

**Health literacy status among pregnant women in a Brazilian conditional cash transfer programme: a cross-sectional investigation**

**Literacia em saúde entre gestantes do programa brasileiro de transferência condicionada de renda: uma investigação transversal**

**Alfabetización sanitaria entre gestantes del programa brasileño de transferencia condicionada de ingresos: una investigación transversal**

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**Abstract**

Objective: To investigate the overall score and the variables associated with health literacy of pregnant women benefited from a conditional cash transfer programme. Methods: A cross-sectional survey was conducted with pregnant women benefited from a Brazilian conditional

cash transfer programme. We used a validated short health literacy survey developed for research on public health and health promotion. The level of health literacy (high or low) was considered a determining variable. Descriptive, bivariate and multivariate analysis was applied to the data collected. Results: Only the two following variables were associated with health literacy: participation in health education activities and the choice of mothers to seek advice regarding pregnancy. Functional health literacy was higher when pregnant women participated in health education activities. Critical health literacy was higher when pregnant women sought advice from their mothers, friends, and other family members. Conclusion: Health education and a social network of pregnant women should be part of prenatal care.

**Keywords:** Pregnant women; Health literacy; Health promotion; Health education.

### **Resumo**

**Objetivo:** Investigar o escore geral e as variáveis associadas com a literacia em saúde de gestantes beneficiadas por um programa de transferência condicionada de renda. **Métodos:** Estudo transversal conduzido com gestantes beneficiárias do Programa de Brasileiro de Transferência Condicionada de Renda. Foi utilizado um questionário validado para pesquisas de literacia em saúde desenvolvido para pesquisa em Saúde Pública e Promoção da Saúde. O nível de literacia em saúde (alto ou baixo) foi considerado como variável determinante. Os dados foram analisados de forma descritiva, bivariada e multivariada. **Resultados:** Duas variáveis analisadas foram associadas a literacia em saúde: a participação em atividades de educação em saúde e a escolha das mães para o aconselhamento sobre a gestação. A literacia funcional foi maior quando as gestantes participaram de atividades de educação em saúde. A literacia crítica foi maior quando as gestantes solucionaram suas dúvidas com suas mães, amigos ou outros familiares. **Conclusões:** A educação em saúde e a rede social das gestantes devem fazer parte do pré-natal.

**Palavras-chave:** Gestante; Alfabetização em Saúde; Promoção da Saúde; Educação em Saúde.

### **Resumen**

**Objetivo:** Investigar la puntuación general y las variables asociadas a la alfabetización sanitaria de gestantes beneficiadas por un programa de transferencia condicionada de ingresos. **Métodos:** Estudio transversal conducido con gestantes beneficiarias del Programa de Brasileño de Transferencia Condicionada de Ingresos. Se utilizó un cuestionario validado para la investigación de alfabetización sanitaria desarrollado para la pesquisa en Salud Pública y

Promoción de la Salud. El nivel de alfabetización en salud (alto o bajo) se consideró una variable determinante. Los datos se analizaron de forma descriptiva, bivariada y multivariante. Resultados: Dos variables analizadas fueron asociadas a alfabetización sanitaria: la participación en actividades de educación sanitaria y la elección de las madres para el asesoramiento sobre la gestación. La alfabetización funcional fue mayor cuando las gestantes participaron en actividades de educación sanitaria. La alfabetización crítica fue mayor cuando las gestantes resolvieron sus dudas con sus madres, amigos u otros familiares. Conclusiones: La educación sanitaria y la red social de las gestantes deben formar parte de la consulta prenatal.

**Palabras clave:** Gestante; Alfabetización sanitaria; Promoción de la Salud; Educación sanitaria.

## 1. Introduction

Health literacy (HL) is a multifaceted concept that may be understood as knowledge, motivation, and competence to access, understand, evaluate, and apply the health information received in health care. This process requires individual and collective decisions to improve quality of life. The HL status affects health behaviour, use of health services, health outcomes, and health care costs (Sørensen, et al., 2012).

Based on this concept, several studies on the HL of pregnant women have confirmed its association with inadequate beliefs about medications (Duggan, et al., 2014), low perception for the risk of self-medication, herbal medicines, and dental X-rays (Lupattelli, et al., 2014), frequent use of tobacco during pregnancy (Lupattelli, et al., 2014), negative perception on vaccinations (Castro-Sánchez, et al., 2018) and underutilisation of professional midwives and health services (Lori, et al., 2015), understanding maternal HL may provide health professionals with the information required to improve prenatal care (Yee, et al., 2017), and health promotion activities (Akbarinejad, Soleymani & Shahrzadi, 2017). However, understanding the distribution of HL in the general population remains challenging for public health and health promotion sectors (Abel, et al., 2015).

Conditional cash transfer programmes and the development of quality prenatal care are other social platforms that may improve prenatal outcomes (Triyana & Shankar, 2017). These programmes provide periodical cash payments to families in poverty or vulnerable conditions, aiming to break the cycle of poverty. Consequently, conditional cash transfer programmes have been linked to improved obstetric and perinatal outcomes in many countries

such as India (Lim, et al., 2010), Mexico (Darney, et al., 2014), Peru (Pérez-Lu, et al., 2017), and Indonesia (Triyana & Shankar, 2017).

The conditional cash transfer programme of the Brazilian government, known as Bolsa Família (Family Allowance Programme), has been associated with the improvement of a wide spectrum of health conditions (Alves & Escorel, 2013), such as reduced number of deaths attributed to poverty-related causes and decrease in overall childhood mortality rates (Rasella, et al., 2013).

The HL status may be related to higher equity levels in public health (Sørensen, et al., 2012) and it may help health professionals to promote adequate health education activities (Abel, et al., 2015). Hence, this study aimed to investigate contextual variables associated with the overall score and structural factors of HL in pregnant women benefited from a conditional cash transfer programme.

## **2. Methodology**

This study was a cross-sectional survey (Celentano & Szklo, 2018) conducted among Brazilian pregnant women recipients of a conditional cash transfer programme. The Human Research Ethics Committee of the Federal University of Minas Gerais approved this research project. All participants provided informed consent prior to the study, which was conducted in accordance with the Declaration of Helsinki. The investigation process and the present article were designed according to the STROBE (Strengthening the Reporting of Observational studies in Epidemiology) statement.

The study included pregnant women recipients of a cash transfer payment from the Family Allowance Programme, living in upstate Minas Gerais (Human Development Index = 0.789) in the southeast region of Brazil, and whose last known menstruation date was between July and November 2017. This time frame was selected for covering one of the two annual periods when the local programme supervisor should send the consolidated data of pregnant women included in the Family Allowance Programme to the national supervisor. In this period, 128 pregnant women had participated in the programme.

The data were collected between January and May 2018 at the addresses provided by the Family Allowance Programme. Self-applied questionnaires were completed in the presence of a research assistant who aided the pregnant women, from minimal supervision to reading all the questions, when assistance was required.

Health literacy was considered the dependent variable, including overall and structural

factors scores. Independent variables included the characteristics of pregnant women (gestational and actual age), socioeconomic characteristics (years of education, marital status, and family income), participation in health education activities, search for advice regarding pregnancy, occupational status, and religion. Age, gestational age, and level of education were collected as numerical variables. Other characteristics were recorded as nominal variables.

Health literacy (HL) was assessed with the instrument developed and tested by Abel et al. (2015) to improve the understanding on the distribution of HL in the general population. This instrument measures HL by eight Likert-scale items that assess four structural factors: 1) Health information understanding (or Functional HL-1), 2) Health information search (or Functional HL-2), 3) Health interactivity, and 4) Health critical knowledge. The instrument was translated and validated to Brazilian Portuguese (pHLAT-8) by Quemelo, et al. (2017).

The structural factors of HL were obtained by adding the questions of the pHLAT-8. Functional health literacy related to understanding information (FHL-1) was obtained by adding questions one and two (maximum score is 10). Functional health literacy related to searching information (FHL-2) was obtained by adding questions three and four (maximum score is 8). Interactive health literacy (IHL) was obtained by adding questions five and six (maximum score is 10). Critical health literacy (CHL) was obtained by adding questions seven and eight (maximum score is 9). Overall, the maximum pHLAT score is 37.

Additionally, another instrument was used to collect contextual characteristics of pregnant women, such as age, gestational age, level of education, income, number of children, marital status, main person advising pregnant women, participation in collective health education activities, people living in the same household, occupational status, and religion.

The statistical analysis was performed with the STATA software, version 12.0 (StataCorp., College Station, TX, USA). Descriptive analyses were conducted considering frequency and measures of central tendency. Numerical variables were dichotomised using the median as cut-off. Originally, the pHLAT-8 did not classify HL as low and high, but our study provided such classification. Hence, we selected the median as cut-off (50th percentile), which was presented in high and low scores.

Bivariate analyses were conducted to test associations between predictors and outcomes using the chi-square test ( $p < 0.05$ ). Poisson regression with robust variance was used for the multivariate analysis, with the calculation of prevalence ratios (PR) and respective 95% confidence intervals (CI). Variables with  $p$ -value  $< 0.20$  in the bivariate analysis were incorporated into the multivariate analysis and those with  $p$ -value  $< 0.05$  in the final model were considered significantly associated with the outcome.

### 3. Results

There were 97 pregnant women participating in this study, representing 24.22% of loss, which occurred because either the pregnant women denied participation in the study (2.34%) or their address and phone number from the registration data in the Family Allowance Programme was incorrect or outdated (21.88%). Additional attempts to find the missing pregnant women were performed through the contact with primary health care professionals and neighbours. Despite the efforts, these women were not found. However, the families enrolled in the Family Allowance Programme present very low income and low level of education. Thus, the pregnant women who could not be found should not be different from those participating in the study. Table 1 presents the other contextual characteristics examined in the pregnant women.

**Table 1.** Frequency of contextual characteristics of pregnant women who benefited from the conditional cash transfer programme.

Investigated Variables	Frequency	
	N	%
<b>Gestational age</b>		
12–28 weeks	52	53.61
29–38 weeks	45	46.39
<b>Pregnant women's age</b>		
14–24 years	45	46.39
25–41 years	52	53.61
<b>Years of Schooling</b>		
4–8 years	45	46.39
9–15 years	52	53.61
<b>Marital status</b>		
Single	54	55.67
Married	43	44.33
<b>Familiar Income</b>		
≤ 1 minimum wage	52	53.61
> 1 minimum wage	45	46.39
<b>Health education</b>		
Participated	26	26.80
Not participated	71	73.20
<b>Doubts solution</b>		
Mother	37	38.1
Health Professionals	46	47.4
Friends and family	13	13.4
<b>Work Status</b>		
Working	18	18.56
Not working	79	81.44
<b>Religious Status</b>		
Practicing	42	43.30
Not practicing	55	56.70

Source: Research developed by the authors.

The pregnant women were between 14 and 41 years old ( $25.04 \pm 5.44$ ), presented gestational age between 12 and 38 weeks ( $27.45 \pm 6.14$ ), and had between 4 and 15 years of schooling ( $8.61 \pm 2.39$ ). The mean number of children among the pregnant women was  $1.56 \pm$

0.90, not considering the current pregnancy.

Table 2 presents the measures of central tendency of the structural factors of health literacy (HL).

**Table 2.** Measures of central tendency of Structural Factors of HL.

HL Structural Factors	Mean	SD	P25	P75	Min	Max
Health Literacy Overall	22.82	6.04	18	34	10	37
Health Information Understanding	6.41	2.47	5	8	0	10
Health information Searching	4.84	2.15	4	6	0	8
Interacting Health Literacy	6.11	2.64	5	8	0	10
Critical Health Literacy	5.45	2.31	4	9	0	9

SD: Standard Derivation; P25: Percentile 25; P75: Percentile 75; Max: Maximum value observed; Min: Minimum value observed. Source: Authors.

The highest mean values observed were for Health Information Understanding and Interacting Health Literacy. However, these structural factors also present greater amplitude between the maximum and minimum values.

Table 3 shows the results of the bivariate analyses among all the independent variables analyzed and the structural factors of HL. Table 4 presents results of the multivariate analyses for overall HL, FHL-1, and FHL-2.

**Table 3.** The relationship between HL scores and contextual characteristics of pregnant women who were recipients of the conditional cash transfer programme.

	Overall Literacy Score				FHL-1				FHL-2				IHL				CHL			
	Low		High		Low		High		Low		High		Low		High		Low		High	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
<b>Gestational age</b>	0.400								0.324				0.810				0.626			
12–28 weeks	31	59.62	21	40.38	24	46.15	28	53.85	26	50.00	26	50.00	24	53.33	21	46.67	28	53.85	24	46.15
29–38 weeks	23	51.11	22	48.89	23	51.11	22	48.89	18	40.00	27	60.00	29	55.77	23	44.23	22	48.89	23	51.11
<b>Mother age</b>	0.697				0.462				0.071				0.810				0.462			
14–4 years	26	57.78	19	42.22	20	44.44	25	55.56	16	35.56	29	64.44	29	55.77	23	44.23	25	55.56	20	44.44
25–41 years	28	53.85	24	46,15	27	51.92	25	48.08	28	53.85	24	46.15	24	53.33	21	46.67	25	48.08	27	51.92
<b>Schooling</b>	0.697				0.087				0.142				0.324				0.050			
4–8 years	26	57.78	19	42.22	26	57.78	19	42.22	24	53.33	42	46.67	27	60.00	18	40.00	22	42.31	30	57.69
9–15 years	28	53.85	24	46,15	21	40.38	31	59.62	20	38.46	32	61.54	26	50.00	26	50.00	28	62.22	17	37.78
<b>Familiar Income</b>	0.211				0.936				0.163				0.516				0.936			
≤ 1 minimum wage	32	61.54	20	38.46	25	48.08	27	51.92	27	51.92	25	48.08	30	57.69	22	42.31	27	51.92	25	8.08
> 1 minimum wage	22	48.89	23	51.11	22	48.89	23	51.11	17	37.78	28	62.22	23	51.11	22	48.89	23	51.11	22	48.89
<b>Marital status</b>	0.700				0.733				0.306				0.151				0.196			
Single	31	57.41	23	42.59	27	50.00	27	50.00	22	40.74	32	59.26	33	61.11	21	38.89	31	57.41	23	42.59
Married	23	53.49	20	46.51	20	46.51	23	53.49	22	51.16	21	48.84	20	46.51	23	53.49	19	44.19	24	55.81
<b>Have other sons</b>	0.727				0.654				0.505				0.447				0.161			
No	6	66.67	3	33.33	4	55.56	5	44.44	3	33.33	6	66.67	6	66.67	3	33.33	7	77.78	2	22.22
Yes	48	54.55	40	44.33	42	47.73	46	52.37	41	46.59	47	53.41	47	53.41	41	46.59	43	48.86	45	51.14
<b>Health education</b>	0.003				0.784				0.027				0.140				0.271			
No	46	64.79	25	35.21	35	49.39	36	50.70	37	52.11	34	47.89	42	59.15	29	40.95	39	54.93	32	45.07

Yes	8	30.77	18	69.23	12	46.15	14	53.85	7	26.92	19	73.08	11	42.31	15	57.69	11	42.31	15	57.69
<b>Living with Mother</b>	0.644				0.900				0.433				0.173				0.303			
No	7	50.00	7	50.00	40	48.19	43	51.81	5	35.71	9	64.29	10	71.43	4	28.57	9	64.29	5	35.71
Yes	47	56.63	36	43.37	7	50.00	7	50.00	39	46.99	44	53.01	43	51.81	40	48.19	41	49.40	42	50.60
<b>Doubts solution</b>	0.028				0.020				0.897				0.005				0.009			
Mother	13	46.43	15	53.57	11	39.29	17	60.71	12	42.82	16	57.14	12	42.86	16	57.14	9	32.14	19	67.86
Health Professionals	32	69.57	14	30.43	29	60.04	17	36.96	10	43.48	13	56.17	33	71.74	13	28.26	31	67.39	15	32.61
Friends and family	9	39.13	14	60.87	7	30.43	16	69.57	10	43.48	13	52.17	8	34.78	15	65.22	10	43.48	13	56.52
<b>Work Status</b>	0.991				0.368				0.931				0.137				0.884			
Working	10	55.56	8	44.44	7	38.89	11	61.11	8	44.44	10	55.56	7	38.89	11	61.11	9	50.00	9	50.00
Not working	44	55.70	35	44.30	40	50.63	39	49.37	36	45.57	43	54.43	46	58.23	33	41.77	41	51.90	38	48.10
<b>Religious Status</b>	0.326				0.580				0.665				0.225				0.499			
Practicing	21	50.00	21	50.00	19	45.24	23	54.47	18	42.86	24	57.14	20	47.62	22	52.38	20	47.62	22	52.38
Not practicing	33	60.00	22	40.00	28	50.91	27	49.09	26	47.27	29	52.73	33	60.00	22	40.00	30	54.55	25	45.45

FHL1: Functional Health Literacy - Health Information Understanding; FHL2: Functional Health Literacy - Health Information Searching; IHL: Interacting Health Literacy; CHL: Critical Health Literacy. Source: Research developed by the authors.

**Table 4.** The prevalence ration (PR) of the unadjusted and adjusted models of independent variables of the overall HL as well as the FHL-1 and FHL-2 structural factors of the p-HLAT-8 of pregnant women who benefited from the cash conditional transfer programme.

Variables	Overall HL		Health Information Understanding (FHL-1)		Health Information Searching (FHL-2)	
	Unadjusted Model	Adjusted Model	Unadjusted Model	Adjusted Model	Unadjusted Model	Adjusted Model
	PR (IC95%)	PR (IC95%)	PR (IC95%)	PR (IC95%)	PR (IC95%)	PR (IC95%)
<b>Gestational age</b>	0.630		0.700		0.326	
12–28 weeks	1		1		1	
29–38 weeks	0.91 (0.61–1.34)		1.09 (0.89–1.62)		1.20 (0.83–1.73)	
<b>Mother age</b>	0.464		0.403		0.075	
14–24 years	1		1		1	
25–41 years	0.86 (0.59–1.27)		1.21 (0.77–1.89)		0.72 (0.50–1.03)	
<b>Schooling</b>	0.100		0.697		0.155	
4–8 years	1		1		1	
9–15 years	1.41 (0.94–2.13)		1.09 (0.69–1.72)		1.32 (0.90–1.93)	
<b>Familiar Income</b>	0.937		0.215		0.166	
≤ 1 minimum wage	1		1		1	
> 1 minimum wage	0.98 (0.67–1.45)		1.33(0.85–2.08)		1.29 (0.90–1.86)	
<b>Marital status</b>	0.733		0.700		0.318	
Single	1		1		1.00	
Married	1.06 (0.72–1.58)		1.09(0.70–1.71)		0.84 (0.56–1.20)	
<b>Others pregnancy</b>	0.676		0.525		0.389	
No	1		1		1	
Yes	1.18 (0.55–2.52)		1.36 (0.52–3.55)		0.80 (0.48–1.33)	

<b>Health education</b>	0.782		< 0.001	0.002	0.014	0.016
No	1		1	1	1	1
Yes	1.06 (0.69–1.62)		1.97 (1.31–2.96)	1.88 (1.25–2.84)	1.52 (1.09–2.14)	1.49 (1.08–2.06)
<b>Living with Mother</b>	0.902		0.632		0.393	
No	1		1		1.00	
Yes	0.96 (0.55–1.70)		1.15 (0.64–2.06)		1.21 (0.78–1.89)	
<b>Doubts solution</b>	0.026	0.029	0.029		0.660	
Health Professionals	1	1	1		1	
Friends and family	1.88 (1.18–3.00)	1.82 (1.14–2.90)	2.00 (1.15–3.46)		1.08 (0.68–1.71)	
Mother	1.64 (1.01–2.66)	1.62 (1.01–2.62)	1.76 (1.01–3.08)		1.09 (0.71–1.68)	
<b>Work Status</b>	0.334		0.991		0.931	
Working	1		1		1	
Not working	1.24 (0.80–1.91)		1.00 (0.56–1.78)		1.02 (0.64–1.62)	
<b>Religion Status</b>	0.580		0.326		0.665	
Practicing	1		1		1	
Not practicing	1.11 (0.76–1.64)		1.25(0.80–1.95)		1.08 (0.75–1.56)	

Source: Authors.

The participation of pregnant women in health education activities improved the overall measure of HL, especially FHL-2. The person pregnant women selected for advice affected the overall measure of HL, modifying FLH-1 and IHL. In the adjusted model, pregnant women who sought advice from friends and other family members had an overall HL score of 82% or higher (PR = 1.82; 95%CI: 1.14–2.90). Advice from the mothers of pregnant women had a positive association with the overall HL outcome. The likelihood of participating in health education activities was 88% or higher for a FHL-1 outcome (PR = 1.88; 95%CI: 1.25–2.84) and 49% or higher for a FHL-2 outcome (PR = 1.49; 95%CI: 1.08–2.06), when comparing pregnant women who did not participate in health education activities to those who did it. Table 5 presents the results of multivariate analyses for IHL and CHL.

**Table 5:** The prevalence ration (PR) of the unadjusted and adjusted models of independent variables for the IHL and CHL structural factors of p-HLAT-8 of pregnant women who were recipients of the cash conditional transfer programme.

Variables	Interacting Health Literacy (IHL)		Critical Health Literacy (CHL)	
	Unadjusted Model	Adjusted Model	Unadjusted Model	Adjusted Model
	PR (IC95%)	PR (IC95%)	PR (IC95%)	PR (IC95%)
<b>Gestational age</b>	0.812	-	0.627	-
12–28 weeks	1		1	
29–38 weeks	1.05 (0.68–1.64)		1.11(0.73–1.67)	
<b>Mother age</b>	0.811	-	0.469	-
14–24 years	1		1	
25–41 years	0.95 (0.61–1.47)		1.17(0.77–1.78)	
<b>Schooling</b>	0.333	-	0.061	-
4–8 years	1		1	
9–15 years	1.25 (0.79–1.96)		1.53 (0.98–2.38)	
<b>Familiar Income</b>	0.518	-	0.937	-
≤ 1 minimum wage	1		1	
> 1 minimum wage	1.15 (0.74–1.79)		1.01(0.67–1.54)	
<b>Marital status</b>	0.153	-	0.197	-
Single	1		1	
Married	1.37 (0.89–2.13)		1.31 (0.87–1.97)	
<b>Others pregnancy</b>	0.492	-	0.190	-
No	1		1	
Yes	1.39 (0.54–3.63)		2.30 (0.66–7.99)	
<b>Health education</b>	0.119	-	0.249	-

No	1		1	
Yes	1.41 (0.91–2.18)		1.28 (0.84–1.95)	
<b>Living with Mother</b>	0.235	-	0.355	-
No	1		1	
Yes	0.60 (0.25–1.40)		0.70 (0.34–1.48)	
<b>Doubts solution</b>	0.007	0.005	0.002	< 0.001
Health Professionals	1	1	1	1
Friends and family	2.31 (1.33–4.00)	2.20 (1.26–3.83)	1.73 (0.99–3.00)	1.67 (0.95–2.92)
Mother	2.02 (1.15–3.55)	2.07 (1.18–3.64)	2.08 (1.27–3.40)	2.29 (1.45–2.92)
<b>Work Status</b>	0.100	-	0.884	-
Working	1		1	
Not working	1.46 (0.93–2.30)		1.04 (0.62–1.74)	
<b>Religion Status</b>	0.225	-	0.499	-
Practicing	1		1	
Not practicing	1.31 (0.84–2.02)		1.15 (0.76–1.74)	

Source: Research developed by the authors.

Pregnant women who sought advice from friends and family members were twice more likely to present an IHL outcome (PR = 2.20; 95%CI:1.26–3.83). Considering a CHL outcome, the mothers were mainly responsible for advising pregnant women (PR = 2.29; 95%CI: 1.45–2.92).

#### 4. Discussion

This research was designed to investigate the contextual variables associated with the health literacy (HL) of low-income pregnant women recipients of the conditional cash transfer programme of the Brazilian government. Only two variables were associated with HL: participation in health education activities and the choice of mothers to seek advice regarding pregnancy from family and friends. Health education was responsible to improve the understanding and search for information, while advice from mothers, friends, and other family members showed an improvement of interactive and critical HL.

Health education during prenatal care has been reported by several authors as the way to improve maternal, obstetric, and children outcomes (Quemelo, et al., 2017; McFadden, et al., 2017; Silva, Lima & Osório, 2016; Lumbiganon, et al., 2016; Bahri, et al., 2015; Brasington, et al., 2016; Al-Ateeq & Al-Rusaies, 2015). Pregnant women who received health education during prenatal care presented reduced complications during pregnancy

(Brasington et al., 2016; Al-Ateeq & Al-Rusaies, 2015), increased duration and exclusivity of breastfeeding, babies with higher birth weight (Silva, Lima & Osório, 2016), and improvement in oral health beliefs and behaviours (Bahri, et al., 2015). The results of the present study help understanding the mechanism that connect health education to improved outcomes in maternal and child health.

Social networks (mothers, friends, and other family members) were associated with improved HL results, which is favourable because mothers prefer to receive information from their peers than from health professionals (Duncanson, Burrows & Collins, 2014). Social networks act as mediators of HL for developing the autonomy of patients, communication with health professionals, and acceptance of potential diseases. This mediation happens because people rely on the health literacy skills of other people to search for, understand, and use health information (Edwards, et al., 2012). Moreover, peer support is sufficient to increase the knowledge of pregnant women and promote healthy breastfeeding practices (Kempenaar and Darwent, 2013).

Traditionally, there is still no cut-off point to determine whether the values obtained for the structural factors of HL are good or not when using the pHLAT-8. However, our results may be compared with validation studies of HLAT-8. Our study population presented lower results in all structural factors than the studies by Abel, et al. (2015), Guo, et al. (2018) and Quemelo, et al., (2017). This result may be explained by the lower level of education of pregnant women investigated, considering there is a direct relationship between HL and levels of education (Duggan, et al., 2014; Castro-Sánchez, et al., 2018; Akbarinejad, Soleymani & Shahrzadi, 2017). It is worth noting that, despite the impact of level of education on HL, improving this parameter alone is not enough to improve HL levels (Lupattelli, et al., 2014).

This lower HL status observed in pregnant women recipients of a conditional cash transfer programme is concerning and consistent with other studies (Lori, et al., 2015; Akbarinejad, Soleymani & Shahrzadi, 2017) observed that more than half of pregnant women analysed presented inadequate HL. Lori, et al. (2015) indicated that pregnant women with low HL interpret the information received incorrectly, execute health skills incorrectly during prenatal care, and do not understand that health services may help them and their families. Thus, strategies should be directed to pregnant women to improve HL, and our study indicates two ways: health education and social networks.

Although other variables did not present statistically significant values, contextual factors must be also considered for understanding HL. Guo, et al., (2018) observed that intact families were associated with a higher HL status. Additionally, self-efficacy and school

environment were important in predicting functional HL, whereas social support was an important predictor of the structural factors of interactive and critical HL. Akbarinejad, Soleymani & Shahrzadi, 2017) observed an indirect relationship between HL and age, which may be linked to the reduction in cognitive performance and sensory abilities. However, Duggan, et al. (2014) indicated that HL improved as age increased. Thus, age seems to be a contradictory predictor of HL in pregnant women, considering the present study used a similar age range and did not observe a relationship between age and HL.

This study presents limitations. The first one is the associated with use of a self-reported survey, which implies the possibility of participants to over- or undervalue their responses. However, this is a common problem for observational studies using self-reported instruments. The second limitation was the failure to locate some pregnant women (n=31); however, their sociodemographic characteristics are very similar to those participating in the study. Finally, the cross-sectional design does not allow establishing cause-effect (reverse causality) (Celentano & Szklo, 2018). Thus, other study designs are suggested to investigate the association between HL and contextual characteristics of pregnant women.

Despite the limitations, it is important to highlight that this study used a validated instrument and it was the first to use the pHLAT-8 (or versions of the original instrument in any language) compared to other validation studies; also, multivariate analyses were performed. In addition, the population of the present study was affected strongly by social inequities, configuring a priority population in need of the creation and implementation of health promotion strategies.

## **5. Conclusions**

Our study on HL among low-income pregnant women benefited from a cash transfer programme of the Brazilian government shows lower HL than other studies using the same instrument. Participation in health education activities and the involvement in social networks for advice regarding pregnancy are two predictors of HL in this population.

As practice implications, the results reinforce the importance of health teams to develop health education activities among pregnant women, especially low-income mothers. This initiative may improve the understanding and search for information. Such health education programme may benefit from the incorporation of social networks of pregnant women, who may serve as models for peer education.

Further research on health literacy should be carried out to confirm the influence of schooling and age. The identification of the methodology used in educational activities and its influence on health literacy can contribute to better health education practices.

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