



# A Structure Equation Model Examining Self-care Behavior toward Pregnancy-related Complication and Their Associated Factors among Women in Indonesia

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## Abstract

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**BACKGROUND:** Maternal mortality rate is commonly caused by pregnancy-related complications. Performing adequate self-care could reduce maternal and child mortality, improve quality of life, and reduce health-care expenses. Few studies exploring factors associated with self-care behaviors toward pregnancy-related complications using the basis of Orem's theory.

**AIM:** This study aimed to investigate the self-care behaviors pregnancy-related complications and their associated factors among women in Indonesia.

**METHOD:** This study was used a cross-sectional design. A multistage random sampling of 320 pregnant women was recruited from four Public Health Centre in West Java, Indonesia. Participants were 18 years old or older and trimester II and III. Structural equation modeling was used for analysis.

**RESULTS:** The mean age of the mother was 27 years (SD = 6.03) and gestational age was 26 months (SD = 9.17). A pregnant woman has moderate self-care behaviors with a mean of 156.5 (SD = 16.91). Path analysis revealed that knowledge, self-efficacy, and social support have both direct and indirect effects through empowerment on self-care behaviors toward pregnancy-related complications.

**CONCLUSION:** This finding provides an initial understanding of basic conditioning factors on self-care behaviors and the mediating role of empowerment. This study also provides a significant contribution for clinical practice as basic data to establish future intervention to promote empowerment to achieve optimal self-care behaviors in pregnant women to prevent a complication.

## Introduction

Pregnancy is a significant period that affects almost every aspect of women's live [1]. Most pregnancies are normal, but every pregnancy has a risk of complications. The complications leading to maternal death can occur without warning at any time during pregnancy and childbirth [2]. Every day in 2017, around 810 women died from pregnancy-related complications [3]. The maternal mortality ratio (MMR, number of maternal deaths per 100,000 live births) was decreased by around 38% worldwide from 2000 to 2017, with 94% of all maternal deaths occurring in low- and lower-middle-income countries [3]. Although MMR has reduced, it has not been achieved in Indonesia as the MMR of this country was 177 per 100,000 live births in 2018, and despite significant progress to reducing MMR, MMR appears to be higher than many other countries [3], [4]. However, this effort needs to accelerate with an aim at meeting the target of the 2030 Sustainable

Development Goal (SDG-3.1) of an MMR of less than 70 per 100,000 [5]. A systematic review conducted by Say *et al.* (2014) shows that pregnancy-related complications that occurred in Southeast Asia were caused by bleeding of 29.9% (15–51.3%) and indirect causes of 16.8% (7.8–34.2%) [6]. While, in Indonesia, pregnancy-related complications were caused by bleeding (30.3%), preeclampsia (27.1%), infection (7.3%), prolonged labor (1.8%), and others (40%) [7], [8]. Deaths due to pregnancy-related complications can be prevented by 74% if they received the appropriate intervention, through the prevention and treatment of complications as well as with improving quality services [9].

This research was guided by Orem's theory of self-care deficit which stated that a person initiates and performs self-care to maintain life, healthy functioning, and well-being [10]. Previous studies reported that the ability of mothers to perform self-care could reduce maternal and child mortality, improve quality of life, and reduce health-care expenses [11], [12], [13]. Another

study found that self-care has a significant impact on reducing pregnancy-related complications by performed stress management, take nutrition and supplements, doing physical activity, and routine antenatal care [14]. Previous studies reported that factors associated with overall self-care behavior were perceived self-efficacy, perceived social support from family, knowledge on self-care during pregnancy, accessibility to health services, and self-esteem [15], [16], [17]. According to Orem's self-care deficit nursing theory, self-care is influenced by basic conditioning factors (BCFs), including age, gender, developmental state, environmental factors, family system factors, sociocultural factors, health state, pattern of living, health-care system factors, and availability of resources [10]. These BCFs may influence an individual's ability to participate in self-care activities or modify the kind or amount of self-care required.

This study focused on the self-care behavior toward pregnancy-related complications because self-care is necessary and of the utmost importance during pregnancy. Orem's self-care deficit theory in 2001 was applied in the conceptual framework and general. BCFs consisted of (1) personal factors: Age, education level, work status, current gestational age (current GA), number of gravidas, childbearing, and abortion and (2) family factors: Social support and empowerment. Abilities for self-care consisted of three variables, namely, knowledge on self-care of pregnancy-related complications, maternal health training, and self-efficacy. On the basis of Orem's theory and literature review, potential variables of postulated as influencing self-care behaviors of pregnant women toward pregnancy-related complications have not been identified. Finally, the finding of the study may provide useful information for the health personnel to encourage appropriate self-care behaviors toward pregnancy-related complications leading to reduce mortality, quality pregnancy, and quality of life. Therefore, this study aimed to investigate the self-care behaviors pregnancy-related complications and their associated factors among women in Indonesia using a structural equation model.

## Methods

### *Design and sample*

Across-sectional, descriptive correlational design with a predictive approach was utilized to investigate the correlates of self-care behaviors toward pregnancy-related complications among women in Indonesia. The sample size determination was based on power analysis in the assessment of the root-mean-square error of approximation (RMSEA). A multistage random sampling of 320 pregnant women was recruited from four Public Health Centre in West Java, Indonesia. Participants were

18 years old or older and trimester II and III. Pregnant women with complications such as severe preeclampsia, antepartum bleeding, having cardiovascular disease, etc., were excluded from the study.

### *Instruments*

The research instrument was the self-administered questionnaire which consisted of personal information, including marital age, education level, work status, current gestational age (current GA), number of gravidas, childbearing, and abortion. Information about maternal health training, including participation in seminar and education or counseling was collected.

Self-care behaviors scale measured in this study, including health literacy, psychological factors, physical activity, nutrition intake, risk prevention related to a pregnancy complication, personal hygiene, taking a supplement, and vitamin during pregnancy. A total of 75 items was used with a 4-point rating scale ranging from 0 (never) to 4 (usually). Content validity was reviewed and approved by four experts in midwifery and obstetrics and gynecology with CVI range from 0.76 to 0.89. Data were verified with internal consistency reliability coefficients between 0.72 and 0.92.

Social support from family has 12 items related to social support provided by family, friends, and others (health workers), including emotional support, appreciation support, information support, and instrumental support adopted to the pregnant women condition. This questionnaire used a five-scale scoring, 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), and 5 (strongly agree). The total score ranges from 12 to 60. Low social support scored less than 22, moderate scored ranges from 22 to 30, and high was 31 to 41, and very high social support was more than 41. This instrument has been validated previously with good validity; items correlation ranged from 0.56 to 0.87. The reliability test using Cronbach's alpha coefficient was 0.76 [18].

Self-efficacy scale was utilized the perceived self-efficacy theory of Bandura (1997) by developing 15 items measure confidence in behavior and a tendency to act. Each item on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). Content validity was reviewed and approved by four experts in midwifery and obstetrics and gynecology with CVI range from 0.63 to 0.82. Cronbach's alpha coefficient in the current study was 0.68.

Knowledge of pregnancy-related complication, statements were adapted from a literature review on significant knowledge of pregnancy-related complications by developing 16 statements on a 2-answer, namely correct, wrong, each statement on the correct answer was scored 1 and wrong scored 0. Content validity was reviewed and approved by four experts in midwifery and obstetrics and gynecology with CVI ranges from 0.68 to 0.90. The reliability in the current study was 0.71.

Empowerment was measured using 14 items with a 4-point rating scale ranging from 0 (never) to 4 (usually). The statements focused on the need for prevention, the ability to manage behavior, and the ability to prevent. Content validity was reviewed and approved by four experts in midwifery and obstetrics and gynecology with CVI range from 0.69 to 0.92. The reliability in the current study was 0.72.

### Procedure

Ethical approval was obtained from the ethics research committee of the study institution. All participants were given a written information sheet during their antenatal care or visiting public health center. The researcher distributed a set of self-administered anonymous questionnaires to those who agreed to participate. Time to complete all questionnaires was around 20 to 30 minutes.

### Data analysis

Data were analyzed using SPSS version 20.0 (SPSS Inc., Chicago, IL, USA) and LISREL Version 8.8 (Scientific Software International, Inc., Skokie, IL, USA), and the level of significance was set at  $p < 0.05$ . Descriptive statistics were used to summarize the selected factors and all continuous variables, namely, the self-care behaviors, social support, self-efficacy, knowledge on self-care during pregnancy, and empowerment of the participants.

Path analysis was used to examine the relationship BCFs and self-care behaviors. The overall fit of the path model was examined by the goodness-of-fit indices, including a non-significant chi-square value, the RMSEA, standardized root mean square residual (SRMR), non-normed fit index (NNFI), comparative fit index (CFI), and adjusted goodness-of-fit indices (AGFI). RMSEA and SRMR less than 0.08 indicating an acceptable fit. The values of AGFI, CFI, and NNFI ranged from 0 to 1, with AGFI & 0.90 and CFI and NNFI & 0.97, indicating a good fit to data [19].

## Results

### Demographic characteristics

Table 1 shows the demographic characteristics of pregnant women in this study. The mean age of the mother was 27 years (SD = 6.03), with an age range of 17 years to 42 years. The majority of participants (43.1%) were graduated from junior high school and almost all (90%) were housewives. The average gestational age was 26 months (SD = 9.17), with a range of 3 months to 40 months. More than half (56.7%) gravida less than

two, 94.7% childbearing <2 times, and 98.4% had no history of abortion. Most (98.4%) of pregnant women do not have a history of disease with an average body mass index of 21 kg/m<sup>2</sup> (SD = 2.39) with a range of 16 to 31. While the average upper arm circumference is 26 cm (SD = 2.67) with a range of 18–34 cm.

**Table 1: Sociodemographic characteristics of the sample (n = 320)**

Variables	n (%)
Age – mean ± SD (year)	27.18 ± 6.03
Education level	
Elementary school	48 (15)
Junior high school	138 (43.1)
Senior high school	127 (39.7)
University	7 (2.2)
Employment	
Government employee	4 (1.3)
Private employee	17 (5.3)
Housewife	288 (90)
Others	11 (3.4)
Gestational age – mean ± SD (months)	26.25 ± 9.17
Number of gravida	
<2	182 (56.9)
>2	138 (43.1)
Number of childbearing – <2	303 (94.7)
Number of abortions – <1	315 (98.4)
No previous disease history	315 (98.4)
Body mass index – mean ± SD (kg/m <sup>2</sup> )	21.11 ± 2.39
Upper arm circumference – mean ± SD (centimeter)	26.57 ± 2.67

### BCFs and self-care behaviors

Table 2 shows that, on average, a pregnant woman has moderate self-care behaviors with a mean of 156.5 (SD = 16.91), with the lowest value of 93 and the highest value of self-care that is 193. Participation in maternal health education through seminars or counseling shows a moderate average (15.91, SD = 2.84) with the lowest value was 11 and the highest value was 24. The average score of knowledge on self-care of pregnancy-related complications was 11.85 (SD = 1.98), with a range of 8 to 21 which shows that the knowledge of pregnant women about pregnancy-related complications was still low. In addition, the mean score social support was 31.69 (SD = 7.35), with a minimum score of 15 and a maximum of 47. Empowerment of pregnant women in the prevention of complications of pregnancy and childbirth is still low, with an average value of 34.73 (SD = 8.38) with a range of scores from 18 to 56. While for self-efficacy, the average score is quite good, namely 44.02 (SD = 8.47), with a minimum value of 29 and a maximum of 60.

**Table 2: Overview of variables**

Variables	Mean ± SD	Range
Self-care behaviors	156.5 ± 16.91	93 – 193
Maternal health education	15.91 ± 2.84	11 – 24
Knowledge on self-care of pregnancy-related complications	11.85 ± 1.98	8 – 21
Social support	31.69 ± 7.35	15 – 47
Empowerment	34.73 ± 8.38	18 – 56
Self-efficacy	44.02 ± 8.47	29 – 60

According to bivariate analysis, self-care behaviors was negatively associated with knowledge ( $r = -0.167$ ) and maternal health education ( $r = -0.572$ ) and positive correlation with self-efficacy ( $r = 0.467$ ), social support ( $r = 0.396$ ), and empowerment ( $r = 0.401$ ). None of the demographic characteristics of participants were associated with self-care behaviors.

### The path model

Path analyses were used to determine the relationship between BCFs and self-care behaviors. The Chi-square was 92.67 and degree of freedom (df) was 7, with a significant Chi-squared test result ( $p = 0.06 > 0.05$ ). The goodness-of-fit indices for the hypothesized model were RMSEA = 0.02, AGFI = 0.91, CFI = 0.91, NFI = 0.90, and SRMR = 0.09, indicated that the final model fit to the data. The final model obtained is presented in Figure 1. The final model accounted for 43% and 27% of the variance of self-care

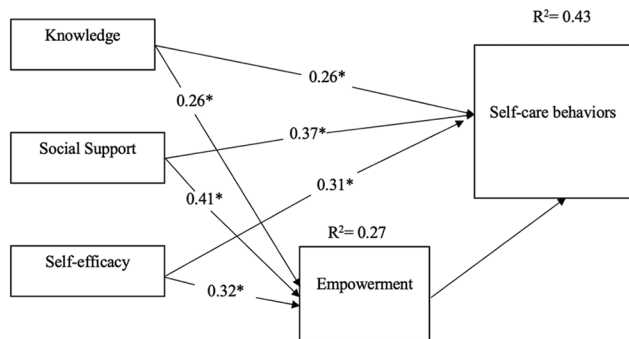


Figure 1: Path diagram relating selected basic conditioning factors, empowerment, and self-care behavior toward pregnancy-related complications

behaviors and empowerment, respectively. Both direct and indirect, and total effects of the selected factors of self-care behaviors are shown in Table 3.

**Table 3: Summary of standardized direct, indirect, and total effects of the selected basic conditioning factors on self-care behaviors toward pregnancy-related complication**

Variables on the final path model	Self-care behavior		
	Direct effect	Indirect effect	Total Effect
Knowledge on self-care of pregnancy-related complications	0.26*	0.11*	0.31*
Social support	0.37*	0.19*	0.42*
Self-efficacy	0.31*	0.15*	0.36*

Note \*:  $p < 0.05$

## Discussion

This research shows that self-care behaviors toward pregnancy-related complications of pregnant women were low. Our findings supported a previous study conducted in Ethiopia showed that self-care related medication in pregnant women was very low at 15.5%, this shows the low self-care behavior of pregnant women [20]. In addition, a study conducted in Thailand on primigravida adolescents reported that the score of self-care behavior in specific trimesters was lower than scores in the first and third trimesters (57.58, 60, respectively, 45, and 64.65) [16]. However, these results were different from the study conducted by Lertsakornsiri [21] in Bangkok that found the majority of respondents had high-level self-care behavior scores.

The different results could be affected by differences in the age of pregnant women (18–40 years), and the level of education that only completed junior secondary education and pregnancy for the 1<sup>st</sup> time.

The results of this study indicated that empowerment is a mediator of the relationship between knowledge, self-efficacy, and social support with self-care behaviors. Knowledge, social support, and self-efficacy have a positive relationship with empowerment; besides that, empowerment has a positive relationship with self-care. Some pregnant women try to apply advice regarding to dietary patterns and physical exercise; they will find and digest whether the advice is good or not for them, while others may not experience such benefits; the former will become convinced that their behavior is important, while the latter will not draw such conclusions. Rather than seeing self-care behavior as a consequence of empowerment (as assumed by the research design), this interpretation considers empowerment as a consequence of experience. The results of this study are in line with research conducted on diabetic patients, where empowerment is the mediator of the relationship between knowledge and self-care [22]. To our understanding, this is the first research that associates empowerment with self-care and social support, self-efficacy, and knowledge in pregnant women. Therefore, intervention to improve the empowerment is needed to reduce pregnancy-related complication.

In Indonesia itself, there is a program focus on community empowerment in preventing pregnancy-related complications by involving family and community. Nonetheless, a previous study reported that the program had not been carried out optimally, with sticker sticking not being performed properly, home visits by midwives not being completed and no reporting had been performed, and there was no guidance for the implementation of this program [23]. Another study reported that the community did not understand community empowerment in preventing pregnancy-related complications and there was no support for implementation the program by pregnant women and husbands, while cadres and midwives understood the community empowerment in preventing pregnancy-related complications concept [24]. Our findings could be one of the recommendations for optimizing the community empowerment program in preventing pregnancy-related complications to reduce maternal mortality by increasing the self-care ability of pregnant women.

Knowledge of pregnancy-related complications has a relationship with empowerment and self-care. This finding was consistent with a previous study that reported a correlation between self-care behaviors and knowledge [25]. Self-care behaviors are influenced by internal factors, including beliefs on the effectiveness of the actions taken, and the external environment factors that will affect the changes in one's self in doing

self-care. A study conducted in the United States found that pregnant women realized that they need to eat good nutritious foods and exercise during pregnancy, but in practice, they cannot choose good nutritious foods or exercise that are beneficial because of a lack of knowledge about the types of food and exercise that will benefit them [26]. It is possible that pregnant women generally try to make a strong contribution to self-care regardless of their basic level of knowledge, but there may also be differences in demographic and clinical characteristics (in particular, older age, cultural effects, and clinical conditions) that encouraging this opposite effect. Regardless, further investigation of the profile of self-care and knowledge of pregnant women together is needed, especially to determine whether pregnant women can lead in self-care without the level of basic knowledge needed to do so successfully.

Self-efficacy was significantly associated with self-care behaviors toward pregnancy-related complications. This finding was in line with previous studies [17], [21], [27]. Research on the perceived self-efficacy theory of Bandura and Orem's self-care theory by Callaghan [27] showed that support system, adequate income, and living conditions, daily religious activity, and medical issues or disabilities were significant factors leading to healthy behaviors. Individuals with low self-efficacy will avoid tasks that they find difficult. Furthermore, social support is an important aspect in empowerment to improve self-care behavior related to pregnancy complications. The results showed that family support affects adherence to self-care, so the family can control the health of pregnant women [28]. Health-care professionals also need to consider self-efficacy and social support to design intervention on enhancing self-care behaviors toward pregnancy-related behaviors.

This study has a significant implication for clinical practice. Our study showed that all BCFs are modifiable, thus a health-care professional could incorporate the findings of this study to enhance self-care behaviors toward pregnancy-related complications. It is also important to establish an assessment tool to identify pregnant women at high risk of self-care deficit to be able to provide an individually tailored intervention to avoid the development of self-care deficits. In addition, this model can help to broaden our knowledge of the implications of BCFs on self-care behaviors and the mediating role of empowerment so that customized interventions could be design targeted modifiable factors to change the outcome. Health-care professionals could cooperate with volunteers to design an educational intervention to educate pregnant women and to promote their self-care behaviors toward pregnancy-related complications.

This study has some limitations. First, this study was conducted in one province, while Indonesia has 34 provinces; therefore, it may have limitations

to generalize the findings to all pregnant women in Indonesia. However, we try to select a sample using random sampling. Second, there was a 57% variance in self-care behaviors not describe in our path model; there may have been other significant variables not selected for this analysis. However, having too many variables could lead to a lack of focus to fill the questionnaire due to a lot of questions. Future studies investigating other modifiable BCFs of self-care behaviors are needed to gain a more comprehensive understanding.

## Conclusion

This finding provides an initial understanding of BCFs on self-care behaviors and the mediating role of empowerment. This is one of the first studies to examine factors affecting self-care behaviors toward pregnancy-related complications, thus future research is needed to confirm our findings. This study also provides a significant contribution to clinical practice as basic data to establish future intervention to promote empowerment to achieve optimal self-care behaviors in pregnant women to prevent a complication.

### ***Ethics approval and consent to participate***

This study was approved by International review board of affiliated university (E0322019). As the data were also collected from the public health centers, another clearance was obtained from the Department of Health and Research and Development in West Java, Indonesia. Informed consent was obtained from participants. Several measures were taken to ensure privacy and confidentiality throughout the study period by excluding personal identifiers.

### ***Availability of data and materials***

The data that support the findings of the current study are available from the corresponding author on request.

## Authors' Contributions

RN designed the study and recruited the participants. RN and mm analyzed the data and wrote the manuscript. RN, HM, and VMT contributed to the design of the study, data collection, and manuscript writing. All authors contributed, read, and approved the final manuscript.

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