

Development of Maternal Health Literacy Measurements: A Scoping Review

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Abstract

Background: Maternal health literacy (MHL) is essential in identifying pregnant women with limited MHL, especially in the post-COVID-19 period. The data can assist in the design of tailored interventions for improving MHL. Nevertheless, MHL measurements are not routinely applied because more general health literacy scales are used to assess MHL in pregnancy. **Objective:** This study aimed to provide an overview of MHL measurement development. **Method:** A scoping review was utilized in this study. The search was conducted through four electronic databases (CINAHL, PubMed, Web of Science, and Science Direct) published in English and Indonesian between 2001 to 2021, with the searching process of PCC (Population: pregnant women, Concept: maternal health literacy instrument development, Context: clinical or community setting). The selection process of the articles is referred to as Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). **Result:** The selected articles' critical appraisal was done using The Joanna Briggs Institute Checklist. The measurements of MHL are Maternal Health Literacy and Pregnancy Outcome Questionnaire (MHLAPQ), Maternal Health Literacy (MaHeLi), and Maternal Health Literacy Inventory in Pregnancy (MHELIP). These instruments are adequate, valid, and reliable. The MHELIP is the fittest instrument to capture the MHL concept because it consists of specific items to measure MHL in pregnancy. Future studies must investigate this topic as thoroughly as the current material available in some databases. In addition, healthcare practitioners can apply the MHL in pregnancy measurement to analyze and report client cases, contributing to the expansion of MHL's body knowledge.

Keywords: maternal health literacy, instrument, pregnant women, a scoping review



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INTRODUCTION

Maternal health literacy (MHL) is a set of skills that enable women to access, comprehend, evaluate, and apply knowledge about pregnancy to enhance health quality and outcomes throughout pregnancy (1,2). Pregnant women are a part of the population that needs qualified MHL to sort out the amount of health information they encounter during their pregnancy, some of which are untrustworthy (3). Higher MHL levels result in improved maternal outcomes (4).

Identifying the prevalence of MHL in a population is essential for teaching women about health and pregnancy and assisting healthcare providers in enhancing health services. Understanding the MHL level helps healthcare providers improve their services (5). The survey results could be utilized to identify areas with low MHL and develop interventions for women with low MHL (6). Comprehensive tests are required to understand the gap between women's ability and the need to comprehend health services. These tests may direct efforts to educate pregnant women about health issues and provide pregnancy-related health information that is simple to understand.

Measurement of the MHL must be adequate and accurate to direct attention to crucial issues, such as lowering the maternal mortality rate (2,3,7). To date, no consistent method has been used to measure MHL (8). There is a tendency to measure MHL among pregnant women using general health literacy questionnaires, making it difficult to compare results. It further complicates the interpretation of maternal health literacy levels among pregnant women due to the lack of subject-specific tools (6,9).

OBJECTIVE

The study aimed to examine the development of MHL instruments as a technique to aid in the design of MHL-specific interventions.

Methods and Design

This study was a scoping review study referred to by Arkey and O'Malley. Five stages for conducting scoping review include 1) identifying the research question, 2) identifying relevant studies, 3) study selection, 4) charting the data, and 5) collating, summarizing, and

reporting the results.

Identifying the research question

The specific research question for this study was: What is already known from the existing literature about the instruments to measure maternal health literacy in pregnant women?

Identifying relevant studies

The articles were searched in four electronic databases, including Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Web of Science (WOS), and Science Direct. The particular clinical questions were set to search the articles, such as population (P), concept (C), and context (C). The population was selected as pregnant women, for the concept was the instrument to measure maternal health literacy in pregnancy. The context was studies done in clinical or community settings.

The Boolean search used several keywords, like instrument OR measurement AND maternal health literacy AND pregnancy or pregnant women AND community. We set a time limit between September 2021 and March 2022 for searching the articles in the databases.

Study selection

The inclusion criteria of the references included in this scoping review were: 1) original research articles published between 2001 to 2021, 2) full-text articles, 3) published in English and Indonesia language, 4) the population of the study was pregnant women, 5) represent MHL measurement development, at least the validity and reliability analysis, and 6) utilized in clinical or community setting. The start date of 2001 was chosen because it covered the initiation of the MHL concept, as introduced by Renkert & Nutbeam (2001). Due to the cost and time involved in translating resources, materials in languages other than English and Indonesian were excluded. Articles that discuss MHL in pregnant women with mental illness were excluded.

Two reviewers then applied the inclusion and exclusion criteria to all the citations. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) were used in the article selection process for this study. All authors conducted the initial screening and content analysis.

Charting the data

Charting is a technique for synthesizing critical issues of the study question. Each of the four articles included in the study received positive evaluations. In the synthesis phase, the four articles were extracted and analyzed for the identification of several points: 1) author(s) and year of publication, 2) purpose, 3) design, 4) the number of participants, 5) study population, 6) setting, 7) essential findings. The data charting presented more detail in the result section.

RESULT

Screening Process

The authors identified 95 articles from CINAHL (15 articles), PubMed (40 articles), Web of Science (10 articles), and Science Direct (30 articles). In the identification step of the selection procedure, the authors eliminated three articles due to their duplication. The authors match the 92 articles' inclusion and exclusion criteria in the next phase. The remaining 13 articles met the requirements. Finally, only four articles were included in this study. Figure 1 depicts the selection process in this study.

Characteristics of the Included Studies

The selected articles included in this study were published between 2001 to 2021. Most of the studies were conducted in Africa (Nigeria and Uganda), and the rest was in Asia (Iran) (4,6,9). The detailed characteristics of the study are described in Table 1.

Among the articles which described the development of maternal health literacy, two of them were descriptive surveys and correlational studies. The rest described the development of the instrument, followed by the psychometric properties of the developed instrument.

The participants of the studies were pregnant women. A study conducted in Uganda recruited pregnant adolescents aged 15 to 19 years. Only one study added nursing mothers as their participants (9). Overall, the study purposed to develop and evaluate the MHL among pregnant women.

Definition of Maternal Health Literacy

Over the past decade, the concept of MHL has evolved from a patient attribute or level of literacy to a two-way process between healthcare providers and patients. MHL is derived from the more general health literacy (HL) concept. Nutbeam should first address health literacy as a measurable outcome of health education intervention (10). Renkert and Nutbeam proposed MHL as a method for measuring the effectiveness of prenatal classes to enhance the content and delivery of antenatal courses (2).

MHL acknowledges women's ability to make health decisions that benefit and sustain them and their children (11). MHL is defined as cognitive and social abilities that regulate the ability and motivation of women to gain access to, understand, assess, and apply knowledge to improve and maintain their own and their children's health (2,12). A foundational level of MHL could be attained by enhancing the capacity of individuals to get, interpret, and comprehend essential information and health-related services for mothers required for effective decision-making (3).

Characteristics of Maternal Health Literacy

Characteristics are elements of the MHL concept. MHL is characterized by the ability to obtain, comprehend, evaluate, and apply knowledge pertaining to maternal health (4,6). Cognitive and social skills (CSS) and evaluation of health information (AHI) were identified as additional components of MHL (9,13). CSS is mothers' self-evaluations of their capacity to fulfill their maternal role responsibilities to achieve optimal health for themselves and their children. At the same time, AHI, as a principle of MHL, emphasizes the cognitive and literacy abilities necessary for comprehending and evaluating the available health information (9).

Regarding Nutbeam's discussion of health literacy, MHL consists of three levels. They are functional MHL, interactive MHL, and critical MHL (2,10). Functional MHL is basic factual information about maternal health concerns that do not promote skill development or autonomy but enable a pregnant woman to

follow instructions.

Conversely, interactive MHL is a broader set of skills that enables a pregnant woman to develop the ability to act independently on knowledge, actively seek out health-related information, and boost motivation and self-confidence. Last but not least, critical MHL refers to information that places pregnant women within a socio-economic framework. It entails empowerment since it enhances the capacity to critically detect possibilities (or the lack thereof) to withstand social and economic adversity (2,10,14).

Predictors of Maternal Health Literacy

Predictors define as a condition that determines MHL before any health education. Some studies explored MHL's predictors, including demographic, socio-economic, and environmental factors (3,13,15–17). Personal and situational factors affect MHL level, which is personal factors are factors related to individual characteristics, and situational factors are factors coming from the external world of pregnant women (17,18).

Personal factors affecting MHL include age (13), educational level (3,13,16,19–22), gestational age (3,16,23–26), parity (13,16,17), preconception awareness (13), employment (21), household income (19–22), and previous mode of delivery (21). On the other hand, situational factors that affect MHL are residence location (21), media exposure (22), and social support (17,20)

Outcomes of Maternal Health Literacy

Outcome refers to the consequences of a woman's MHL level. Timing and frequency of prenatal care (ANC), neonatal birth weight, normal hematocrit counts, ferrous and folic acid consumptions, pregnancy weight increase, gestational age at birth, breastfeeding, and maternal self-esteem have been connected with MHL (2–4,22,24,25,27). Positive behavior, such as healthy habits and nutrient-rich food consumption, was counted as a result of higher level MHL (22). Additionally, improved parenting has been observed as an additional effect of MHL (20). Overall, greater levels of MHL result in a superior quality of life for both

mother and child during pregnancy and after birth (3).

Measurements of Maternal Health Literacy

The review summarized three instruments that measured MHL in pregnancy. They are the Maternal Health Literacy and Pregnancy Outcome Questionnaire (MHLAPQ) (4), the Maternal Health Literacy (MaHeLi) (9), and the Maternal Health Literacy Inventory in Pregnancy (MHELIP) (6). All of these instruments are in English.

The instruments found in this review are self-report questionnaires. They have good validity and reliability, as described in the published articles. Detailed information related to the instruments' scale construction and psychometric properties is shown in Table 2.

DISCUSSION

The population in this study focuses on pregnant women. Indonesia has almost five million pregnant women out of 71 million women of reproductive age, according to the Indonesian Health Survey of 2021 (28). Pregnant women in Indonesia must still battle with the high mortality rate of their population. Maternal mortality continues to be a problem for the country because this country, Indonesia, did not meet the United Nations' 2015 Millennial Development Goals (MDGs) Target 5, which aimed to reduce the maternal mortality rate by 75% (28,29). Therefore, efforts to reduce maternal mortality have been extended to achieve the 2030 Sustainable Development Goals (SDGs) target MMR of less than 70 for every 100,000 live births (29,30).

MHL is frequently utilized in health sciences literature to predict pregnancy outcomes. More specifically, it has been identified as a factor in maternal healthcare adherence and empowerment for pregnant women (13,31–33). The World Health Organization promotes MHL as a strategy for meeting some of the Sustainable Development Goals related to maternity and child health targets (34).

Nutbeam (2000) first established health literacy as a measurable result of health education intervention. This idea was followed by Renkert & Nutbeam (2001) by introducing the concept of MHL to measure the outcome of antenatal classes and to improve the content and

delivery of antenatal classes.

The most comprehensive definition of MHL describes it as cognitive and social skills that govern the ability and motivation of women to obtain access to, understand, and use information in ways that enhance and sustain their health and that of their children (2,6).

MHL was a concept that needed to be quantified further. Comprehensive testing is required to ascertain the gap between capabilities and existing demands to lead efforts to educate pregnant women about health issues and generate more easily gathered health-related information on pregnancy (6,7,13). An appropriate, accurate, and standard measurement is needed to demonstrate the importance of maternal health literacy. However, MHL measures are only sometimes applied (8).

Indonesian scholars who have examined MHL have used general health literacy scales to assess health literacy among pregnant women. For example, the Health Literacy Questionnaire (HLQ) was used to determine health literacy among pregnant women in Yogyakarta (35). In Semarang, Central Java, a study was conducted with pregnant women using a condensed version of the Health Literacy Questionnaire-16 (HLQ-16) (36). The HLQ and HLQ-16 do not include questions about pregnancy or childbirth. The remaining studies on health literacy among pregnant women in Indonesia did not specify how health literacy was measured (37,38).

The prevalence of using general health literacy assessments with pregnant women complicates study comparisons. It complicates the interpretation of MHL levels among pregnant women, as the measures are not subject-specific (6,13). This is why a more accurate tool is required to assess MHL.

This study revealed three instruments developed to measure MHL among pregnant women. Mojinyinola (2011) invented the MHLAPQ, a self-report questionnaire comprising 33 items assessing demographics, maternal health literacy, and pregnancy outcomes. This instrument is reliable, with a Cronbach's alpha of 0.81. There are three sections in the MHLAPQ. The first part assesses the pregnant woman's demographic characteristics (sex, age, marital status, occupational position, level of education,

religion, and income). The second part of the instrument focuses on determining maternal health literacy. And the third part was designed to assess pregnancy outcomes. Only the second and third sections of the MHLAPQ were scored.

MHLAPQ is simple to use, inexpensive, and offers a straightforward grading system. The instrument's psychometric analysis results are excellent. However, more information about the theory or the qualitative techniques that guided the instruments' development needs to be provided. Moreover, the items needed to be more generic to evaluate maternal health literacy, mainly speaking and hearing.

A more specific instrument to measure MHL was developed by (9), a 20-item Maternal Health Literacy (MaHeLi) scale. These items were constructed based on Glanz et al.'s (39) theory of Health Beliefs Model and Sorensen et al.'s (1) Integrated Model of Health Literacy.

Furthermore, Renkert & Nutbeam (2001) MHL concept discovered a critical link between health literacy and maternal health. These are the integrated fundamentals of the MaHeLi scale. Previously, the MaHeLi had 20 items and then reduced became 12 items (9). The construct of the MaHeLi was updated to include seven *Competence and Coping Skills Scale* (CCS) and five *Appraisal Health Information* (AHI) items, omitting *Health Seeking Behavior* (HSB) formerly had in the MaHeLi's twenty items. The rationale was that the developers felt that the elements under HSB would fundamentally change the concept of maternal health literacy's uni-dimensionality.

When looking at MaHeLi's 12 items, items one to four are far too broad to capture MHL among pregnant women. Although MaHeLi has a strong foundation in instrument creation based on theory, is reliable, and has a practical component in administration, some of the items in MaHeLi do not reflect MHL in pregnancy in particular.

A new instrument intends to assess MHL among pregnant Iranian women and address the shortcomings of earlier MHL instruments, such as the lack of a specific construct on MHL during pregnancy (6). The MHELIP was created in two stages by its designers. The first part was a qualitative investigation, and the second assessed the MHELIP's validity and reliability.

The MHELIP is a legitimate and

trustworthy instrument, as previously mentioned in its validity and reliability. The development of this instrument did not use theory as a foundation for the instrument's development, instead relying on in-depth and personal interviews with pregnant women to gather materials and comprehend the notion of maternal health literacy. It becomes MHELIP's strength because it was created based on the knowledge and experience of pregnant women.

Even though the instrument has many items (48 items), it evaluates MHL in pregnancy in a particular, holistic, and consistent manner. The items covered all aspects of maternal health literacy, as evidenced by the fact that the four domains collected during the qualitative phase were likewise expressed during factor analysis.

These are not visible on the two prior instruments evaluating MHL (MHLAPQ and MaHeLi), which have fewer components and whose items have a different consistency than the dimensions mentioned above (6).

This is the first study that reviews MHL inventory development. Additional studies might be valuable to develop the short version of instruments measuring maternal health literacy. It becomes an essential point because the measurement utilization would take a long time to complete by the participants.

Some limitations were found in this study, one of which is language bias. The authors limit to searching the English and Indonesian language articles and published years included in the study. Moreover, the output of this study is restricted to the critical search terms set in this study

CONCLUSION

This scoping review indicates that the MHLAPQ, the MaHeLi, and the MHELIP were developed and then used to measure MHL among pregnant women. All of these instruments have good validity and reliability. The standard gold instrument has yet to be available to measure the concept of MHL. It is crucial to have a consensus on the standard gold inventory to measure MHL in pregnancy. Once the standard instrument is achieved, the output assessment of MHL can help health professionals by showing them which areas of health promotion and pregnancy-related health literacy interventions may need improvement.

Since, to the best of our knowledge, this was the first study to investigate specific instruments for measuring MHL during pregnancy, the invention and analysis of each MHL-measuring instrument constituted the study's strength. However, several limitations were noted, namely the fact that English and Indonesian were the languages of the included literature in this study. In addition, some studies may have been overlooked because some nursing articles needed to be indexed in any available databases.

Further research and the development of MHL-specific measurements during pregnancy are necessary. Future studies must investigate this topic as thoroughly as the current material available in some databases. In addition, healthcare practitioners can apply the MHL in pregnancy measurement to analyze and report client cases, contributing to the expansion of MHL's body knowledge. Incorporating interventions based on MHL in pregnancy measurement into medical practice can improve MHL and maternal health outcomes for clients

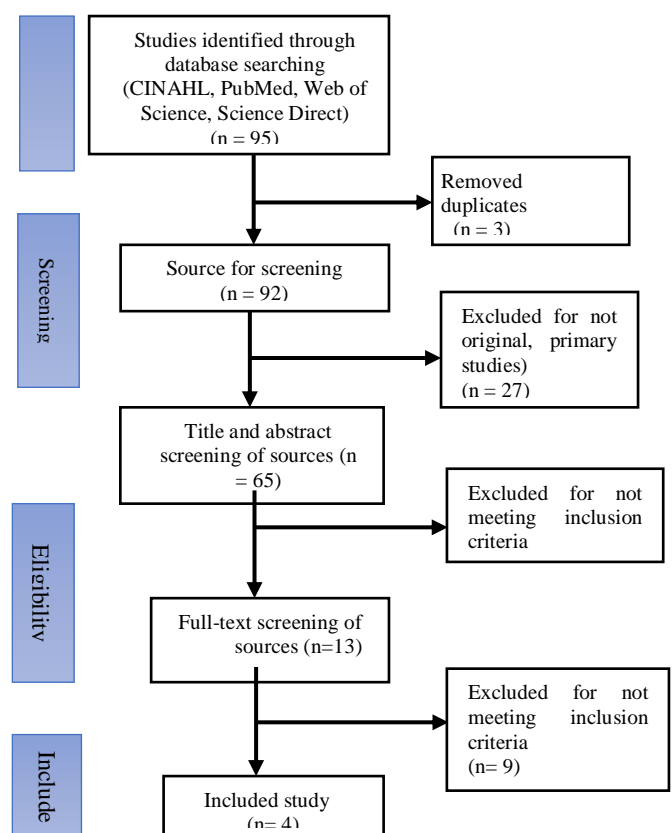


Figure 1. The study selection process

Table 1. Characteristics of the instruments included in this study

No	Author(s), year	Purpose(s)	Design	Population	Number of samples	Setting
1	Mojoyinola, 2011	Investigated the influence of maternal health literacy on healthy pregnancy and pregnancy outcomes	Cross-sectional	Pregnant women and nursing mothers	231	Adeoyo Maternity Hospital and State Hospital, Ring Road Ibadan, Nigeria
2	Guttersrud et al., 2015	Validated the Maternal Health Literacy (MaHeLi) composite scale measuring maternal health literacy	Cross-sectional: Rasch analysis	Adolescents aged 15 to 19 years	384	Health centers in the Jinja and Iganga districts of the Busoga region of Uganda
3	Naigaga et al., 2015	Understood the relationship between selected demographic characteristics and maternal health literacy	Correlational study	Adolescents aged 15 to 19 years	384	Health centers in the Jinja and Iganga districts of the Busoga region of Uganda
4	Taheri et al., 2020	Developed and evaluated the psychometric properties of the Maternal Health Literacy Inventory in Pregnancy (MHELIP)	Phase 1: Qualitative Phase 2: Psychometric evaluation	Pregnant women	Phase 1: 19 Phase 2: 320	Medical Healthcare centers in Tehran, Iran

Table 2. Characteristics of the instruments measuring MHL concept

No	Tool	Intended respondents	Scale construction	Interpretation	Validity and reliability
1	The Maternal Health Literacy and Pregnancy Outcome Questionnaire(4)	Pregnant women and nursing mothers	Self-report questionnaire: paper-pencil-based survey; three sections: 1) 7 items measuring a demographic variable, 2) 13 items measuring MHL, 3) 13 items measuring pregnancy outcomes; rating score with four range of Linkert Scale.	Section 1: no score interpretation Section 2: total score (13 items x 4) = 52; high MHL level = 52, medium MHL level = 26; low MHL = below/less than 26 Section 3: total score (13 items x 4) = 52; high or good pregnancy outcomes = 52, mild or moderate pregnancy outcomes = 26, poor or bad pregnancy outcomes = below/less 26	Cronbach's alpha value = 0.81
2	The Maternal Health Literacy (MaHeLi)(9,13)	Adolescents aged 15 to 19 years	Self-report questionnaire: paper-pencil-based survey; initially, it consists of 20 items with three subscales: Health Seeking Behavior (item number 1 to 7), Competence and Coping Scale (item number 8 to 14), and Appraisal Health Information (item numbers 15-20). Then the MaHeLi revised become 12 items, omitting the Health Seeking Behavior subscale. It is a six-point rating scale.	No information	Cronbach's alpha value of 0.92. Person-separated index (PSI) = .91 Chi-square statistic = 191.5 (df = 100)
3	The Maternal Health Literacy in Pregnancy Inventory (MHELIP)(6)	Pregnant women aged ranging from 16 to 45 years, either nullipara or multipara, with various educational level background	Self-report questionnaire: paper-pencil-based survey; 48 items with four subscales: Maternal Health Knowledge, Maternal Health Decision Making and Behavior, Maternal Health Information Assessment, Maternal Health Information Search; five range of Linkert Scale.	The total score is calculated by adding the raw score and linearly transferring it to a score from 0 to 100 using the formula: Score = (raw score - minimum possible raw score): (maximum possible raw score - the minimum possible raw score) x 100 Interpretation: Inadequate MHL = 0 - 50; Problematic = 50.1 - 66; sufficient = 66.1 - 84; excellent = 84.1 - 100	The qualitative phase resulted in 124 item pools and 78 items as the initial instrument. In the content validity procedure (10 experts) produced 54 items, then after, the content validity ratio and content validity index resulted in 53 items. No reduction in the face validity stage. Construct validity (Confirmatory Factor Analysis) resulted in 48 items (46.49% of the total variance). Cronbach's alpha value = 0.94 Interclass Correlation Coefficient value = 0.96

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