worth noting that unforeseen extreme weather events, such as heavy rainfall in Rio Grande do Sul⁽³³⁾ and extreme heat waves in Campo Grande, caused additional operational difficulties during data collection, hindering travel and conducting interviews, which were conducted at the doorsteps of homes or in common, open areas, for safety reasons.

Quality control of telephone interviews faced limitations, such as interviewees' fear of providing data, nonexistent phone numbers, and unsuccessful calls. These problems are linked to the growing fear of providing personal information due to digital scams and data sharing⁽²⁹⁾. Furthermore, technological and behavioral changes related to telephone use have been observed, including households no longer having landlines or whose calls are not answered, call blocking services, and people using their cell phones more for texting and browsing than for voice calls⁽²⁹⁾.

In addition to the logistical challenges, adapting the TLS to a digital format was a limitation, as the paper questionnaire and its average completion time of 25 minutes were not compatible with the current reality of field research, which must prioritize people's time and sustainability, reducing paper use. Validation of the adapted TLS is currently underway, using statistical methods to assess its psychometric properties.

Representative population samples from a country with a vast territory like Brazil are difficult and expensive to recruit, but useful for public health and clinical practice. When this is not feasible, an alternative is to increase sample size and diversity through multicenter initiatives, as in this project.

■ CONCLUSION

The low response rates in in-person interviews, mainly due to absenteeism and refusals, as well as in telephone reinterviews conducted during quality control, suggest the need to expand strategies to address these challenges in household surveys. Among the strategies, we highlight the need to expand the project's publicity through other communication channels and other organizations (local radio and television stations, popular newspapers, neighborhood associations, associations representing condominiums and building managers, among others), before and during the field

research. Another strategy is to offer participants the option of responding to the interview via video call.

Considering the scarcity of population-based studies conducted in Brazil on HL, the results of this study will contribute to the advancement of research in this area. Data on the prevalence of health literacy levels among Brazilians can inform health and education policies and programs focused on health communication.

■ REFERENCES

1. Arrighi E, Ruiz de Castilla EM, Peres F, Mejía R, Sørensen K, Gunther C, et al. Scoping health literacy in Latin America. *Glob Health Promot*. 2021;29(2):78-87. <https://doi.org/10.1177/17579759211016802>
2. Wang J, Shahzad F. A Visualized and Scientometric Analysis of Health Literacy Research. *Front Public Health*. 2022;9:811707. <https://doi.org/10.3389/fpubh.2021.811707>
3. Araújo GR, Castro PASV, Ávila IR, Bezerra JMT, Barbosa DS. Effects of public health emergencies of international concern on disease control: a systematic review. *Rev Panam Salud Publica*. 2023;47:e74. <https://doi.org/10.26633/RPSP.2023.74>
4. Farnood A, Johnston B, Mair FS. A mixed methods systematic review of the effects of patient online self-diagnosing in the "smart-phone society" on the healthcare professional-patient relationship and medical authority. *BMC Med Inform Decis Mak*. 2020;20(1):253. <https://doi.org/10.1186/s12911-020-01243-6>
5. Huettemann R, Sevov B, Meister S, Fehring L. Understanding citizens' attitudes within user-centered digital health ecosystems: a sequential mixed method methodology including a web-survey. *Digit Health*. 2024;10. <https://doi.org/10.1177/20552076241255929>
6. Lima JP, Abreu DPG, Bandeira EO, Brum AN, Garlet BB, Martins NFF. Functional health literacy in older adults with hypertension in the Family Health Strategy. *Rev Bras Enferm*. 2020;73:e20190848. <https://doi.org/10.1590/0034-7167-2019-0848>
7. Park E, Kwon M. Testing the digital health literacy instrument for adolescents: cognitive interviews. *J Med Internet Res*. 2021;23(3):e17856. <https://doi.org/10.2196/17856>
8. Xie L, Zhang S, Xin M, Zhu M, Lu W, Mo PKH. Electronic health literacy and health-related outcomes among older adults: a systematic review. *Prev Med*. 2022;157:106997. <https://doi.org/10.1016/j.ypmed.2022.106997>
9. Selva-Pareja L, Ramos-Pla A, Mercadé-Melé P, Espart A. Evolution of scientific production on health literacy and health education: a bibliometric analysis. *Int J Environ Res Public Health*. 2022;19(7):4356. <https://doi.org/10.3390/ijerph19074356>
10. Jesus PR, Bianchini BV, Ziegelmann PK, Dal Pizzol TS. The low health literacy in Latin America and the Caribbean: a systematic review and meta-analysis. *BMC Public Health*. 2024;24:1478. <https://doi.org/10.1186/s12889-024-18972-2>

11. Woods NK, Ali U, Medina M, Reyes J, Chesser AK. Health literacy, health outcomes and equity: a trend analysis based on a population survey. *J Prim Care Community Health*. 2023;14. <https://doi.org/10.1177/21501319231156132>
12. Arriaga M, Francisco R, Nogueira P, Oliveira J, Silva C, Câmara G, et al. Health Literacy in Portugal: results of the health literacy population survey project 2019–2021. *Int J Environ Res Public Health*. 2022;19(7):4225. <https://doi.org/10.3390/ijerph19074225>
13. Schaeffer D, Berens EM, Vogt D, Gille S, Griesse L, Klinger J, et al. Health Literacy in Germany: findings of a representative follow-up survey. *Dtsch Arztebl Int* 2021;118:723–9. <https://doi.org/10.3238/arztebl.m2021.0310>
14. Mengue SS, Bertoldi AD, Boing AC, Tavares NUL, Pizzol TSD, Oliveira MA, et al. National Survey on Access, Use and Promotion of Rational Use of Medicines (PNAUM): household survey component methods. *Rev Saúde Pública*. 2016;50:4s. <https://doi.org/10.1590/S1518-8787.2016050006156>
15. Associação Brasileira de Empresas de Pesquisa (ABEP). Critério Brasil [Internet]. [cited 2024 Sep 3]. Available from: <https://www.abep.org/criterio-brasil>
16. Maragno CAD, Mengue SS, Moraes CG, Rebelo MVD, Guimarães AM de M, Pizzol T da SD. Test of health Literacy for Portuguese-speaking Adults. *Rev Bras Epidemiol*. 2019;22:e190025. <https://doi.org/10.1590/1980-549720190025>
17. Mialhe FL, Moraes KL, Bado FMR, Brasil VV, Sampaio HA de C, Rebustini F. Propriedades psicométricas do instrumento adaptado European Health Literacy Survey Questionnaire short-short form. *Rev. Latino-Am. Enfermagem*. 2021;29:e3436. <https://doi.org/10.1590/1518-8345.4362.3436>
18. Instituto Brasileiro de Geografia e Estatística (IBGE). Pesquisa Nacional por Amostra de Domicílios Contínua 2023 [Internet]. 2023[cited 2024 Aug 7]. Available from: https://www.ibge.gov.br/estatisticas/downloads-estatisticas.html?caminho=Trabalho_e_Rendimento/Pesquisa_Nacional_por_Amostra_de_Domicilios_continua/Trimestral/Microdados/2023
19. Winter N. SURVWGT: Stata module to create and manipulate survey weights [Software] [Internet]. Stat Softw Components. 2018[cited 2024 Aug 7]. Boston College Department of Economics. Available from: [https://econpapers.repec.org/software/bocbocode/s427503.htm#:~:text=SURVWGT%3A%20Stata%20module%20to%20create%20and%20manipulate%20survey%20weights,-Nicholas%20Winter&text=Abstract%3A%20survwtg%20creates%20sets%20of,the%20survey%20jackknife%20\(JK*\)](https://econpapers.repec.org/software/bocbocode/s427503.htm#:~:text=SURVWGT%3A%20Stata%20module%20to%20create%20and%20manipulate%20survey%20weights,-Nicholas%20Winter&text=Abstract%3A%20survwtg%20creates%20sets%20of,the%20survey%20jackknife%20(JK*))
20. Carvalho TR, Ribeiro LC. Associação entre letramento funcional em saúde e adesão ao tratamento medicamentoso da Hipertensão Arterial Sistêmica na atenção primária à saúde. *Rev APS*. 2020;23(4): 734–749. <https://doi.org/10.34019/1809-8363.2020.v23.16894>
21. Batista MJ, Marques ACDP, Silva Junior MF, Alencar GP, Sousa MDLRD. Tradução, adaptação transcultural e avaliação psicométrica da versão em português (brasileiro) do 14-item Health Literacy Scale. *Ciênc Saúde Coletiva*. 2020;25(7):2847–57. <https://doi.org/10.1590/1413-81232020257.22282018>
22. Romero S, Scortegagna H, Doring M. Nível de Letramento Funcional em Saúde e Comportamento em Saúde em Idosos. *Texto Contexto - Enfermagem*. 2018;27(4):e5230017. <https://doi.org/10.1590/0104-07072018005230017>
23. Silva-Junior MF, Sousa MLR, Batista MJ. Health literacy on oral health practice and condition in an adult and elderly population. *Health Promot Int*. 2021;36(4):933–42. <https://doi.org/10.1093/heapro/daaa135>
24. Bourne PA, Morris C, Charles CA, Eldemire-Shearer D, Kerr-Campbell MD, Crawford TV. Health literacy and health seeking behavior among older men in a middle-income nation. *Patient Relat Outcome Meas*. 2010;1:39–49. <https://doi.org/10.2147/PROM.S11141>
25. Rodrigues LARL, Costa e Silva DM, Oliveira EAR, Lavôr LCC, Sousa RR, Carvalho RBN, et al. Sampling plan and methodological aspects: a household healthcare survey in Piauí. *Rev Saúde Pública*. 2021;55:118. <https://doi.org/10.11606/s1518-8787.2021055003441>
26. Tiller D, Herzog B, Kluttig A, Haerting J. Health literacy in an urban elderly East-German population - results from the population-based CARLA study. *BMC Public Health*. 2015;15:883. <https://doi.org/10.1186/s12889-015-2210-7>
27. Simpson RM, Knowles E, O’Cathain A. Health literacy levels of British adults: a cross-sectional survey using two domains of the Health Literacy Questionnaire (HLQ). *BMC Public Health*. 2020;20:1819. <https://doi.org/10.1186/s12889-020-09727-w>
28. Alves MCGP, Escuder MML, Goldbaum M, Barros MB de A, Fisberg RM, Cesar CLG. Sampling plan in health surveys, city of São Paulo, Brazil, 2015. *Rev Saúde Pública*. 2018;52:81. <https://doi.org/10.11606/S1518-8787.2018052000471>
29. Maslovskaya O, Lynn P, Calderwood L, Durrant G, Fitzgerald R, Nicolaas G, et al. Survey futures position statement on response rates: supporting material [Internet]. 2025[cited 2024 Aug 7]. Available from: https://surveyfutures.net/wp-content/uploads/2025/06/Response-Rates-Postition-Statement_SupportingMaterial.pdf
30. Jabkowski P, Cichocki P. Survey response rates in European comparative surveys: a 20-year decline irrespective of sampling frames or survey modes. *Qual Quant*. 2025;59(1):635–55. <https://doi.org/10.1007/s11135-024-01993-9>
31. Silva VSTM, Pinto LF. Nationwide population-based household surveys in health: a narrative review. *Ciênc Saúde Colet*. 2021;26(9):4045–58. <https://doi.org/10.1590/1413-81232021269.28792020>
32. G1. Golpe do Censo: bandidos se vestem de funcionários do IBGE e alegam pendências para conseguir dados de moradores [Internet]. Rio de Janeiro: G1; 2023 [cited 2024 Jul 11]. <https://g1.globo.com/rj/rio-de-janeiro/noticia/2023/09/19/golpe-do-censo-bandidos-se-vestem-como-funcionarios-do-ibge.ghtml>
33. Alvalá RCS, Ribeiro DF, Marengo JA, Seluchi ME, Gonçalves DA, Antunes da Silva L, et al. Analysis of the hydrological disaster occurred in the state of Rio Grande do Sul, Brazil in September 2023: Vulnerabilities and risk management capabilities. *Int J Disaster Risk Reduct*. 2024;110:102046. <https://doi.org/10.1016/j.ijdrr.2024.104645>

■ Availability of data and material

Access to the dataset may be obtained upon request to the corresponding author.

■ Acknowledgments

We would like to thank the National Council for Scientific and Technological Development – CNPq, for the support granted through the CNPq/MCTI/FNDCT Call No. 18/2021 - Range A - Emerging Groups; and the Coordination for the Improvement of Higher Education Personnel (CAPES), funding code 001, for the master's scholarship granted to Tatiana da Silva Sempé and for the doctoral scholarship granted to Patricia Romualdo de Jesus.

■ Authorship contribution

Conceptualization: Tatiane Da Silva Dal Pizzol, Patricia Romualdo De Jesus, Tatiana Da Silva Sempé, Regina Tomie Ivata Bernal, Liziane Maahs Flores, Edi Franciele Ries, Juliane Fernandes Monks Da Silva, Paulo Maximiliano Corrêa, Marcia Regina Martins Alvarenga, Rogério Dias Renovato, Ruberval Franco Maciel, Sotero Serrate Mengue

Data Curation: Tatiane Da Silva Dal Pizzol, Patricia Romualdo De Jesus, Tatiana Da Silva Sempé, Regina Tomie Ivata Bernal,

Formal Analysis: Tatiane Da Silva Dal Pizzol, Regina Tomie Ivata Bernal

Funding Acquisition: Tatiane Da Silva Dal Pizzol

Research: Tatiane Da Silva Dal Pizzol, Patricia Romualdo De Jesus, Tatiana Da Silva Sempé, Regina Tomie Ivata Bernal, Liziane Maahs Flores, Edi Franciele Ries, Juliane Fernandes Monks Da Silva, Paulo Maximiliano Corrêa, Marcia Regina Martins Alvarenga, Rogério Dias Renovato, Ruberval Franco Maciel, Sotero Serrate Mengue

Methodology: Tatiane Da Silva Dal Pizzol, Patricia Romualdo De Jesus, Tatiana Da Silva Sempé, Regina Tomie Ivata Bernal, Liziane Maahs Flores, Edi Franciele Ries, Juliane Fernandes Monks Da Silva, Paulo Maximiliano Corrêa, Marcia Regina Martins Alvarenga, Rogério Dias Renovato, Ruberval Franco Maciel, Sotero Serrate Mengue

Project Administration: Tatiane Da Silva Dal Pizzol

Resources: Tatiane Da Silva Dal Pizzol, Sotero Serrate Mengue

Software: Patricia Romualdo De Jesus, Regina Tomie Ivata Bernal

Supervision: Tatiane Da Silva Dal Pizzol, Patricia Romualdo De Jesus, Liziane Maahs Flores, Edi Franciele Ries, Juliane Fernandes Monks Da Silva, Paulo Maximiliano Corrêa, Marcia Regina Martins Alvarenga, Rogério Dias Renovato, Ruberval Franco Maciel

Validation: Tatiane Da Silva Dal Pizzol, Patricia Romualdo De Jesus, Tatiana Da Silva Sempé, Regina Tomie Ivata Bernal

Visualization: Tatiane Da Silva Dal Pizzol, Patricia Romualdo De Jesus, Tatiana Da Silva Sempé, Regina Tomie Ivata Bernal

Writing - Original Draft: Tatiane Da Silva Dal Pizzol, Patricia Romualdo De Jesus, Tatiana Da Silva Sempé

Writing - Review and Editing: Tatiane Da Silva Dal Pizzol, Patricia Romualdo De Jesus, Tatiana Da Silva Sempé, Regina Tomie Ivata Bernal, Liziane Maahs Flores, Edi Franciele Ries, Juliane Fernandes Monks Da Silva, Paulo Maximiliano Corrêa, Marcia Regina Martins Alvarenga, Rogério Dias Renovato, Ruberval Franco Maciel, Sotero Serrate Mengue

The authors declare that there is no conflict of interest.

■ Corresponding author

Tatiane da Silva Dal Pizzol

E-mail: tatiane.silva@ufrgs.br

Associate editor:

Aline Marques Acosta

Editor-in-chief:

João Lucas Campos de Oliveira

Received: 02.24.2025

Approved: 07.07.2025