The effect of education and smoke-free home activity contract on changes in husbands' smoking intensity in the home in North Lombok District, West Nusa Tenggara

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Abstract

Purpose: Home is the place most at risk of exposure to cigarette smoke. Indonesia recorded that 85% of households are exposed to cigarette smoke. Smoke-free homes (SFH) were initially introduced by the Environmental Protection Agency, United States, 2001 to increase awareness of the health hazards of second-hand smoke (SHS) and one's ability to limit cigarette consumption in the home. The success and effectiveness of implementing smoke-free homes (SFH) cannot be separated from the modification of the behavior of each individual. This study aims to determine the effect of education and smoking-free house activity contracts on reducing the smoking intensity of husbands in the house in North Lombok Regency, West Nusa Tenggara. **Methods:** This study is a retrospective, pre-, and post-intervention cohort study using secondary data from the Peer Health SHS-LBW Intervention Study in North Lombok Regency, West Nusa Tenggara Province. The data used were baseline data and 6-month data on 733 active smoking husbands who lived in the same house with pregnant women aged less than 4 months when they were respondents in the study. The data will be tested using Chi-square and logistic regression to determine the most influencing variables. **Results:** The results of the chi-square analysis showed that most husbands with total income did not know/low income 66.67% did not experience changes or tended to increase the intensity of smoking in the house. In the comparative analysis, the value of p = 0.01 was obtained, which means a statistically significant relationship exists between the amount of income and the change in the smoking intensity of the husband in the house. Age, type of work, level of education, location of residence, and the respondent's willingness to attend education and smoke-free house activity contracts did not show a statistically significant relationship with changes in the husband's smoking intensity in the house (p-value>0.05). **Conclusion:** Education and smoke-free house activity contracts (SFH) did not affect the reduction in the intensity of husbands' smoking in the house.

Keywords: smoke-free homes (SFH); smoking intensity; social cognitive theory (SCT)

INTRODUCTION

Cigarettes can affect health, social, economic, and environmental conditions, including the smoker, other people, and the surrounding environment. Burning cigarettes produces three types of smoke: smoke from the cigarette embers themselves (*sidestream smoke*), smoke inhaled by the smoker (*mainstream smoke*), *smoke from the cigarette itself (sidestream smoke)*, and smoke exhaled by smokers (*exhaled mainstream smoke*). The smoke produced from burning cigarettes is not only inhaled by smokers but also becomes air pollution for the environment [1,2].

Passive smokers or people exposed to cigarette smoke will receive the same compounds as those inhaled directly by active smokers. Continuous exposure to cigarette smoke can increase the risk of developing lung and heart disease by 20-30%. Smoking has been proven to cause various health problems, including the surrounding environment, which also has the risk of developing the same health problems.

The Indonesian government has attempted various forms of controlling tobacco consumption as a form of protection for the community from exposure to cigarette smoke [3]. The government tries to reduce the death rate, improve health, and fulfill the right to the availability of a clean and healthy space or environment needed for breathing. The smoke-free workplace and public area policy was implemented in the UK in 2007. It has been shown to encourage individuals to implement a smoking ban in *smoke-free homes* (SFH), as the house is the place most at risk of exposure to cigarette smoke [4].

The Environmental Protection Agency initially introduced smoke-free homes (SFH), United States 2001, which aimed to increase awareness of the health hazards of *second-hand smoke* (SHS) and the ability to limit cigarette consumption in the home. This is evident from 69% of households in Doncaster who registered and promised to implement a smoking ban at home, successfully maintaining the agreement for 6 months [4]. Nichter in 2015, also explained that 6 months after signing the declaration of a community-based smoke-free home initiative in India, 59% of men who smoked no longer smoked in the home, 21% did it occasionally (4-8x a month), and 17% rarely did it (1-3x a month) [5]. Smoking-free homes can also improve air quality by allowing them to be free from tobacco smoke pollution [6].

In addition to *the Environmental Protection Agency*, *Quit Tobacco International* (QTI) is engaged in education and community-based smoking cessation programs. QTI focuses more on conducting smoking cessation research and developing Indonesia's first smoke-free home initiative. QTI is a project based in India and Indonesia [5]. In Indonesia, 85% of households are exposed to cigarette smoke [7]. Nichter *et al.* (2010) developed a smoke-free home initiative in Yogyakarta, Special Region of Yogyakarta. Continuing from the research of Nichter *et al.* (2010) related to changing smoking norms in society, after the *Smoke-free homes* (SFH) intervention in Yogyakarta, 54% of smokers did not smoke in the house [9]. *Smoke-free homes* (SFH) can be an effective aid in reducing the daily consumption rate of smokers and can increase the likelihood of quitting smoking [10].

The success and effectiveness of implementing *Smoke-free homes* (SFH) cannot be separated from the modification of each individual's behavior. One strategy for modifying behavior to form good behavior for not smoking in the house is by using *social cognitive theory* (SCT). This theory connects three reciprocal factors between *person*, *behavior*, and *environment* [11]. In addition to the three reciprocal factors, Albert Bandura explains that behavior occurs due to self-efficacy or self-*ability* by making individuals play a role in the change process. It is hoped that with this *social cognitive theory* (SCT) approach, the higher a person considers themselves capable (*self-efficacy*), the more intense they will try to change behavior, such as not smoking in the house.

Peer Health SHS-LBW intervention study is a study that aims to determine the impact of reducing exposure to cigarette smoke in the home on the prevalence of low birth weight (LBW) and *neonatal health* in North Lombok Regency, West Nusa Tenggara. In addition to conducting a smoke-free home movement intervention, this study also conducted a mass media campaign and education, a declaration of a "smoke-free home community," and individual smoke-free home contracts on a household scale. This study used a quasi-experimental method with data collection time for pregnant women and husbands carried out simultaneously for four waves (*baseline*, 6 months of pregnancy, at birth, and 1 month after giving birth).

Based on several problems, researchers are interested in analyzing the influence of education and smoke-free home activity contracts on changes in husbands' smoking intensity at home in North Lombok Regency, West Nusa Tenggara. This study is a pre and post-study by analyzing *baseline data* and 6th-month data on husbands (secondary data analysis), which is expected to reduce the intensity of husbands' smoking at home after education and smoke-free home activity contracts in North Lombok Regency, NTB.

METHODS

This quantitative study uses secondary data from *the Peer Health SHS-LBW Study Intervention in North Lombok Regency, West Nusa Tenggara Province. It uses a retrospective cohort* design to examine the relationship between dependent and independent variables [12].

This study used data from husband questionnaires at *baseline* (1550 respondents) and month 6 (1166 respondents). The total sample of this study was 733 respondents (*baseline* and month 6) active smokers who lived in homes with pregnant women aged less than 4 months when this study was conducted. Data were tested using *Chi-Square* and logistic regression to see the most influential variables with a p-value <0.05 (p<0.05) significance.

RESULTS

Table 1 shows the results of the analysis of respondent characteristics. Respondents in this study were categorized into two categories based on the distribution of existing data: ≤30 years and >30 years. The majority of respondents in this study 37.38%, were >30 years old, 274 people.

As many as 74.49% or 546 respondents who participated in this study worked informally. Of the respondents' education level, 59.35% or 435 were in elementary education. So the majority of respondents 74.08%, fell into the low-income category, 543 people. Both respondents were well into the category of not working/non-formal and formal workers; most lived with their pregnant wives at home, 74.49% and 25.51% of respondents.

The results of the pre-intervention analysis of education and smoke-free home contracts in Table 2 showed that 51.30%, or equivalent to 376 people, smoked around ≥20 cigarettes a week inside the house. The results of the post-intervention analysis showed that almost 77.49% smoked ≤20 cigarettes a week, and 68 respondents smoked inside the home. Almost all respondents in the intervention area willing to sign a smoke-free home contract were 695 people or 94.82%. For most of the respondents who smoked inside the house both before and after the intervention, the change in the intensity of the husband's smoking inside the home increased by 468 people or 63.85%.

Bivariate analysis was conducted to see the relationship between variables, the dependent variable with the independent variable and the dependent variable with the external variable. Data analysis in this study used the *Chi-square test* with a significance value of *p* <0.05.

Table 1. Distribution of respondent characteristics (n=733)

Variables	n	%
Age (years)		
≤ 30	271	36.97
> 30	271	37.38
Missing	188	25.65
Type of work		
Unemployed/ non-formal	546	74.49
Formal	187	25.51
Level of education		
Basic education	435	59.35
Further education	298	40.65
Income level		
Don't know/low-income	543	74.08
High income	157	21.42
Missing	33	4.50
Respondent's location of residence		
At home, not working/non-formal	536	74.49
At home, formal	187	25.51
Changes in husband's smoking intensity in		
Decrease	265	36.15
No change/increase	468	63.85
Education and contract activities for smoke-free homes		
Did not sign the contract	38	5.18
Signing the contract	695	94.82

Table 2. Results of the pre-intervention analysis of education and smoke-free home contracts (n=733)

Variables	Pre		Post	
	n	%	n	%
Husband's smoking intensity at home during a week				
≤ 20 sticks	357	48.70	568	77.49
≥ 20 sticks	376	51.30	165	22.51

Table 3 results from a cross-analysis between respondent characteristics and changes in the husband's smoking intensity at home. Based on the results, the majority of husbands with unknown/low income, 362 people, did not experience changes or tended to increase smoking intensity at home. A *p-value* of 0.01 was obtained in the comparative analysis, meaning a statistically significant relationship exists. Respondents with unknown/low income have a potential of 0.64 times more likely to experience changes in smoking intensity at home towards being constant or even increasing in a week.

Furthermore, the results of the cross-analysis in Table 3 show that age, type of work, level of education, location of residence, and respondents' willingness to participate in education and smoke-free home activity contracts do not show a statistically significant relationship to changes in the intensity of husbands' smoking in the home (p-value> 0.05).

Table 4 results from a cross-analysis of respondents' characteristics and willingness to participate in education and smoke-free home activity contracts in North Lombok Regency, NTB. The majority of respondents who are willing to participate in education

Table 3. Cross table of respondent characteristics with changes in husband's smoking intensity at home (n=733)

Variables	Changes in husband's smoking intensity at home during a week		p	OR (CI 95%)
	Decrease	Increase		
Age (years)				
≤ 30	91	180	0.37	0.85
> 30	102	172		(0.59 – 1.23)
Type of work				
Unemployed /non-formal	192	354	0.34	1.18
Formal	73	114		(0.82 – 1.68)
Level of education				
Basic education	156	279	0.84	0.97
Further education	109	189		(0.70 – 1.33)
Income level				
Don't know/ low-Income	181	362	0.01*	0.64
High income	69	88		(0.11 – 0.93)
Respondent's location of residence				
At home, not working/non-formal	192	354	0	0
At home, formal	73	114		
Smoke-free home activity education and contract				
Did not sign the contract	9	29	0.10	0.53
Signing the contract	256	439		(0.22 – 1.18)

*p-value significant (p<0.05)

Table 4. *Cross table* of respondent characteristics regarding husband's participation as an active smoker in education and contract activities for smoke-free homes (n=733)

Variables	SFH education and contracts		p	OR (CI 95%)
	No	Yes		
Age (years)				
≤ 30	21	250	0.04*	2.21
> 30	10	264		(1.00 – 5.38)
Type of work				
Unemployed/ non-formal	31	515	0.30	0.65
Formal	7	180		(0.24 – 1.53)
Level of education				
Basic education	22	413	0.85	0.94
Further education	16	282		(0.46 – 1.95)
Income level				
Don't know/low-income	26	517	0.87	0.94
High income	8	149		(0.40 – 2.44)
Respondent's location of residence				
At home, not working/non-formal	31	515	0.30	0
At home, formal	7	180		

*p-value significant (p<0.05)

and sign smoke-free home activity contracts are respondents aged >30 years, which is 264 people. Furthermore, based on comparative analysis, a *p-value* of 0.04 was obtained (p-value <0.05), meaning a statistically significant relationship exists between age and willingness to participate in education and sign smoke-free home activity contracts. The odds ratio for respondents aged >30 years is 2.21 times more likely to be willing to participate in education and sign smoke-free home activity contracts.

Furthermore, the results of the cross-analysis in Table 4 show that respondents' type of work, level of education, income, and location of residence do not show a statistically significant relationship with their willingness to participate in education and contract activities for smoke-free homes in North Lombok Regency, NTB (p-value> 0.05).

Multivariate analysis is an analysis between 2 or more variables. This analysis aims to determine the variables most related to the dependent variable. This analysis uses logistic regression analysis to see whether there is an influence on the independent variables and confounding variables with the dependent variable. Table 5 shows the results of multivariate analysis using a logistic regression test. Phase I was conducted to determine the relationship between changes in the husband's smoking intensity, the willingness to participate in education, smoke-free home activity contracts, and respondent characteristics as external

Table 5. Results of multivariable analysis of changes in husband's smoking intensity at home

Variable	Stage 1		Stage 2	
	p	OR (CI 95%)	p	OR (CI 95%)
Age (years)				
≤ 30	0.37	0.85		
> 30		(0.60 – 1.12)		
Type of work				
Unemployed/ non-formal	0.34	1.18		
Formal		(0.84 – 1.66)		
Level of education				
Basic education	0.84	0.97		
Further education		(0.71 – 1.32)		
Income level				
Don't know/ low-income	0.01*	0.64	0.02*	0.17
High income		(0.44 – 0.91)		(0.04 – 0.72)
Respondent's location of residence				
At home, not working/non-formal	0.34	0.85		
At home, formal		(0.60 – 1.19)		
Smoke-free home activity education and contract				
Did not sign the contract	0.10*	0.53		
Signing the contract		(0.25 – 1.14)		

*p-value significant (p<0.05)

variables. The analysis showed a statistically significant relationship between changes in the husband's smoking intensity in the home and the amount of income (p-value <0.25).

Next, a second stage multivariate analysis was conducted on variables with probability values (*p-value*<0.25), income, education, and SFH contracts. The study showed that the amount of income had a statistically significant relationship to changes in the intensity of the husband's smoking in the home (*p-value*<0.05).

DISCUSSION

In this study, researchers conducted secondary data analysis *of the Peer Health SHS-LBW study* on the effect of education and smoke-free home activity contracts on changes in husbands' smoking intensity at home in North Lombok Regency, NTB. Education and smoke-free home activity contracts can reduce the intensity of husbands' smoking at home in North Lombok Regency, NTB. Several studies have stated that exposure to cigarette smoke tends to be higher indoors. The following is an explanation of the effect of education and smoke-free home activity contracts on changes in husbands' smoking intensity at home based on the analysis results in this study.

In this study, age, type of job, education level, residence location, and respondents' willingness to participate in education and smoke-free home activity contracts did not show any relationship to changes in the husband's smoking intensity in the home. This can be explained individually in terms of the relationship with changes in smoking intensity in the home.

The age of the respondents did not have a statistically significant relationship to changes in the intensity of husbands' smoking at home due to addiction to nicotine or cigarettes. So, they tend to find it more difficult to change or reduce their habits without any factors forcing them to change. The same thing was also explained in previous studies: the habit of smoking in adult men will be challenging to eliminate, and the possibility of being involved in smoking is higher with age due to their smoking habits from a young age. Nketiah-Amponsah et *al.* (2018) emphasized that adult men in Ghana smoke an average of 6 cigarettes per day [13]. In addition, it could also be caused by respondents who do not know for sure the amount of cigarette consumption in units of cigarettes or days during a week at home. This causes a lack of accuracy in the existing data and does not correspond to the actual situation.

Different results showed a statistically significant relationship between age and the existence of education and smoke-free home activity contracts in North Lombok Regency, NTB. Most of those who signed the smoke-free home activity contract were in the age group >30 years, 264 people. Respondents aged >30 years had *an odds* ratio of 2.21 times the possibility of being willing to participate in education and sign a smoke-free home activity contract. This could be because respondents were concerned about the vulnerability of the health of the baby in the womb, as well as the health of family members due to exposure to cigarette smoke in the home, so they were willing to participate in education and sign a smoke-free home activity contract.

Education level, type of work, and income are three things that are interrelated with each other. It can also be seen from the results of this study that respondents with basic education tend to have jobs in the category of unemployed or non-formal and have low income. However, in this study, education level and type of work did not correlate with the decrease in the husband's smoking intensity at home. Most respondents did not change or increase. The amount of income, although it shows a relationship with changes in the husband's smoking intensity at home, tends to be in the category of changes that do not change or increase because the frequency distribution of respondents in the intervention area at the level of education, type of work, and income influence each other. This can be suspected by the majority of respondents in the intervention area having a low level of education, so respondents do not work or even work informally, resulting in a more significant financial burden. So, smoking is the right thing to divert them from stress or anxiety due to work. The same thing was also explained by Nketiah-Amponsah *et al.* (2018), who state that those in low socioeconomic and demographic categories (age, poor, and low education) are more likely to smoke [13].

Furthermore, when associated with smoking habits at home, Gould., *et al.* (2017) explained to strengthen the statement above that low work and income levels increase the incidence of stress or depression, which are the most decisive factors supporting the increase in the incidence of cigarette exposure more often in women at home [14]. Meanwhile, Fawzani *et al.* (2005) and Najmah *et al.* (2015) explained that education level, type of work and amount of income are significantly related and can influence a person's smoking intensity [15,16].

Furthermore, regarding the level of education, although it can show differences in the number of cigarettes, the intensity of smoking is still different. Highly educated individuals tend to extract less nicotine from cigarettes than those with low education,

as evidenced by one additional year of schooling causing a decrease in smoking intensity by 2 percent [17]. The same thing is also seen in the distribution of the comparison between the level of education and changes in smoking intensity in the home. In this study, 156 people had low education, and 109 had high education. Strengthened by the WHO statement (2012) that educated people tend to be more aware of health-related to cigarette consumption, and they will tend to have a higher chance of quitting smoking. WHO also explained that daily smokers are dominated by those with less education and work as self-employed [18].

The respondent's residence refers to the husband coming home regularly to see how long the husband is near the pregnant wife at home. Based on the research of Wei *et al.* (2014), the most significant exposure to cigarettes occurs in the home, and smoking regulations are not enough to reduce SHS exposure in women and children. Based on the analysis results in this study, there is no relationship between the respondent's residence and the decrease in the husband's smoking in the house. This is based on the majority of respondents being in the unemployed or non-formal category and 354 respondents living and returning home regularly with their pregnant wives at home [19]. The same thing was also explained by Gould., *et al.* (2017), that there is a relationship between the type of work and low income to the increase in the incidence of cigarette exposure more often in women at home [14].

Another cause that thwarts efforts to reduce the intensity of smoking in the house could be due to the low knowledge of respondents regarding the dangers of cigarette smoke for pregnant women and children in the house. Jackson *et al.* (2016) explained the same thing that husbands often smoke in front of their pregnant wives in the house. And most husbands who generally have poor knowledge about the risks of smoking tend never to try to stop smoking in the house. Strengthened by several reasons why husbands ignore their wives' requests to smoke outside the house. This study also explains the helplessness of wives in negotiating a smoke-free home [20].

Meanwhile, the analysis results between education and smoke-free home (SFH) activity contracts on changes in the husband's smoking intensity in the home did not show a relationship. Several factors, outside variables such as nicotine addiction, may cause this. The same thing was also explained in previous studies, that it is tough to reduce the duration and intensity of smoking in smokers due to the effects of high nicotine dependence. Smokers with a long smoking duration and high smoking intensity tend to find it challenging and have lower intentions to change

their habits [21]. The same thing was also explained by Messer *et al.* (2008) that the effect of implementing or eliminating smoke-free homes is relatively small (an average of 2 per day) and tends to maintain their smoking patterns, thus minimizing smoking cessation in the future [22].

A different thing was conveyed by Durazo *et al.* in 2020 in their study entitled *Smoke-free home intervention in permanent supportive housing: multifaceted intervention pilot,* which is based on *social cognitive theory (SCT)* explaining that individuals who implement SFH report a decrease in tobacco consumption [23]. This is inseparable from the application of *social cognitive theory (SCT),* which emphasizes behavioral changes influenced by *self-efficacy* in individuals. *Self-efficacy* is one of the core components of *social cognitive theory (SCT), and it is* recognized as an essential predictor of behavioral change, in this case, smoking status. It has been proven that there is an increase in emotional and social self-efficacy scores after the intervention, and a smoking cessation program with social cognitive theory can drastically increase the proportion of smoking cessation, with an adjusted odds ratio of 6.42 in the intervention group compared to the control group at 6 months follow-up. The study of Zheng *et al.* also showed a higher proportion of smokers' desire to quit and lower daily cigarette consumption in the intervention group [24]. This is in line with findings from previous research showing that the better smokers assess themselves as being able to carry out prescribed quitting skills (SE skills), the more frequently they make attempts to quit smoking [25].

The success of smoking cessation methods or efforts honestly depends on the firm intention and desire of the smoker himself. If there is no desire or will, then it is impossible for the technique or effort to succeed [15]. Smoking and tobacco use are very likely to be influenced by many factors, so in making the program and theory used effectively, several things need to be considered. Smoking cessation interventions must focus on changing smoking norms for behavioral change to occur. Many studies on smoking cessation interventions have been conducted in developed countries where tobacco control policies have been well implemented and therapeutic approaches to quitting are available. It is likely that early adopters of these treatments have better results than later adopters and that smokers who are among the first to try each of these treatments have higher self-efficacy when quitting. In countries where smoking cessation strategies have been implemented and many interventions have been carried out for an extended period, people who still smoke are more likely to be

individuals whose smoking behavior cannot be easily changed through intervention.

In contrast, well-designed intensive behavioral interventions can provide better results among smokers. Smoking cessation programs can be implemented in every country. Still, they must pay attention to and adapt to the social and cultural background so that they can be applied to local smokers [24].

CONCLUSION

Education and smoke-free home (SFH) activity contracts did not significantly impact the intensity of husbands' smoking at home and showed no statistically significant relationship. In contrast, the study revealed a statistically significant relationship between income level and changes in the husband's smoking intensity at home in North Lombok Regency, West Nusa Tenggara.

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