The Association Between Husbands' Knowledge and Attitudes Regarding the Effects of Secondhand Smoke Exposure on Pregnancy

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Pregnant women exposed to secondhand smoke may face an increased risk of adverse pregnancy outcomes, particularly during the perinatal period. Despite these risks, exposure to household tobacco smoke among pregnant women remains a concern, including in the service area of Sukawati I Community Health Center. This study aimed to examine the association between husbands' knowledge and attitudes regarding the effects of secondhand smoke exposure on pregnancy in the service area of Sukawati I Community Health Center, Gianyar Health Office. An analytical cross-sectional study was conducted using a questionnaire. A probability sampling technique with simple random sampling was employed, involving 42 husbands from 13 banjars (traditional neighborhood units) in Sukawati. Data were analyzed using Spearman's rank correlation test. The findings showed that most respondents had good knowledge of the effects of secondhand smoke exposure on pregnancy. Most respondents also demonstrated positive attitudes toward preventing such exposure. However, the Spearman's rank correlation analysis revealed a very weak positive relationship between husbands' knowledge and attitudes (r = 0.163), which was not statistically significant (p = 0.301). These findings indicate that husbands' knowledge levels were not significantly associated with their attitudes toward secondhand smoke exposure during pregnancy.
Keywords: knowledge; attitudes; husbands; pregnancy

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1. Introduction

Pregnancy is generally considered a natural physiological process; however, various risk factors can transform a healthy pregnancy into a pathological condition. Exposure to secondhand smoke poses a significant threat to maternal and fetal health [1]. Toxic substances in tobacco smoke, including carbon monoxide (CO), nicotine, and free radicals, cause vasoconstriction, impair blood flow to the placenta, and damage the fetal vascular system [2]. Consequently, the delivery of essential nutrients and oxygen to the fetus is disrupted, potentially compromising optimal fetal growth and development.

From a reproductive health perspective, exposure to tobacco smoke can be harmful throughout pregnancy. It has been linked to serious complications, including miscarriage, ectopic pregnancy, placenta previa, placental abruption, and premature rupture of membranes. Other potential risks include preterm birth, intrauterine fetal death, low birth weight (LBW), and sudden infant death syndrome (SIDS) [3].

Secondhand smoke exposure during pregnancy is a particularly important concern in Indonesia because of the high prevalence of smoking, especially among men. According to Statistics Indonesia (2024), the proportion of the population who smoked reached 28.99% in 2024, an increase from 28.62% in 2023. A GoodStats survey reported a smoking prevalence of 17.62% in Bali Province [4]. The high prevalence of smoking, particularly among men, increases the likelihood of tobacco smoke exposure in the household. As a result, pregnant women may be exposed to secondhand smoke, especially from their husbands.

Limited awareness of the risks that tobacco smoke poses to pregnancy and fetal health may contribute to husbands smoking near their pregnant wives. Smoking also imposes economic and social burdens and adversely affects environmental quality and public health. Therefore, education about the dangers of tobacco smoke during pregnancy is essential for pregnant women and other household members to help protect fetal growth and development [5].

Field observations indicate that pregnant women continue to be exposed to household tobacco smoke, particularly in the service area of Sukawati I Community Health Center. Investigating husbands' knowledge and attitudes concerning the effects of tobacco smoke on pregnancy is therefore important for informing health promotion and fetal health prevention efforts. This study aimed to determine the association between husbands' knowledge levels and attitudes regarding the effects of secondhand smoke exposure on pregnancy in the service area of Sukawati I Community Health Center, Gianyar Health Office.

2. Literature Review And Problem Statement

Knowledge refers to an individual's understanding of a particular object or subject, which is acquired through sensory perception, learning, and information exposure [6]. In the context of health, knowledge plays an important role in shaping an individual's perspective and response to health-related issues [6]. Attitude, on the other hand, represents an individual's positive or negative evaluation of a particular object or stimulus, which develops through learning and personal experience [7]. Attitude consists of cognitive, affective, and conative components that influence how individuals evaluate and respond to specific situations [7]. Previous studies have examined knowledge, attitudes, and related preventive behaviors regarding cigarette smoke exposure during pregnancy. A cross-sectional study of 150 non-smoking pregnant women with smoking husbands in Urmia, Iran, found that knowledge about environmental tobacco smoke was significantly and positively correlated with attitude ($r = 0.280$) and with efforts to prevent exposure ($r = 0.403$) [8]. An interventional study of 140 male smokers whose wives were pregnant showed that training on the effects of second-hand smoke significantly increased their self-efficacy compared with the control group [9]. A cross-sectional study of husbands of pregnant women in the working area of a community health center in North Denpasar found a significant relationship between husbands' knowledge of the effects of cigarette smoke exposure during pregnancy and their smoking practices [10].

Although these studies have addressed knowledge, attitudes, and preventive practices related to cigarette smoke exposure during pregnancy, they differ in their research subjects and outcome variables. Previous research has examined the relationship between knowledge and attitude among pregnant women [8], the effect of education on male smokers' self-efficacy [9], and the relationship between husbands' knowledge and smoking practices [10]. However, to the best of our knowledge, the relationship between husbands' level of knowledge and their attitudes toward the effects of cigarette smoke exposure on pregnancy has not been examined, particularly in the working area of UPTD Puskesmas Sukawati I, Gianyar. This study addresses this research gap by examining the knowledge and attitudes of husbands who smoke within the local context. Accordingly, the research problem is formulated as follows: Is there a relationship between husbands' level of knowledge and their attitudes toward the effects of cigarette smoke exposure on pregnancy in the working area of UPTD Puskesmas Sukawati I, Gianyar?

3. Method

This study employed an analytical cross-sectional survey design to examine the association between husbands' knowledge and attitudes. A cross-sectional design examines associations between risk factors

and outcomes by collecting observational data at a single point in time [11]. The study was conducted from March to April 2026.

The study population consisted of all husbands of pregnant women registered in the service area of Sukawati I Community Health Center. Records for January through December 2025 identified 722 eligible husbands. The sample size was calculated using Slovin's formula, $n = N / (1 + N \cdot e^2)$, where N is the population size (722) and e is the margin of error (15%, or 0.15). The calculation was $n = 722 / (1 + 722 \times 0.15^2) = 722 / 17.245 = 41.87$. Because respondents must be counted in whole numbers, this value was rounded up to 42 respondents to meet the minimum sample-size requirement.

Proportionate random sampling was used to ensure representation from each banjar according to its population size while providing members of the population with an equal opportunity for selection. After the sample allocation for each banjar was determined, individuals were randomly selected from the relevant resident lists. Selected individuals were subsequently contacted at their homes and invited to participate. The final sample comprised 42 respondents from 13 banjars in Sukawati. The distribution of respondents across the 13 banjars is presented in Table 1.

Table 1. Distribution of Respondents by Banjar

No	Banjar	Jumlah
1.	Banjar Gelumpang	3
2.	Banjar Telabah	3
3.	Banjar Palak	3
4.	Banjar Tebuana	3
5.	Banjar Dlodtangluk	3
6.	Banjar Gelulung	3
7.	Banjar Pekuwudan	3
8.	Banjar Bedil	3
9.	Banjar Tameng	3
10.	Banjar Dlodpangkung	3
11.	Banjar Kebalian	3
12.	Banjar Babakan	4
13.	Banjar Mudita	5
	Total	42 Responden

The inclusion criteria were as follows:

1. Husbands of registered pregnant women.
2. Husbands residing in the service area of Sukawati I Community Health Center.
3. Husbands of pregnant women who smoked.
4. Husbands who agreed to participate by signing an informed consent form.

The exclusion criteria were as follows:

1. Husbands whose health condition at the time of data collection prevented participation.
2. Husbands who did not complete the questionnaire in full.

The independent variable was husbands' level of knowledge regarding the effects of secondhand smoke exposure on pregnancy. The dependent variable was husbands' attitude toward secondhand smoke exposure during pregnancy. Data were collected using two printed questionnaires, one for knowledge and one for attitude.

The knowledge questionnaire consisted of 20 items. Each correct answer was scored 1 and each incorrect answer was scored 0, giving a total score of 0–20, which was converted to a percentage of the maximum score. Knowledge was classified as good (76%–100%), moderate (56%–75%), or poor (<56%) [12].

The attitude questionnaire consisted of 20 items covering the cognitive, affective, and conative components of attitude. Each response supporting the prevention of secondhand smoke exposure in pregnant wives (favorable) was scored 1, and each unsupportive response (unfavorable) was scored 0, giving a total score of 0–20. For negatively worded statements, reverse scoring was applied to ensure that higher scores consistently represented more positive attitudes toward preventing secondhand smoke exposure. The total score was converted to a percentage of the maximum score. Attitude was classified as positive when the score was at least 76% of the maximum score (i.e., 16 or more of 20 items) and negative when it was below 76% (0–15) [12]. The 76% cut-off was used as the operational threshold to distinguish positive and negative attitudes based on the classification applied in this study.

Validity was assessed using Pearson's product–moment correlation in the Statistical Package for the Social Sciences (SPSS), with items considered valid when the corrected item–total correlation exceeded 0.30. Reliability was assessed using Cronbach's alpha, with a value of 0.70 or higher considered reliable. Each questionnaire was analyzed separately using the responses of the 42 study respondents. For the knowledge questionnaire, 19 of 20 items were valid (r = 0.472–0.819), whereas item 2 did not meet the criterion (r = 0.045); the Cronbach's alpha coefficient for the 20-item knowledge questionnaire was 0.945. For the attitude questionnaire, all 20 items were valid (r = 0.582–0.922) and the Cronbach's alpha coefficient was 0.966. Both questionnaires showed excellent internal consistency. All 20 knowledge items were retained in the scoring process.

The association between husbands' knowledge and attitudes was examined using Spearman's rank correlation based on the total questionnaire scores. For the categorized knowledge and attitude variables, the association was assessed using the Freeman–Halton extension of Fisher's exact test because of the small expected cell frequencies. Statistical significance was determined at $\alpha = 0.05$.

4. Results and Discussion

Characteristics of the Study Participants

Data were obtained from questionnaires completed by 42 respondents in the service area of Sukawati I Community Health Center, Gianyar Health Office. The questionnaires were used to examine the association between husbands' knowledge levels and attitudes regarding the effects of secondhand smoke exposure on pregnancy.

Table 2. Frequency Distribution of the Characteristics of Husbands of Pregnant Women

No.	Category	f	%
1	2	3	4
1	Age		
	Late adolescence (17–25 years)	3	7,1
	Early adulthood (26–35 years)	33	78,6
	Late adulthood (36–45 years)	6	14,3
	Jumlah	42	100
2	Education		
	Higher education	19	45,2
	Senior high school	21	50,0
	Junior high school	2	4,8
	Total	42	100,0

No	Category	f	%
3	Pekerjaan		
	Civil servant	7	16,7
	Private-sector employee	29	69,0
	Self-employed	6	14,3
	Total	42	100,0

Table 3. Frequency Distribution of Husbands' Knowledge of the Effects of Secondhand Smoke Exposure on Pregnancy

No	Knowledge level	f	%
1	Good	35	83,3
2	Moderate	7	16,7
	Total	42	100,0

These results indicate that most participating husbands had good knowledge of the effects of secondhand smoke exposure on pregnancy.

Table 4. Frequency Distribution of Husbands' Attitudes Regarding the Effects of Secondhand Smoke Exposure on Pregnancy

No	Husbands' attitudes	f	%
1	Positive	24	57,1
2	Negative	18	42,9
	Total	42	100,0

These findings indicate that more than half of the respondents had attitudes supportive of efforts to prevent secondhand smoke exposure during pregnancy.

Table 5. Bivariate Analysis of the Association Between Husbands Knowledge and Attitudes Regarding Secondhand Smoke Exposure During Pregnancy

Knowledge level	Sikap Suami				Total		*r*	*p*
	Positive		Negative					
	f	%	f	%	f	%		
Good	20	57,1	15	42,9	35	100,0	0,163	0,301
Moderate	4	57,1	3	42,9	7	100,0		
Poor	0	0	0	0	0	0		

The Spearman's rank correlation analysis revealed a correlation coefficient (r) of 0.163, indicating a very weak positive relationship between husbands' knowledge and attitudes regarding secondhand smoke exposure during pregnancy. The p-value was 0.301, which exceeded the significance level of $\alpha = 0.05$. Therefore, the association was not statistically significant. These findings indicate that husbands' knowledge levels were not significantly associated with their attitudes regarding secondhand smoke exposure during pregnancy.

Husbands Knowledge of the Effects of Secondhand Smoke Exposure on Pregnancy

Adequate knowledge among husbands is important in reducing the risks of secondhand smoke exposure to pregnant women and their fetuses. Knowledge develops through an individual's awareness and understanding of objects or events based on information acquired through reasoning and sensory experiences [13]. Several factors may be associated with an individual's level of knowledge, including educational background and employment. A study involving pregnant women found that knowledge about

environmental tobacco smoke exposure was significantly associated with educational attainment and employment status [8].

Education may also contribute to an individual's understanding of the health risks associated with tobacco smoke exposure. Kamaruddin et al. (2020) examined pregnant women's knowledge of the dangers of cigarette smoke during pregnancy and highlighted the importance of improving public understanding of its potential effects on maternal and fetal health [2]. In addition, research involving husbands of pregnant women has specifically examined their knowledge of secondhand smoke exposure during pregnancy in relation to smoking practices [10].

Husbands' understanding of the harmful effects of secondhand smoke exposure is particularly important because of their role in protecting maternal and fetal health. An educational intervention involving male smokers whose wives were pregnant demonstrated that training about the effects of secondhand smoke exposure could significantly improve their self-efficacy in preventing exposure [9]. Therefore, providing health education to husbands during pregnancy care visits is an important effort to increase their awareness and encourage preventive actions.

Husbands Attitudes Toward the Effects of Secondhand Smoke Exposure on Pregnancy

The findings showed that most respondents in the service area of Sukawati I Community Health Center, Gianyar Health Office, had positive attitudes toward the effects of secondhand smoke exposure on pregnancy. This suggests that most husbands recognized the importance of protecting pregnant women from tobacco smoke exposure. Attitudes reflect an individual's evaluation of a particular object or situation and may influence their readiness to respond in certain ways. However, attitudes do not necessarily translate directly into actual behavior [14].

In the context of pregnancy, husbands' attitudes play an important role in supporting efforts to prevent secondhand smoke exposure. A study involving pregnant women with smoking husbands found a positive and significant relationship between knowledge and attitudes toward avoiding environmental tobacco smoke exposure at home. The study also reported an association between knowledge and efforts to prevent such exposure [8]. Furthermore, research involving male smokers whose wives were pregnant found that an educational intervention significantly improved the emotional dimension of attitudes and preventive behavior, highlighting the importance of strengthening husbands' awareness and responses to secondhand smoke exposure during pregnancy [9].

In the present study, husbands' attitudes reflected their views on the importance of protecting their pregnant wives from secondhand smoke exposure. These attitudes may be influenced by their knowledge, personal experiences, and understanding of the potential harmful effects of tobacco smoke during pregnancy. Nevertheless, positive attitudes do not necessarily mean that preventive behaviors are consistently practiced. Therefore, assessing attitudes alongside actual smoking practices is important in understanding husbands' roles in protecting pregnant women from secondhand smoke exposure.

The Association Between Husbands' Knowledge Levels and Attitudes Regarding the Effects of Secondhand Smoke Exposure on Pregnancy

The Spearman's rank correlation analysis showed a correlation coefficient (r) of 0.163 and a p-value of 0.301, indicating a very weak positive relationship between husbands' knowledge and attitudes regarding the effects of secondhand smoke exposure on pregnancy. However, the relationship was not statistically significant because the p-value exceeded 0.05. Thus, this study did not find sufficient statistical evidence of an association between husbands' knowledge levels and attitudes toward secondhand smoke exposure during pregnancy.

The descriptive findings showed that 57.1% of respondents had positive attitudes, while 42.9% had negative attitudes. The proportions were identical among respondents with good and moderate knowledge levels. This suggests that differences in knowledge categories were not reflected in the distribution of attitudes. Although the descriptive results showed no association between the categorized variables, the Spearman correlation based on total scores indicated a very weak positive relationship that was not statistically significant.

Attitudes involve cognitive, affective, and conative components, which reflect an individual's beliefs, emotional responses, and behavioral tendencies. Knowledge contributes to the cognitive component of attitudes but does not independently determine how individuals respond to particular situations [14]. This perspective helps explain why husbands with good knowledge may still have different attitudes toward secondhand smoke exposure during pregnancy.

Previous research among pregnant women with smoking husbands found a significant positive relationship between knowledge and attitudes toward avoiding environmental tobacco smoke exposure at home ($r = 0.280$; $p = 0.001$) [8]. Unlike that study, the present research did not find a statistically significant relationship. However, the two studies involved different respondent groups, as Bayrami et al. examined pregnant women, whereas the present study focused on husbands. These differences should be considered when comparing the findings.

Research involving husbands of pregnant women has also examined the relationship between knowledge of secondhand smoke exposure during pregnancy and smoking practices [10]. Furthermore, an educational intervention involving male smokers whose wives were pregnant found improvements in awareness, the emotional dimension of attitudes, and preventive behavior following training [9]. Although these studies examined different outcomes, they highlight the importance of considering both knowledge and behavioral factors when addressing secondhand smoke exposure during pregnancy.

The absence of a statistically significant relationship in the present study suggests that knowledge alone may not adequately explain differences in husbands' attitudes. Personal experiences, smoking habits, and social influences may also be relevant, although these factors were not directly examined in the present analysis. Health education programs should therefore consider addressing not only knowledge of the harmful effects of secondhand smoke but also attitudes and smoking-related behaviors to encourage greater protection for pregnant women.

5. Conclusion

This study found that most husbands of pregnant women in the service area of Sukawati I Community Health Center, Gianyar Health Office, had good knowledge of the effects of secondhand smoke exposure on pregnancy, particularly its potential consequences for maternal and fetal health. Most respondents also demonstrated positive attitudes toward protecting pregnant women from tobacco smoke exposure. However, the Spearman's rank correlation analysis showed a very weak positive relationship between husbands' knowledge and attitudes ($r = 0.163$), which was not statistically significant ($p = 0.301$). These findings indicate that differences in husbands' knowledge levels were not significantly associated with their attitudes toward secondhand smoke exposure during pregnancy. Therefore, improving knowledge alone may not be sufficient to encourage positive attitudes, highlighting the importance of broader health education efforts that also address personal beliefs, smoking habits, and social influences.

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