# Analysis of Factors Affecting Exposure to Nicotine in Breastfeeding Mothers (ASI) in the Work Area of the Public Health Center in Agung, Musi Banyuasin Regency

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**Abstract.** Cigarette smoke is a common air pollutant that affects the health of both active and passive smokers. Passive smoking refers to individuals who are exposed to the smoke exhaled by smokers or volatile compounds from burning tobacco products. The percentage of smoking behavior in homes with babies and toddlers continues to rise, with 85% of family members smoking in their homes as of May 2022. This study utilized a quantitative research design with a case-control study to investigate the factors affecting nicotine exposure in breastfeeding mothers in the Balai Agung Public Health Center's working area. The study utilized a point-time approach, with each object observed only once. The results of the study showed that age and education level had no significant impact on nicotine exposure, while knowledge, length of exposure to cigarette smoke per day, and the ventilation conditions of the house were significant factors affecting exposure to nicotine in nursing mothers. To address this issue, the Musi Banyuasin District Health Office has issued regulations prohibiting smoking in homes. Furthermore, Regular health checks focused on the condition of breastfeeding mothers and their babies are also essential to ensure their well-being. The Balai Agung Health Center must be more proactive in taking measures to protect their patients from the hazards of smoking.

**Keywords:** Passive Smokers, Breastfeeding Mothers, Exposure to Cigarette Smoke, Nicotine

## 1. Introduction

Air is a determining factor that plays a role in assessing the quality of sustainable public health up to a certain regional health level[3]. Human survival is largely determined by the quality of the surrounding air, either directly or indirectly. Since the beginning of the industrial revolution, technological developments have certainly been very close and linear with the increasing amount of pollutants in the air[4]. Until now, open public spaces with healthy air quality have become a rarity in big cities. Air quality is assessed by reviewing existing pollutant level parameters, such as measurements of PM 2.5, PM 10, COx, NOx., organic gas components and other volatile airborne dust particles.[5], [6]. Currently, air that has pollutant levels that exceed the threshold value is an interesting topic to study. In particular, intensive discussion of its impact on health. Air pollution can originate from activities that still use conventional energy sources. Not only that, pollutants can also come from vehicle exhaust emissions, a number of deep-rooted activities such as burning household waste, clearing land by burning, even from burning cigarettes.[6]–[8].

Based on data obtained from the Musi Banyuasin District Health Office in 2019, 76% of family members who have babies and toddlers smoke indoors. In 2020 the percentage will increase to 81% of family members who have babies and toddlers who smoke in the house. By 2021, smoking in the home will increase by 83%. The percentage of smoking behavior in the home continues to increase so that in May 2022 it was recorded that 85% of family members with babies and toddlers smoked in the house. In 15 sub-districts in Musi Banyuasin Regency, one of the sub-districts with

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the highest number of smokers is Sekayu District, especially at the Balai Agung Health Center with the percentage of family members who smoke inside the house as much as 82% in 2021.

The results of the analysis by the Musi Banyuasin Regency Health Office regarding this increase were the impact of the Covid-19 pandemic. Family members spend a lot of time at home, as well as family members who are active smokers [32]. Based on these data, the authors are interested in conducting research with the title "Analysis of Factors Affecting Nicotine Exposure in Breastfeeding Mothers (ASI) in the Work Area of the Balai Agung Health Center, Musi Banyuasin Regency".

## 2. Research methods

### 2.1 Research design

The quantitative research used in this study was a case-control study design. The method used in this study was a one-time approach, meaning that each research subject was only observed once and measurements were taken about the state of the nature or variable of the object at the time of the study. research. test time by quantitative analysis.

#### 2.1.1 Time and Place of Research

This research will be conducted in the working areas of the Balai Agung Health Center, namely Balai Agung Village, Serasan Jaya Village, Soak Baru Village & Sukarami Village. The research was conducted in June-July 2022.

#### 2.1.2 Techniques for collecting data

The sampling technique in this study was purposive sampling, namely sampling based on a specific consideration made by the researcher himself based on previously known characteristics or traits. Breastfeeding mothers included in the inclusion and exclusion criteria were 70 people using 35 problem respondents and 35 control respondents. So the number of respondents in this study amounted to 70 people in one month.

### 2.2 Data collection

Data collection techniques used are:

1. Determine the sample to be observed/data taken first.
2. Primary data collection with questionnaires and interviews
3. Analyzing the relationship between age, mother's education level, mother's knowledge, length of exposure to husband's cigarette smoke, ventilation conditions at home on the quality of breast milk in the working area of the Balai Agung Health Center, Musi Banyuasin Regency.
4. By analyzing the relationship between the dependent variable and several independent variables that are suspected to have a relationship based on multivariate analysis, it can be seen which variable is most relevant to the dividend variable. This study uses multiple logistic regression analysis.

### 2.3 Data analysis

#### 2.3.1 Univariate

Analysis of each variable is done from the search results. This analysis describes each variable presented in the frequency distribution table. In this study, univariate analysis was carried out on the variables of age of breastfeeding mothers, education level of breastfeeding mothers,

knowledge of breastfeeding mothers, length of daily exposure to cigarette smoke, and house ventilation.

### 2.3.2 Bivariate

Two variables, namely the independent variable and the dependent variable which will be seen the relationship then used the Chi-Square statistical test.

## 3. Results and Discussion

### 3.1 Bivariate

The relationship between the two variables, namely dependent and independent, will be seen.

### 3.1.1 Correlation between Maternal Age and Nicotine Exposure in Breastfeeding Mothers

Based on the trial of the relationship between maternal age and nicotine exposure in breastfeeding mothers in the working area of the Balai Agung Treatment Center, Musi Banyuasin Regency, the following results were obtained:

**Table 1.** Maternal Age With Exposure to Nicotine in Breastfeeding Mothers

| Age | Nicotine Exposure | | | | *P-value* | OR | 95% CI |
|---|---|---|---|---|---|---|---|
| | Active Smoker Husband | | Passive Smoker's Husband | | | | |
| | N | % | N | % | | | |
| 25-35 Years | 25 | 71.4 | 21 | 60.0 | 0.450 | 1667 | 0.615-4.519 |
| <25 and >35 Years | 10 | 28.6 | 14 | 40.0 | | | |
| Amount | 35 | 50 | 35 | 50 | | | |

*Source: Research Primary Data, 2022*

Based on table 2.1 it is known that the results of bivariate analysis with the chi-square test obtained a P-value of 0.450. The value of p>α (0.05) means that Ho is accepted and Ha is rejected, which means that there is no relationship between maternal age and exposure to nicotine in breastfeeding mothers at the Balai Agung Health Center, Musi Banyuasin Regency. The Odd Ratio value was 1.667 (95% CI = 0.615-4.519), which means that mothers aged <25 and >35 years had a 1.667 times higher risk of exposure to nicotine in nursing mothers.

### 3.1.2 Correlation between Mother's Education Level and Nicotine Exposure in Breastfeeding Mothers

Based on testing the relationship between the education level of the mother and nicotine exposure in breastfeeding mothers in the Working Area of the Balai Agung Health Center, Musi Banyuasin Regency, the following results were obtained:

**Table 2.** Mother's Education Level With Exposure to Nicotine in Breastfeeding Mothers

| Mother's Education Level | Nicotine Exposure | | | | *P-value* | OR | 95% CI |
|---|---|---|---|---|---|---|---|
| | Active Smoker Husband | | Passive Smoker's Husband | | | | |
| | N | % | N | % | | | |
| Low (Elementary-junior high school graduates) | 3 | 8.6 | 5 | 14.3 | 0.707 | 0.563 | 0.124-2.560 |

| Mother's Education Level | Nicotine Exposure | | | | *P-value* | OR | 95% CI |
|---|---|---|---|---|---|---|---|
| | Active Smoker Husband | | Passive Smoker's Husband | | | | |
| | N | % | N | % | | | |
| High (High School Graduates-Completed D3/S1/S2/S3 College) | 32 | 91.4 | 30 | 85.7 | | | |
| Amount | 35 | 50 | 35 | 50 | | | |

Source: Research Primary Data, 2022

Based on table 2.2 it is known that the results of bivariate analysis with the chi-square test obtained a P-value of 0.707. The value of p>α (0.05) means that Ho is accepted and Ha is rejected, which means that there is no relationship between the education level of the mother and exposure to nicotine in breastfeeding mothers at the Balai Agung Health Center, Musi Banyuasin Regency.

### 3.1.3 Relationship between Mother's Knowledge and Nicotine Exposure in Breastfeeding Mothers

Based on testing the relationship between mother's knowledge and nicotine exposure in breastfeeding mothers in the Working Area of the Balai Agung Health Center, Musi Banyuasin Regency, the following results were obtained:

**Table 3.** Mother's Knowledge With Nicotine Exposure in Breastfeeding Mothers

| Mother Knowledge | Nicotine Exposure | | | | *P-value* | OR | 95% CI |
|---|---|---|---|---|---|---|---|
| | Active Smoker Husband | | Passive Smoker's Husband | | | | |
| | N | % | N | % | | | |
| Adequate (<56%-75%) | 14 | 40.0 | 25 | 71.4 | 0.016 | 0.267 | 0.098-0.723 |
| Good (76%-100%) | 21 | 60.0 | 10 | 28.6 | | | |
| Amount | 35 | 50 | 35 | 50 | | | |

Source: Research Primary Data, 2022

Based on table 2.3 it is known that the results of bivariate analysis with the chi-square test obtained a P-value of 0.016. The value of p <α (0.05) means that Ho is rejected and Ha is accepted, which means that there is a relationship between mother's knowledge and exposure to nicotine in breastfeeding mothers at the Balai Agung Health Center, Musi Banyuasin Regency. The Odd Ratio value was 0.267 (95% CI = 0.098-0.723), which means that the level of knowledge of mothers is low/sufficient, 3.273 times more at risk of exposure to nicotine in breast milk of mothers who are breastfeeding.

### 3.1.4 Relationship between duration of exposure to cigarette smoke smoked by mothers per day and exposure to nicotine in breastfeeding mothers

Based on the correlation test between long exposure to cigarette smoke smoked by mothers per day and exposure to nicotine in breastfeeding mothers in the Working Area of the Balai Agung Health Center, Musi Banyuasin Regency, the following results were obtained:

**Table 4.** Duration of Exposure to Cigarette Smoke Per Day With Exposure to Nicotine in Breastfeeding Mothers

| Length of exposure to cigarette smoke per day | Nicotine Exposure | | | | *P-value* | OR | 95% CI |
|---|---|---|---|---|---|---|---|
| | Active Smoker Husband | | Passive Smoker's Husband | | | | |
| | N | % | N | % | | | |
| >6-12 hours | 21 | 60.0 | 11 | 31.4 | 0.031 | 3,273 | 1224-8748 |
| 0-6 hours | 14 | 40.0 | 24 | 68.6 | | | |
| Amount | 35 | 50 | 35 | 50 | | | |

Source: Research Primary Data, 2022

Based on table 2.4 it is known that the results of bivariate analysis with the chi-square test obtained a P-value of 0.031. The p value <α (0.05) so that Ha is accepted, which means that there is a relationship between exposure to cigarette smoke per day and exposure to nicotine in breastfeeding mothers at the Balai Agung Health Center, Musi Banyuasin Regency. The Odd Ratio value was 3.273 (95% CI = 1.224-8.748), meaning that the duration of exposure to cigarette smoke per day was 3.273 times the risk of exposure to nicotine in nursing mothers who were breastfeeding.

### 3.1.5 Correlation between Home Ventilation Conditions and Nicotine Exposure in Breastfeeding Mothers

Based on testing the relationship between home ventilation conditions and nicotine exposure in breastfeeding mothers in the Working Area of the Balai Agung Health Center, Musi Banyuasin Regency, the following results were obtained:

**Table 5.** Conditions of House Ventilation with Nicotine Exposure in Breastfeeding Mothers

| Home Ventilation Conditions | Nicotine Exposure | | | | *P-value* | OR | 95% CI |
|---|---|---|---|---|---|---|---|
| | Active Smoker Husband | | Passive Smoker's Husband | | | | |
| | N | % | N | % | | | |
| Not Good (> 10% x Room Floor Area | 23 | 65.7 | 10 | 28.6 | 0.004 | 4,792 | 1741-13188 |
| Good (<10% x Room Floor Area | 12 | 34.3 | 25 | 71.4 | | | |
| Amount | 35 | 50 | 35 | 50 | | | |

Source: Research Primary Data, 2022

Table 2.5 shows that the results of bivariate analysis with the chi-square test obtained a P-value of 0.004. The value of p <α (0.05) means that Ho is rejected, which means that there is a relationship between the ventilation conditions of the house and exposure to nicotine in breastfeeding mothers at the Balai Agung Health Center, Musi Banyuasin Regency. The Odd Ratio value was 4.792 (95% CI = 1.741-13.188), meaning that indoor ventilation conditions were 4.792 times faster at risk of exposure to nicotine in breast milk of mothers who are breastfeeding.

## 3.2 Discussion

### 3.2.1 Maternal Age Relationship withExposure to Nicotine in Breastfeeding Mothers

The results of this study were in line with research (Masni, 2012) which showed that there was no significant relationship between maternal age and nicotine exposure in nursing mothers. Masni's study found that the characteristics of the respondents in the case group were that there were more mothers aged between 20 to 35 years compared to mothers aged 35 years. In addition, the sample size in Masni's study (2012) between cases and controls had a ratio of 1:2 due to the limited sample of cases, in contrast to this study, namely the sample size of cases and controls (1:1) with a wider coverage. research area.

### 3.2.2 Correlation between Mother's Education Level and Nicotine Exposure in Breastfeeding Mothers

In research [12], in line with the results of this study, it was explained that the results of the analysis showed a significance level = 0.131 while there was no significant relationship between education and the practice of preventing exposure to cigarette smoke. Education affects the way a person learns because the higher the education, the easier it is to receive information from the formal education they have received as well as from other people and the media. The more information a person has, the more his knowledge develops. This is also supported by research findings [13] which confirms that there is no relationship between education and childbirth practices in an effort to protect families from exposure to cigarette smoke.

According to Notoamodjo (2012) explains the concept of education as a learning process, meaning that in education there is a process of growth, development or change in individual groups or society. The higher a person's education, the easier it is to accept new things and adapt to them. Low educational attainment made it difficult to receive instruction, including information about the dangers of nicotine exposure in nursing mothers. A good level of education will make it easier to obtain information, especially related to meeting the nutritional needs of children to ensure their nutritional adequacy.

According to [14], the low level of maternal education causes a lack of knowledge of mothers to solve problems, especially to receive information about the dangers of nicotine exposure to mothers. This knowledge is obtained both formally and informally. Meanwhile, mothers with more education are often more open to accepting changes or things to maintain their health. Educational attainment is thought to be related to knowledge of breastfeeding mothers, this is related to the level of knowledge of mothers that someone with higher education will have broader knowledge than those with low education.

### 3.2.3 Mother Knowledge Relationship withExposure to Nicotine in Breastfeeding Mothers

According to Notoatmodjo (2007), the result of human perception or the result of someone experiencing an object through their five senses is an understanding of knowledge. Knowledge is an important area in shaping behavior. Behavior based on knowledge will last longer and be more accepted in society than behavior that is not based on knowledge. So someone who already has good knowledge will behave well because of knowledge-based behavior [36].

The results of this study also have the same results as [12] showing that knowledge and actions to avoid exposure to cigarette smoke actually have a relationship. The results of this study also lead to [15] which confirms that there is a relationship between subject knowledge and practice in prevention practices. The more someone knows or understands something, the better their practice will be. On the other hand, bad knowledge will lead to bad practice.

### 3.2.4 Correlation between duration of exposure to cigarette smoke per day and exposure to nicotine in breastfeeding mothers

Based on (Wardaningtyas., AK Prakoso DA 2012) a family with 1 or more smokers in the house has a major effect on the weight gain of a growing baby. More than 5,300 compounds have been identified in tobacco smoke from tobacco or cigarette smoke, namely exposure to a mixture of compounds from tobacco smoke and the smoke exhaled by the smoker. This group of compounds includes carbon and amides, imides, lactams, metals, lactones, N-nitrosamines, aldehydes, nitrogen oxides of ketones, carboxylic acids, alcohols, phenols, esters, amines, N-heterocyclics, nitriles, nitro compounds, anhydrides, carbohydrates, ethers and hydrocarbons (IARC, 2012).

Passive smoking is as dangerous as active smoking because passive smokers indirectly or forcibly inhale active smokers' cigarette smoke and unknowingly contaminate the people around them. Or in general passive smokers are people who do not smoke but inhale environmental tobacco

smoke (ETS), especially primary tobacco smoke and second hand cigarette smoke exhaled by smokers.[16]

The amount of exposure to tobacco smoke that a person receives depends on the environment in which that person lives. If someone lives with a family member who smokes, that person will be exposed to secondhand smoke for a longer time. The longer a person is exposed to secondhand smoke, the higher the risk of adverse health effects. Where the health problems that occur in passive smokers depend on the type and length of exposure to tobacco smoke in the environment they live in [17] [18].

Breastfeeding mothers who are constantly exposed to cigarette smoke will experience a decrease in their supply of breast milk (ASI) and a shorter duration of breastfeeding because their body stops producing breast milk.[19] [20][21][22] Secondhand smoke or nicotine alters the mother's hormone levels, causing decreased lactation. The results of research and experiments clearly show that the levels of the hormone prolactin will be reduced by the presence of nicotine in the blood. Even though the role of the hormone prolactin is what encourages lactation and stimulates the development of the mammary glands. This is what causes milk production to stop.[23] [24][25][26].

The results of this study [27] also provide evidence that mothers with a lot of household exposure to smokers have a much higher risk of stopping breastfeeding than vice versa. The practitioner can assess the current regimen of smoking family members to provide smoking cessation education and support for this high-risk group. Further research is needed to analyze the mechanism of smoking in breastfeeding practice.

### 3.2.5 Correlation between Home Ventilation Conditions and Nicotine Exposure in Breastfeeding Mothers

Smoking behavior does not only affect smokers but also non-smokers around or commonly known as passive smokers. Passive smokers receive 75% of the light from passive smokers due to direct exposure [33]. Most smoking is the habit of family members to smoke in the house, which is bad for the health of other family members who do not smoke. Children and women are the group most at risk for smoke-related disorders, especially at home because of the time they spend in the bedroom. again [28]. The increasing problem of passive smoking in closed living or work environments allows the effects of secondhand smoke to occur. This shows the double danger of smoking not only for the smoker himself but also for the people around him. Therefore, controlling smokers who cause cigarette smoke is very dangerous for the health of active smokers and passive smokers is a solution to breathing fresh air without exposure to cigarette smoke or often called building a smoke-free living space. [29].

Exposure to cigarette smoke can reduce milk production because it interferes with the hormones prolactin and oxytocin in milk production. Smoking stimulates the release of adrenaline where adrenaline inhibits the release of oxytocin (Haryono & Setianingsih, 2014). According to research [30], it shows that there is an effect of passive smoking on regular milk production in Bendan Village, Banyudono Regency, Boyolali Province (p value = 0.010 <0.05). This study is also in line with research (Susanna, 2003) which used descriptive research which showed that nicotine was 4-6 times higher in passive smokers compared to regular cigarette smoke, so that smokers have a higher risk of exposure. . passive smokers compared to active smokers. for health[31].

Many family members, especially men, are active smokers but do not understand and are not aware of the conditions around them when they smoke. Researchers have seen husbands and grandfathers smoking indoors even when they are around their wives, children and grandchildren. Awareness among breastfeeding mothers that smoking should be avoided is also lacking in allowing mothers to breastfeed in places where there is a risk of exposure to secondhand smoke.[30]. Exposure to secondhand smoke increases a child's risk of developing lung infections, asthma, and sudden infant death syndrome [31].

## 4. Conclusion

1. Mother's age with nicotine exposure in breastfeeding mothers in the Working Area of the Balai Agung Health Center, Musi Banyuasin Regency has no significant relationship.
2. The education level of mothers with nicotine exposure in breastfeeding mothers in the working area of the Balai Agung Health Center, Musi Banyuasin Regency also does not have a significant relationship which can be interpreted that nicotine exposure in breast milk is not due to mother's education.
3. Mother's knowledge of nicotine exposure in breastfeeding mothers has a significant relationship
4. Length of exposure to cigarette smoke per day with exposure to nicotine in nursing mothers has a significant relationship
5. The condition of home ventilation with nicotine exposure in nursing mothers has a significant relationship, which means that good ventilation in the home will reduce the impact of exposure to nicotine if the family member is an active smoker, but you should not smoke in the house.

## 5. Suggestion

1. To the Musi Banyuasin District Health Office to issue regulations regarding the prohibition of smoking in the house.
2. To the Balai Agung Health Center to be more active in preventive and promotive activities related to the dangers of active and passive smoking and to carry out regular health checks focused on the condition of breastfeeding mothers and their babies.
3. Examination in the laboratory regarding the content of breast milk (ASI) in nursing mothers who are exposed to cigarette smoke which contains nicotine and others as well as the long-term danger to the baby's growth.

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