

## RESEARCH ARTICLE

# Health literacy status of pregnant women and women with young children in Tasmania

Satish Melwani<sup>1</sup>  | Verity Cleland<sup>2</sup> | Kira Patterson<sup>3</sup> | Rosie Nash<sup>1</sup> 

<sup>1</sup>School of Medicine, University of Tasmania, Hobart, Tasmania, Australia

<sup>2</sup>Menzies Institute for Medical Research, University of Tasmania, Hobart, Tasmania, Australia

<sup>3</sup>School of Education, University of Tasmania, Launceston, Tasmania, Australia

## Correspondence:

Satish Melwani, School of Medicine, College of Health and Medicine, University of Tasmania, Hobart, TAS 7001, Australia.  
Email: [satish.melwani@utas.edu.au](mailto:satish.melwani@utas.edu.au)

Handling editor: Sarah Ireland

## Abstract

**Issue Addressed:** The literature provides evidence that maternal health is strongly linked with noncommunicable diseases (NCDs) and their associated risk factors. Enabling women with the asset of health literacy may help to reduce the intergenerational impact of NCDs. However, little is known about the health literacy of pregnant women and women with young children in Tasmania and globally. This study aimed to identify the health literacy status of pregnant women and women with young children (0–8 years) living in Tasmania and describe their health literacy status according to their demographic characteristics.

**Methods:** An online cross-sectional survey was undertaken. The survey included demographic questions and a health literacy questionnaire (HLQ). The description of demographic differences across the HLQ scales focused on effect sizes (ES) for standardised differences in mean health literacy scores. The differences found to be statistically significant at  $P < 0.05$  were also included.

**Results:** 194 participants completed the survey with a mean age of 35.3 years. 73.2% were married, 16.5% were pregnant, 93% had one or more children and 81.5% were university educated. For the first five HLQ scales (score range 1–4), the lowest overall score was seen for the scale “Actively managing my health” (mean = 2.96; SD = 0.54). For the last four scales (score range 1–5), the lowest overall score was seen for the scale “Navigating the health care system” (mean = 3.75, SD = 0.67). Nonpregnant women, women with children, women with chronic health conditions and nonmarried women experienced more health literacy challenges.

**Conclusion:** Women in our study showed various strengths and challenges with mean scores varying across the nine HLQ scales. Understanding the health literacy needs of women will enable health services to co-design solutions and interventions capable of responding to the evolving health needs of pregnant women and women with young children. This approach will ensure that codesigned solutions can engage the end-user in healthy lifestyle practices and the solutions are sustainable.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial](https://creativecommons.org/licenses/by-nc/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2022 The Authors. *Health Promotion Journal of Australia* published by John Wiley & Sons Australia, Ltd on behalf of Australian Health Promotion Association.

**So What?:** We must shift away from a “one size fits all” approach to tailor services to respond to the differing health literacy needs of pregnant women and women with young children to support healthy lifestyle practices and reduce the NCD burden.

#### KEYWORDS

chronic diseases, health literacy, healthy lifestyle, maternal and child health, maternal health literacy, noncommunicable disease prevention

## 1 | BACKGROUND

Noncommunicable diseases (NCDs) are the leading cause of death and disability, accounting for 71% of all deaths globally.<sup>1</sup> Most of the global NCD burden (80%) is attributed to five significant NCDs; cardiovascular diseases, diabetes, cancers, chronic respiratory diseases, and mental health conditions.<sup>1</sup> The rising burden of NCDs is contributing to the “social gradient” in health outcomes<sup>2</sup> and is amplifying existing health inequity and poverty.<sup>3</sup> Furthermore, COVID19 is accelerating the NCD burden due to the disruption of essential health services.<sup>4</sup> Additionally, people with existing NCDs are more vulnerable to hospitalisation and death due to COVID19 when compared to their NCD-free counterparts.<sup>5</sup>

A similar trend has been seen in Australia, where NCDs are responsible for 89% of all deaths and place a significant burden on the health and economic growth of the country.<sup>6</sup> Most NCDs (80%) share common modifiable behavioural risk factors, including tobacco use, unhealthy diet, physical inactivity, and harmful alcohol consumption. These behavioural risk factors often contribute to metabolic changes such as high blood pressure, obesity/overweight, and increased cholesterol, further increasing the risk of developing NCDs.<sup>1</sup> Additionally, social determinants of health (family environment, parenting skills and role modelling, education, lifelong learning, housing, employment etc.) influence the prevalence, distribution and risk of developing NCDs in the future.<sup>2</sup> Addressing the common risk factors and social determinants of health is essential to tackle the growing burden of NCDs in Australia and globally.<sup>7</sup>

Previously thought to be conditions associated more with ageing, increasingly NCDs affect people of all ages. Growing evidence suggests that the origin of NCDs in adult life is determined in the uterus<sup>8</sup> and maternal health is strongly linked with NCDs and associated risk factors.<sup>5</sup> Women's health status and lifestyle before, during and after pregnancy can influence the risk of developing an NCD in the future for them and their children.<sup>8</sup> This leads to amplification of the intergenerational perpetuation of NCDs burden. Thus, a circuit breaker is urgently required to address the growing burden of NCDs.

Pregnancy and early motherhood provide a valuable opportunity to improve women's prenatal and postnatal health and reduce the intergenerational impact of NCDs.<sup>9,10</sup> Whilst we acknowledge the changing role of the spousal figure and the diversity of family composition today, the majority of NCDs can be prevented by supporting women (who remain the primary caregivers in most households) to engage in healthy lifestyle practices by empowering them to address common risk factors earlier in the life course.<sup>8,10</sup>

Health literacy is one such tool that can empower people to improve control over their health, influence health behaviour and accelerate the prevention and management of NCDs.<sup>11,12</sup> There is no universally accepted definition for health literacy,<sup>13</sup> however, the World Health Organization defines health literacy as the personal characteristics and social resources that influence the ability of individuals and communities to access, understand, appraise, remember, apply and use information, knowledge and services to make decisions to promote health and sustain healthy behaviour.<sup>14</sup>

Recently, health literacy has been recognised as a much broader concept than an individual's asset. Policymakers are being encouraged to consider how organisations and health services respond to the health literacy needs of individuals and communities to ensure healthier choices are more accessible choices. This is referred to as health literacy responsiveness.<sup>14,15</sup> For services to be ‘health literacy responsive’, they must first understand the health literacy needs of the people in their community and then implement practices that respond to people's needs regardless of their health literacy. This is consistent with the “Optimise Health Literacy and Access” (Ophelia) approach which, provides researchers, health professionals and policymakers with a method to address the health literacy needs and reduce inequity within their local community through the codesign of solutions according to those needs.<sup>16</sup> Thus, empowering women with the asset of health literacy and enhancing their access to health literacy responsive services may enable them to achieve healthy lifestyles before, during, and after pregnancy. This strategy may act as an effective way of preventing NCDs and achieving sustainable and equitable health and wellbeing outcomes.

Research has shown that health literacy can improve health outcomes,<sup>11</sup> sustain healthy behaviour,<sup>17</sup> increase uptake of preventive services and reduce health inequity.<sup>18</sup> However, minimal research has focused on understanding the health literacy needs of pregnant women and women with young children. Our recent scoping review<sup>19</sup> identified a need to create awareness about the importance of addressing the health literacy of pregnant women and women with young children. The study determined that existing interventions failed to consider and address the health literacy needs of women, therefore, were ineffective in engaging women in healthy lifestyle practices.<sup>19</sup> A systematic review by Nawabi et al.<sup>20</sup> found significant heterogeneity in measurement tools used to understand the health literacy status of pregnant women. In addition, no studies focused on developing solutions to respond to health literacy needs of pregnant women and women with young children.<sup>20</sup> Thus, more research is

**TABLE 1** Demographic data for total sample ( $n = 194$ )

Demographic variable		% (n)	Missing
Age	18-30 years	15.4 (28)	2
	≥30	84.5 (164)	
Lives alone		1.0 (2)	2
Born in Australia		89.2 (173)	1
Married		73.2 (142)	1
Pregnant		16.5 (32)	1
Number of children	0	6.2 (12)	3
	1	40.2 (78)	
	2	33.0 (64)	
	> = 3	19.1 (37)	
English spoken at home		98.5 (191)	1
Identifies as Aboriginal/Torres Strait Islander		4.1 (8)	1
Highest level of education	High school or less	8.7 (17)	1
	TAFE/Trade	9.3 (18)	
	University undergraduate	40.7 (79)	
	University postgraduate	40.7 (79)	
Employment Status	Working full time	20.6 (40)	1
	Working part time	51.5 (100)	
	Home duties	15.50 (30)	
	Full time/part time student	4.60 (9)	
No chronic health condition		64.4 (125)	0
Arthritis		2.6 (5)	0
Backpain		4.60 (9)	0
Heart disease		2.10 (4)	0
Asthma/Lung disease		13.40 (26)	0
Cancer		1.0 (2)	0
Depression/Anxiety		20.1 (39)	0
Diabetes		0.5 (1)	0

required globally and nationally to understand the health literacy strengths and challenges of pregnant women and women caring for young children.

Tasmania is an island state in Australia that experiences some of the worst health outcomes nationally. Compared to national averages, Tasmanians experience a greater prevalence of NCDs such as heart diseases (6.0% compared to 4.8%), diabetes (5.5% compared to 4.9%), cancer (3.8% compared to 1.8%) and asthma (12.9% compared to 11.2%).<sup>21</sup> Mental health conditions are on the rise amongst young and middle-aged Tasmanians.<sup>22</sup> Tasmanians also perform poorly against several NCD risk factors. For example, the rates of overweight and obesity among Tasmanian women increased from 49% in 2009 to 57% in 2016. In addition, more than 50% of Tasmanian women who gave birth in 2016 were overweight or obese during their first antenatal visit.<sup>22</sup> These women were at higher risk of developing gestational diabetes which may impact health outcomes for themselves and their children. Also, the prevalence of smoking during pregnancy was 13% and higher among teenage mothers (35%), which can result in poor health outcomes for mothers and their children.<sup>22</sup>

The National Health Survey 2017-2018 showed that Tasmanians have some of the lowest health literacy (across some scales of the Health Literacy Questionnaire).<sup>23</sup> However, no information is available specifically about the health literacy of pregnant women and women with young children in Tasmania. In recognition of the significant burden of NCDs in the region, this study aims to identify the health literacy strengths and challenges of pregnant women and women with children (0-8 years) living in Tasmania. It also aims to describe health literacy status according to demographic characteristics. Determining the health literacy status of Tasmanian women will help to create context-specific solutions that may help to reduce the future burden of NCDs in Tasmania.

## 2 | METHODS

This study was carried out in Tasmania, Australia. This study is the first phase (a cross-sectional survey) of a larger program of work (including interviews and workshops) that aims to codesign health

literacy solutions for pregnant women and mothers with young children in Tasmania. The larger program of work will follow the Ophelia approach,<sup>16</sup> using data from each phase to design locally responsive solutions to support and enable mothers and their children to engage in healthy lifestyle practices to reduce the future burden of NCDs.

The project received ethics approval from the Tasmania Health and Medical Human Research Ethics Committee (Ethics approval number H0023036). All participants were required to read an information sheet and give electronic consent prior to admission to the survey.

## 2.1 | Participant recruitment

Pregnant women and/or women with children (0-8 years) living in Tasmania were recruited using convenience sampling.<sup>24</sup> This involved distributing invitations to complete an online survey via flyers and Facebook posts. Flyers (electronic and paper-based) were distributed to various hospitals, maternity, child health and parenting services and through the research teams' professional networks. Researchers shared flyers multiple times through their personal Facebook accounts and paid Facebook advertisement services. Flyers and Facebook posts invited potential participants to scan a QR code or click on a link that directed them to an online survey.

## 2.2 | Data collection

Data were collected online (22nd March 2021 and 15th July 2021) through the REDCap survey tool.<sup>25</sup> The online survey consisted of: Information sheet, consent form, demographic questions (13 items) and a health literacy questionnaire (HLQ). The HLQ is a 44-item multidimensional questionnaire that measures the concept of health literacy across nine distinct scales. The HLQ was developed using a substantial grounded validity-driven approach and has robust psychometric properties.<sup>26</sup> The HLQ helps to generate a holistic picture of health literacy strengths and challenges people face in their daily lives.<sup>26</sup> The nine scales of the HLQ are:

1. Feeling understood and supported by health care providers (4 items).
2. Having sufficient information to manage my health (4 items).
3. Actively managing my health (5 items).
4. Social support for health (5 items).
5. Appraisal of health information (5 items).
6. Ability to actively engage with health care providers (5 items).
7. Navigating the health care system (6 items).
8. Ability to find good health information (5 items).
9. Understand health information enough to know what to do (5 items).

Scales 1-5 are scored using a 4-point scale: strongly disagree [4], disagree [3], agree [2] and strongly agree [1]. Scales 6-9 are scored

**TABLE 2** Health literacy questionnaire (HLQ) scores for overall sample (n = 194)

HLQ scale		Mean (SD) [95% CI]
Range 1 (lowest) to 4 (highest)		
Scale 1	Feeling understood and supported by health care professionals	3.10 (0.65) [3.00, 3.19]
Scale 2	Having sufficient information to manage my health	3.17 (0.49) [3.10, 3.24]
Scale 3	Actively managing my health	2.96 (0.54) [2.88, 3.04]
Scale 4	Social support for health	3.07 (0.59) [2.98, 3.15]
Scale 5	Appraisal of health information	3.10 (0.55) [3.02, 3.18]
Range 1 (lowest) to 5 (highest)		
Scale 6	Ability to actively engage with health care professionals	3.92 (0.65) [3.82, 4.01]
Scale 7	Navigating the health care system	3.75 (0.67) [3.66, 3.85]
Scale 8	Ability to find good health information	4.20 (0.55) [4.13, 4.28]
Scale 9	Understand health information enough to know what to do	4.39 (0.49) [4.32, 4.46]

using a 5-point scale: cannot do [1], very difficult [2], quite difficult [3], easy [4] and very easy [5]. The HLQ does not provide an overall score instead, it gives a separate score for each scale. Individual scores are calculated by adding the item scores within the scale and dividing by the number of items in that scale. This supports the interpretation of specific strengths and challenges experienced by the respondents across various health literacy scales.<sup>26</sup> An overall single mean score for the HLQ is not recommended.

## 2.3 | Data analysis

Demographic and HLQ data were analysed using IBM SPSS Statistics version 27. Descriptive statistics were used to calculate frequencies, measure of central tendency (mean) and dispersion (standard deviation). The normality of data distribution was checked using Kolmogorov-Smirnov tests.<sup>27</sup>

All HLQ scales were non-normally distributed (see Figure S1), therefore we used robust Analysis of Variance (ANOVA) using the Welch Method<sup>28</sup> to understand the difference in means across demographic variables. Furthermore, post hoc testing using the Games-Howell method of multiple mean comparisons was undertaken where required.

Effect size's (ES) for standardised differences in means were calculated using Cohen's d with interpretation of ES as follows: small ES = <0.20-0.50; medium ES = 0.50-0.80; large ES = >0.80.<sup>29</sup> A P-value of < 0.05 was considered statistically significant, and 95% confidence intervals (CI) were calculated where appropriate. The

TABLE 3 Association between demographic characteristics and HLQ scores

HLQ scale	Scale 1: Feeling understood and supported by health care professionals	Scale 2: Having sufficient information to manage my health	Scale 3: Actively managing my health	Scale 4: Social support for health	Scale 5: Appraisal of health information	Scale 6: Ability to actively engage with health care professionals	Scale 7: Navigating the health care system	Scale 8: Ability to find good health information	Scale 9: Understand health information enough to know what to do
Born in Australia	No (n = 20), Mean (SD)	3.05 (0.41)	3.13 (0.46)	3.02 (0.42)	3.03 (0.44)	3.07 (0.50)	3.67 (0.48)	4.13 (0.50)	4.28 (0.46)
	Yes (n = 173), Mean (SD)	3.10 (0.67)	3.17 (0.50)	2.95 (0.55)	3.07 (0.61)	3.10 (0.55)	3.76 (0.69)	4.21 (0.55)	4.40 (0.49)
	Effect Size (95% CI)	0.08 (−0.39, 0.54)	0.08 (−0.38, 0.54)	−0.13 (−0.59, 0.33)	0.07 (−0.40, 0.53)	0.06 (−0.40, 0.52)	0.13 (−0.33, 0.60)	0.15 (−0.32, 0.61)	0.25 (−0.22, 0.71)
Marital Status	Not married (n = 49)	<b>2.88 (0.74)</b>	3.07 (0.45)	2.87 (0.59)	2.92 (0.72)	3.02 (0.60)	<b>3.67 (0.67)</b>	4.05 (0.60)	4.32 (0.50)
	Married (n = 142)	<b>3.15 (0.59)</b>	3.20 (0.50)	3.00 (0.51)	3.11 (0.54)	3.13 (0.53)	<b>3.99 (0.62)</b>	4.25 (0.52)	4.41 (0.48)
	Effect Size (95% CI)	0.43 (0.10, 0.76)	0.27 (−0.06, 0.59)	0.25 (−0.08, 0.57)	0.32 (−0.06, 0.65)	0.20 (−0.16, 0.53)	0.29 (−0.04, 0.61)	0.37 (0.04, 0.67)	0.19 (−0.14, 0.51)
Pregnancy Status	No (n = 161)	<b>3.03 (0.65)</b>	3.16 (0.50)	<b>2.90 (0.54)</b>	3.04 (0.60)	3.09 (0.55)	3.74 (0.69)	4.20 (0.56)	4.39 (0.48)
	Yes (n = 32)	<b>3.41 (0.51)</b>	3.21 (0.42)	<b>3.24 (0.43)</b>	3.19 (0.53)	3.16 (0.55)	3.80 (0.61)	4.25 (0.49)	4.41 (0.55)
	Effect Size (95% CI)	0.60 (0.22, 0.99)	0.10 (−0.28, 0.48)	0.65 (0.26, 1.03)	0.26 (−0.13, 0.63)	0.13 (−0.25, 0.50)	0.09 (−0.29, 0.47)	0.09 (−0.29, 0.47)	0.04 (−0.34, 0.42)
Number of children	0 (n = 12)	<b>3.56 (0.46)</b>	3.19 (0.40)	<b>3.30 (0.31)</b>	<b>3.35 (0.45)</b>	3.16 (0.61)	3.90 (0.78)	4.23 (0.67)	4.50 (0.70)
	1 (n = 78)	3.09 (0.58)	3.18 (0.48)	3.01 (0.58)	3.18 (0.52)	3.13 (0.54)	3.78 (0.60)	4.27 (0.49)	4.46 (0.44)
	2 (n = 64)	3.13 (0.58)	3.16 (0.50)	2.85 (0.49)	3.01 (0.53)	3.02 (0.51)	3.76 (0.67)	4.15 (0.56)	4.35 (0.50)
	> = 3 (n = 37)	<b>2.89 (0.82)</b>	3.17 (0.55)	<b>2.93 (0.51)</b>	<b>2.83 (0.76)</b>	3.13 (0.61)	3.65 (0.80)	4.18 (0.62)	4.34 (0.49)
	High school completed or less (n = 17)	3.14 (0.87)	3.09 (0.51)	2.76 (0.49)	3.02 (0.60)	2.89 (0.43)	3.68 (0.78)	4.03 (0.63)	4.29 (0.56)
Education status	TAFE/Trade (n = 18)	3.01 (0.78)	3.15 (0.63)	3.02 (0.50)	2.84 (0.86)	2.94 (0.61)	3.62 (0.91)	4.00 (0.74)	4.35 (0.53)
	University - Undergraduate degree (n = 79)	3.01 (0.69)	3.18 (0.52)	2.92 (0.61)	3.06 (0.63)	3.13 (0.62)	3.73 (0.66)	4.19 (0.50)	4.34 (0.53)
	University - Postgraduate degree (n = 79)	3.18 (0.50)	3.18 (0.43)	3.03 (0.49)	3.13 (0.46)	3.14 (0.46)	3.82 (0.61)	4.30 (0.51)	4.47 (0.42)
	Working Full Time (n = 40)	3.12 (0.67)	3.20 (0.45)	2.88 (0.54)	3.13 (0.54)	3.16 (0.64)	3.85 (0.61)	4.31 (0.55)	4.49 (0.52)
Employment Status	Working Part Time (n = 100)	3.08 (0.64)	3.13 (0.53)	2.99 (0.55)	3.03 (0.63)	3.07 (0.54)	3.68 (0.76)	4.17 (0.58)	4.39 (0.47)
	Home Duties (n = 30)	3.12 (0.71)	3.20 (0.44)	2.99 (0.54)	3.00 (0.10)	3.14 (0.46)	3.84 (0.57)	4.24 (0.50)	4.31 (0.56)
	Full time/part time student (n = 9)	3.17 (0.54)	3.05 (0.43)	2.95 (0.55)	3.02 (0.42)	3.00 (0.43)	3.54 (0.49)	4.04 (0.41)	4.24 (0.42)

(Continues)

TABLE 3 (Continued)

HLQ scale	Scale 1: Feeling understood and supported by health care professionals	Scale 2: Having sufficient information to manage my health	Scale 3: Actively managing my health	Scale 4: Social support for health	Scale 5: Appraisal of health information	Scale 6: Ability to actively engage with health care professionals	Scale 7: Navigating the health care system	Scale 8: Ability to find good health information	Scale 9: Understand health information enough to know what to do
Chronic health condition									
No (n = 125)	3.04 (0.58)	3.10 (0.55)	2.96 (0.54)	3.12 (0.54)	3.10 (0.54)	4.00 (0.54)	3.80 (0.54)	4.23 (0.48)	4.40 (0.46)
Yes (n = 69)	3.21 (0.75)	3.21 (0.45)	2.95 (0.53)	2.97 (0.66)	3.09 (0.56)	<b>3.77 (0.81)</b>	3.66 (0.86)	4.16 (0.65)	4.38 (0.53)
Effect Size Chronic Condition (95% CI)	0.26 (−0.03, 0.56)	0.21 (−0.08, 0.51)	−0.02 (−0.31, 0.27)	−0.26 (−0.55, 0.04)	−0.02 (−0.31, 0.28)	−0.35 (−0.65, −0.06)	−0.21 (−0.50, −0.09)	−0.13 (−0.42, 0.16)	−0.04 (−0.33, 0.25)
Asthma/Lung Disease									
No (n = 168)	3.10 (0.67)	3.18 (0.48)	2.96 (0.55)	3.10 (0.57)	3.10 (0.54)	3.94 (0.64)	3.77 (0.64)	4.20 (0.54)	4.38 (0.50)
Yes (n = 26)	3.05 (0.87)	3.13 (0.53)	2.93 (0.44)	2.89 (0.67)	3.10 (0.62)	3.77 (0.73)	3.64 (0.87)	4.20 (0.58)	4.43 (0.43)
Effect Size Asthma/Lung Disease (95% CI)	−0.07 (−0.49, 0.34)	−0.10 (−0.52, 0.31)	−0.06 (−0.47, 0.36)	−0.36 (−0.77, 0.06)	0 (−0.41, 0.41)	−0.26 (−0.67, 0.15)	−0.19 (−0.61, 0.22)	0 (−0.41, 0.41)	0.10 (−0.31, 0.52)
Depression/Anxiety									
No (n = 155)	3.06 (0.59)	3.18 (0.46)	2.96 (0.54)	3.11 (0.55)	3.10 (0.52)	3.96 (0.58)	3.78 (0.60)	4.21 (0.51)	4.40 (0.46)
Yes (n = 39)	3.23 (0.82)	3.13 (0.60)	2.94 (0.55)	2.91 (0.70)	3.09 (0.63)	3.74 (0.88)	3.65 (0.89)	4.17 (0.68)	4.36 (0.58)
Effect Size Depression/Anxiety (95% CI)	0.27 (−0.09, 0.62)	−0.10 (−0.45, 0.25)	−0.04 (−0.39, 0.31)	−0.34 (−0.70, 0.01)	−0.02 (−0.37, 0.33)	−0.39 (−0.69, 0.01)	−0.19 (−0.55, 0.16)	−0.07 (−0.42, 0.28)	−0.08 (−0.43, 0.27)

Note: Results in bold have  $P$ -value > 0.05 for difference in means (tested using robust ANOVA); Effect size (ES) calculated using Cohen's  $d$  for standardised difference in means. Interpretation of ES: "small" ES > 0.20–0.50 SD, "medium" ES approximately 0.50–0.80 SD, and "large" ES > 0.80 SD.



description of demographic differences across the HLQ scales was focused on ES, and the differences found to be statistically significant at  $P < 0.05$  were also included. The ES was calculated for variables with two categories.

### 3 | RESULTS

A total of 194 participants completed the survey over the 4-month period. The demographic characteristics of the study sample are shown in Table 1. Participants' mean age (SD) was 35.3 years (6.04), ranging from 19 to 51 years. Most participants were Australian born, married (does not include de-facto relationship), university educated, not pregnant and had one child. Thirty-six percent of participants self-reported having a chronic health condition. The most common chronic health conditions were depression/anxiety (20%) and asthma/lung diseases (13%).

The mean score of each HLQ scale is shown in Table 2 and the distribution of each HLQ scale is shown as a Figure S1.

For the first five scales scored using the range 1 (strongly disagree) to 4 (strongly agree), the highest overall score was seen for the scale "Having sufficient information to manage my health" (mean = 3.17; SD = 0.49) and the lowest overall score was seen for the scale "Actively managing my health" (mean = 2.96; SD = 0.54). For the last four scales which were scored using range 1 (cannot do) to 5 (very easy), the highest score was seen for the scale "Understand information enough to know what to do" (mean = 4.39, SD = 0.49) and the lowest for "Navigating the health care system" (mean = 3.75, SD = 0.67).

The pattern of HLQ scores according to demographic status is shown in Table 3. Statistically significant differences in health literacy mean scores were seen for marital status (HLQ scales 1 and 6), pregnancy status (scales 1 and 3), number of children (scales 1, 3 and 4) and chronic health conditions (scale 6). No significant differences in mean scores were seen for demographic characteristics such as the country of birth, education status, employment status and existing chronic conditions (asthma/lung disease and depression/anxiety). Due to small cell sizes ( $n < 10$ ), the results for living status (living with husband/partner/family/friends or alone), English spoken at home, identified as Aboriginal or Torres Strait Islander and existing chronic conditions (arthritis, back pain and heart diseases) are not reported here.

A small to medium ES for the difference in means was seen for pregnancy status, with pregnant women having higher health literacy scores than nonpregnant women across the nine HLQ scales. The largest ES of 0.60 and 0.65 was seen for the scales "Actively managing my health" and "Feeling understood and supported by health care professionals".

Small to medium ES for the difference in means was seen for marital status, with married women having higher health literacy scores than nonmarried women across the nine HLQ scales. A statistically significant difference in mean scores was seen for scales "Feeling

understood and supported by health care professionals" and "Ability to actively engage with health care professionals".

Small to medium ES for the difference in means was observed among participants with and without chronic health conditions, although differences were not statistically significant. Participants without chronic health conditions had higher health literacy scores than those with chronic health conditions except for the scales' Feeling understood and supported by health care professionals and "Having sufficient information to manage my health".

Small to medium ES for the difference in means was observed among participants with or without depression/anxiety for the scales' Feeling understood and supported by health care professionals'; "Social support for health" and 'Ability to actively engage with health care professionals'. Participants without depression/anxiety had higher health literacy scores than those with depression/anxiety except for the scale "Feeling understood and supported by health care professionals". For lung disease/asthma, small to medium ES for the difference in means was seen for scales' Social support for health" and 'Ability to actively engage with health care professionals'. However, none of these differences were statistically significant.

The mean health literacy scores were higher for participants with no children than those with one or more children across the nine HLQ scales. The difference in means for the number of children was found to be statistically significant between women with no children and women with three or more children for the scales' Feeling understood and supported by health care professionals'; "Actively managing my health" and "Social support for health".

The difference in mean health literacy scores for education status was not statistically significant across the nine HLQ scales. However, those with a university postgraduate degree had higher health literacy scores across the nine HLQ scales than those with a university undergraduate degree and those without a university degree (High school completed or TAFE/Trade). In addition, the difference in means for employment status was not statistically significant across nine HLQ scales.

### 4 | DISCUSSION

This study aimed to describe the health literacy strengths and challenges of pregnant women and women with young children and compare these across demographic characteristics. It is the first time this population group's health literacy has been assessed using a validated multidimensional HLQ. Women in our study showed various strengths and challenges with mean scores varying across the nine HLQ scales, thus highlighting the need to enhance and tailor health services according to the differing needs of pregnant women and women caring for young children. Demographic characteristics linked with significant health literacy challenges included being unmarried, nonpregnant, having children and the presence of chronic health conditions. These findings emphasise the need to shift from the notion of a "one size fit all" approach to tailoring interventions to effectively

meet the differing health literacy needs of different demographic groups accordingly.

Across the first five HLQ scales, the lowest mean scores were observed for the scale “Actively managing my health”. This scale is related to the participant's ability to increase control over their health and actively engage in self-care and healthy lifestyle practices.<sup>26</sup> The challenges in this scale may be explained by the fact that pregnancy and motherhood are considered challenging, and women can struggle to balance between providing adequate childcare and actively managing their physical, mental, and emotional health and wellbeing.<sup>30,31</sup> In addition, women tend to sacrifice their needs for their children and prioritise their children health over their own health which further impacts self-care practices.<sup>32</sup> Further structural and cultural barriers such as societal expectations during motherhood, gender imbalances in families and stigmatisation further impacts their ability to self-care and access health services.<sup>33</sup> Thus, women may require additional support to engage in healthy lifestyle practices and promote self-care.

For the second set of scales, “Navigating the health care system” had the lowest mean score. This scale is related to accessing adequate health care and support services according to an individual's needs.<sup>26</sup> This finding highlights the need to make health care services more accessible, user-friendly, and more responsive to the population's needs.<sup>15</sup> Adequate and timely access to health care is essential for optimising the management of women and their child's health and reduce the existing health inequalities.<sup>34</sup> Doing so will ensure the health system can effectively meet the changing health needs of pregnant women and women caring for young children and enable them to access women-centred health and support services in a timely manner.

Compared to the mean health literacy scores of the Tasmanian population reported in the National Health Survey 2017-2018,<sup>23</sup> our study participants scored higher on the scales “Having sufficient information to manage my health” (3.17 in this study compared to 3.14); “Appraisal of health information” (3.10 compared to 2.89); “Ability to find good health information” (4.20 compared to 4.05) and “Understand health information enough to know what to do” (4.39 compared to 4.22). The higher scores on these scales may be attributed to the percentage of study participants (81.5%) having a university-level education. Whilst we did not observe any statistically significant difference in mean scores across education levels, those with a university postgraduate degree (e.g. PhD) had higher HLQ scores than those with a university undergraduate degree and those without a university degree (secondary education and TAFE). Higher educational attainment is associated with higher health literacy<sup>35,36</sup> and can play a significant role in mediating the relationship between health literacy and health behaviours.<sup>37</sup> However, it is important to acknowledge that the level of health literacy may also vary among people attending university depending on the discipline (health/nonhealth related course) and duration (undergraduate/postgraduate) of their degree.<sup>38,39</sup>

The mean health literacy scores were higher for married women than unmarried women. This may be attributed to the availability of additional physical, emotional and social support from their spouse and extended family. Lack of social support and connections has been

found to be associated with more significant health literacy challenges.<sup>40</sup> Social support for health is an important concept linked with distributed health literacy.<sup>41</sup> Distributed health literacy acknowledges that health literacy is distributed among family members, social networks and communities and can influence the health decision-making ability of individuals and communities.<sup>41</sup> Research has shown that the women's family and social networks can influence health decision-making and appropriate access to health services and consequently mediate positive and negative health outcomes.<sup>42</sup> This finding has important implications to ensure that social/community support services are enhanced, so that women feel supported and empowered to improve their health and their children's health. A potential solution can be the use of peer mother groups and home visiting programs during and after pregnancy as they can be effective in developing community resilience and social capital and for sharing experience and knowledge.<sup>43,44</sup> These attributes can be crucial in developing social networks, social trust and a sense of security within community and between women and service providers.<sup>45,46</sup> This can further support and enable women to make informed decisions to improve their health<sup>47</sup> and may play a role in achieving healthy lifestyle practices for them and their children.

This study observed higher health literacy scores for pregnant women than nonpregnant women across all the nine HLQ scales. Higher health literacy scores during pregnancy may be attributed to increased interaction with the health system and motivation to achieve healthy pregnancy outcomes. Research has shown that pregnancy may motivate women to engage in healthy lifestyle practices<sup>9</sup> and thus can act as a critical timepoint to address the changing health needs of women and their families. Understanding the health literacy needs of women during pregnancy can play a beneficial role in designing person-centric solutions capable of supporting women to improve their health and the health of the future generation.

Furthermore, women with no children had higher health literacy scores than women with one or more children. This may be because motherhood is often stressful and time-consuming,<sup>31</sup> and the challenges of women may increase with an increase in the number of children.<sup>48</sup> Thus, women may require extended support from health and social services to maintain their health and optimally care for their children. This has implications for policymakers and health systems to ensure that the health needs of women are addressed, and support services are sustained beyond the pregnancy, so women receive extended support to engage in healthy lifestyle practices during pregnancy and beyond.<sup>19</sup>

Participants without chronic health conditions demonstrated higher health literacy levels than those with chronic health conditions, with small to medium ES noted. This finding is supported by other research which has shown that people with chronic health conditions are more likely to have more health literacy challenges.<sup>49,50</sup> This may be attributed to lower health literacy mediating the development of chronic diseases or the changing people's health literacy needs to manage chronic diseases or both. Another explanation could be that people with chronic diseases are likely to have more interaction with the health system and thus may encounter more challenges than



people without chronic diseases who have less interaction with the health system.<sup>49</sup>

The most common chronic health condition reported in this study was depression/anxiety, self-reported in 20.10% of participants, a similar prevalence to the Tasmanian population average of 21.7%<sup>21</sup> thus highlighting a considerable need to enhance mental health services. Women with depression/anxiety reported facing challenges while engaging with health care providers and social support for health. This finding is supported by existing literature that mental health conditions may influence an individual's ability to engage and communicate with their networks and health professionals<sup>49</sup> and thus may impact their use of health services. This is an important finding for policymakers and health providers as it highlights the need to invest resources to understand the health literacy challenges of pregnant women and women with young children living with mental health conditions to empower them to increase control over their health. The WHO identifies mental health conditions both as an NCD and as risk factor for other NCDs and urges an integrated approach to reduce its growing burden.<sup>12</sup>

## 5 | STRENGTHS AND LIMITATIONS

This is the first study to describe the health literacy status of pregnant women and women with young children using the multidimensional HLQ in this priority population group globally and in Australia. While earlier studies have used various tools to identify the health literacy status of pregnant women and women caring for children, those tools provide a single mean health literacy score and fail to provide a holistic picture of their various health literacy strengths and challenges. Using the HLQ enables the identification of strengths and challenges across different health literacy scales, which will help to inform the design of context-specific solutions capable of improving health outcomes and achieving health equity. Whilst outside the scope of this paper, qualitative research is warranted to better understand the meanings of the results and to further explore health literacy strengths and challenges of this population group.

A major limitation in this research was the convenience sampling approach. We attempted to encourage broad participation throughout Tasmania by promoting the survey through paid Facebook advertisements, child and family health centres (state-wide), and professional networks. The high educational attainment of our study participants is evidence of this concern. There is a relationship between high educational attainment and higher health literacy,<sup>35</sup> which may overestimate our study results. It should be highlighted that the health literacy challenges of pregnant women/women caring for children with high educational attainment may differ from those with low educational attainment and thus our findings may not be extrapolated to the broader population. Thus, future studies must do more to engage a diverse sample of women (representing women from a variety of education levels and cultural backgrounds) to yield some insightful and generalisable results.

Another possible limitation of our study was that data were collected using an online survey tool. The online survey may have limited

participation for some cohorts and may have led to poor representation of participants with low education, low socioeconomic status or poor/no internet access. These groups may already be missing out from existing services, and future research should employ effective recruitment strategies to understand the needs of these hard-to-reach groups.

## 6 | CONCLUSION

The health literacy strengths and challenges of pregnant women and women caring for young children in Tasmania varied across different HLQ scales. In this sample of Tasmanian women, nonpregnant women, women with one or more children, women with chronic health conditions and unmarried women experienced the most health literacy challenges. These subgroups may be at increased risk of experiencing challenges associated with accessing health care and the required resources to improve their health outcomes. Thoughtful consideration of the health literacy needs of users will enable health services to develop and implement solutions and interventions capable of responding to the evolving health needs of pregnant women and women with young children effectively. Ultimately, this will empower women to be the circuit breaker capable of reducing the growing burden of NCDs in Tasmania and globally.

## ACKNOWLEDGMENTS

The authors thank Professor Richard Osborne, Centre for Global Health and Equity, Swinburne University of Technology for his generous contribution to access Health Literacy Questionnaire used for data collection in this study. Open access publishing facilitated by University of Tasmania, as part of the Wiley - University of Tasmania agreement via the Council of Australian University Librarians.

## CONFLICT OF INTEREST

Dr Rosie Nash is Editorial Board member of Health Promotion Journal of Australia and co-author of this article. To minimise bias, they were excluded from all editorial decision-making related to the acceptance of this article for publication.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## ORCID

Satish Melwani  <https://orcid.org/0000-0001-8256-3330>

Rosie Nash  <https://orcid.org/0000-0003-3695-0887>

## REFERENCES

1. World Health Organisation. Noncommunicable diseases. 2021. Available from: <https://www.who.int/news-room/fact-sheets/detail/non-communicable-diseases>
2. Marmot M, Bell R. Social determinants and non-communicable diseases: time for integrated action. *BMJ*. 2019;364:l251.

3. Pullar J, Allen L, Townsend N, Williams J, Foster C, Roberts N, et al. The impact of poverty reduction and development interventions on non-communicable diseases and their behavioural risk factors in low and lower-middle income countries: a systematic review. *PLOS ONE*. 2018;13(2):e0193378.
4. McCloskey EV, Harvey NC, Johansson H, Lorentzon M, Vandenput L, Liu E, et al. Global impact of COVID-19 on non-communicable disease management: descriptive analysis of access to FRAX fracture risk online tool for prevention of osteoporotic fractures. *Osteopor Int*. 2021;32(1):39–46.
5. Kapur A, Hod M. Maternal health and non-communicable disease prevention: an investment case for the post COVID-19 world and need for better health economic data. *Int J Gynecol Obstet*. 2020;150(2):151–8.
6. World Health Organisation. Noncommunicable Diseases Progress Monitor 2020. 2020.
7. World Health Organisation. European strategies for tackling social inequities in health: Levelling up Part 2. 2006. Available from: [https://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0018/103824/E89384.pdf](https://www.euro.who.int/__data/assets/pdf_file/0018/103824/E89384.pdf)
8. Kapur A. Links between maternal health and NCDs. *Best Pract Res Clin Obstet Gynaecol*. 2015;29(1):32–42.
9. Hansen EC, Frandsen M, Williams D, Ferguson SG. Australian women's experiences of smoking, cessation and 'cutting down' during pregnancy. *Health Sociol Rev*. 2019;28(1):39–53.
10. Mikkelsen B, Williams J, Rakovac I, Wickramasinghe K, Hennis A, Shin H-R, et al. Life course approach to prevention and control of non-communicable diseases. *BMJ*. 2019;364:l257.
11. Batterham RW, Hawkins M, Collins PA, Buchbinder R, Osborne RH. Health literacy: applying current concepts to improve health services and reduce health inequalities. *Public Health*. 2016;132:3–12.
12. World Health Organisation. WHO Independent High-level Commission on NCDs Report of Working Group 1 2019. Available from: <https://www.who.int/ncds/governance/high-level-commission/HLC2-WG1-report.pdf?ua=1>
13. Sørensen K, Van Den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health*. 2012;12(1):80.
14. World Health Organisation. Health literacy toolkit for low- and middle-income countries: a series of information sheets to empower communities and strengthen health systems India: World Health Organisation, Regional Office for South-East Asia; 2015. Available from: <https://apps.who.int/iris/bitstream/handle/10665/205244/B5148.pdf?sequence=1&isAllowed=y>
15. Trezona A, Dodson S, Osborne RH. Development of the organisational health literacy responsiveness (org-HLR) framework in collaboration with health and social services professionals. *BMC Health Serv Res*. 2017;17(1):513.
16. Batterham RW, Buchbinder R, Beauchamp A, Dodson S, Elsworth GR, Osborne RH. The OPTimising HEalth LiterAcY (Ophelia) process: study protocol for using health literacy profiling and community engagement to create and implement health reform. *BMC Public Health*. 2014;14(1):694.
17. Jessup RL, Osborne RH, Buchbinder R, Beauchamp A. Using co-design to develop interventions to address health literacy needs in a hospitalised population. *BMC Health Serv Res*. 2018;18(1):989.
18. Beauchamp A, Mohebbi M, Cooper A, Pridmore V, Livingston P, Scanlon M, et al. The impact of translated reminder letters and phone calls on mammography screening booking rates: two randomised controlled trials. *PLOS ONE*. 2020;15(1):e0226610.
19. Melwani S, Cleland V, Patterson K, Nash R. A scoping review: global health literacy interventions for pregnant women and mothers with young children. *Health Promot Int*. 2021;37:1–35.
20. Nawabi F, Krebs F, Vennedey V, Shukri A, Lorenz L, Stock S. Health literacy in pregnant women: a systematic review. *Int J Environ Res Public Health*. 2021;18(7):3847.
21. Australian Bureau of Statistics. National Health Survey: First Results, 2017–18 - Key Findings. 2019.
22. Department of Health and Human Services. The State of Public Health Tasmania. 2018. Available from: [https://www.dhhs.tas.gov.au/\\_\\_data/assets/pdf\\_file/0004/375025/The\\_State\\_of\\_Public\\_Health\\_Tasmania\\_2018\\_v10.pdf](https://www.dhhs.tas.gov.au/__data/assets/pdf_file/0004/375025/The_State_of_Public_Health_Tasmania_2018_v10.pdf)
23. Australian Bureau of Statistics. National health survey: Health Literacy, 2018. 2019. Available from: <https://www.abs.gov.au/ausstats/abs@nsf/mf/4364.0.55.014>
24. Edgar TW, Manz DO. Chapter 4 - exploratory study. In: Edgar TW, Manz DO, editors. *Research Methods for Cyber Security*: Syngress, Cambridge, MA: Elsevier; 2017. pp. 95–130.
25. Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, O'Neal L, et al. The REDCap consortium: building an international community of software platform partners. *J Biomed Inform*. 2019;95:103208.
26. Osborne RH, Batterham RW, Elsworth GR, Hawkins M, Buchbinder R. The grounded psychometric development and initial validation of the health literacy questionnaire (HLQ). *BMC Public Health*. 2013;13(1):658.
27. Lilliefors HW. On the Kolmogorov-Smirnov test for normality with mean and variance unknown. *J Am Stat Assoc*. 1967;62(318):399–402.
28. Welch BL. On the comparison of several mean values: an alternative approach. *Biometrika*. 1951;38(3/4):330–6.
29. Cohen J. Preface to the revised edition. In: Cohen J, editor. *Statistical power analysis for the behavioral sciences*. New York: Academic Press; 1977.
30. Barkin JL, Wisner KL. The role of maternal self-care in new motherhood. *Midwifery*. 2013;29(9):1050–5.
31. Cardwell MS. Stress. *Obstet Gynecol Surv*. 2013;68(2):119–29.
32. Loyal D, Sutter A-L, Rasclé N. Changes in mothering ideology after childbirth and maternal mental health in French women. *Sex Roles*. 2021;85(11):625–35.
33. Kragelund Nielsen K, de Courten M, Kapur A. Health system and societal barriers for gestational diabetes mellitus (GDM) services -- lessons from world diabetes foundation supported GDM projects. *BMC Int Health Hum Rights*. 2012;12(1):33–42.
34. Oladapo O, Tunçalp Ö, Bonet M, Lawrie T, Portela A, Downe S, et al. WHO model of intrapartum care for a positive childbirth experience: transforming care of women and babies for improved health and well-being. *BJOG*. 2018;125(8):918–22.
35. Hosking SM, Brennan-Olsen SL, Beauchamp A, Buchbinder R, Williams LJ, Pasco JA. Health literacy in a population-based sample of Australian women: a cross-sectional profile of the Geelong osteoporosis study. *BMC Public Health*. 2018;18(1):876.
36. Beauchamp A, Buchbinder R, Dodson S, Batterham RW, Elsworth GR, McPhee C, et al. Distribution of health literacy strengths and weaknesses across socio-demographic groups: a cross-sectional survey using the health literacy questionnaire (HLQ). *BMC Public Health*. 2015;15(1):678.
37. Friis K, Lasgaard M, Rowlands G, Osborne RH, Maindal HT. Health literacy mediates the relationship between educational attainment and health behavior: a Danish population-based study. *J Health Commun*. 2016;21(sup2):54–60.
38. Mullan J, Burns P, Weston K, McLennan P, Rich W, Crowther S, et al. Health literacy amongst health professional university students: a study using the health literacy questionnaire. *Educ Sci*. 2017;7(2):54.
39. Storey A, Hanna L, Missen K, Hakman N, Osborne RH, Beauchamp A. The association between health literacy and self-rated health amongst Australian university students. *J Health Commun*. 2020;25(4):333–43.
40. Bo A, Friis K, Osborne RH, Maindal HT. National indicators of health literacy: ability to understand health information and to engage actively with healthcare providers - a population-based survey among Danish adults. *BMC Public Health*. 2014;14(1):1095.

41. Edwards M, Wood F, Davies M, Edwards A. 'Distributed health literacy': longitudinal qualitative analysis of the roles of health literacy mediators and social networks of people living with a long-term health condition. *Health Expect*. 2015;18(5):1180–93.
42. Shannon M, Duong Thuy L, Kirsty F, Kirsten M. Distributed health literacy in the maternal health context in Vietnam. *Health Literacy Res Pract*. 2019;3(1):e31–42.
43. Cameron AJ, Charlton E, Walsh A, Hesketh K, Campbell K. The influence of the maternal peer group (partner, friends, mothers' group, family) on mothers' attitudes to obesity-related behaviours of their children. *BMC Pediatr*. 2019;19(1):357.
44. Eronen E. Experiences of sharing, learning and caring: peer support in a Finnish group of mothers. *Health Soc Care Commun*. 2020;28(2): 576–83.
45. Fujiwara T, Natsume K, Okuyama M, Sato T, Kawachi I. Do home-visit programs for mothers with infants reduce parenting stress and increase social capital in Japan? *J Epidemiol Community Health*. 2012;66(12):1167–76.
46. Wind TR, Villalonga-Olives E. Social capital interventions in public health: moving towards why social capital matters for health. *J Epidemiol Community Health*. 2019;73(9):793–5.
47. Kieffer EC, Welmerink DB, Sinco BR, Welch KB, Rees Clayton EM, Schumann CY, et al. Dietary outcomes in a Spanish-language randomized controlled diabetes prevention trial with pregnant Latinas. *Am J Public Health*. 2014;104(3):526–33.
48. Dennis CL, Falah-Hassani K, Brown HK, Vigod SN. Identifying women at risk for postpartum anxiety: a prospective population-based study. *Acta Psychiatr Scand*. 2016;134(6):485–93.
49. Friis K, Lasgaard M, Osborne RH, Maindal HT. Gaps in understanding health and engagement with healthcare providers across common long-term conditions: a population survey of health literacy in 29,473 Danish citizens. *BMJ Open*. 2016;6(1):e009627.
50. Goeman D, Conway S, Norman R, Morley J, Weerasuriya R, Osborne RH, et al. Optimising health literacy and access of service provision to community dwelling older people with diabetes receiving home nursing support. *J Diabetes Res*. 2016;2016:1–12.

## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Melwani S, Cleland V, Patterson K, Nash R. Health literacy status of pregnant women and women with young children in Tasmania. *Health Promot J Austral*. 2022. <https://doi.org/10.1002/hpja.675>