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## MANTRA's effect in raising pregnant women's awareness of cigarette smoke exposure's impacts: a qualitative study


**Nafira Zenina**[1]✉

[1]Department of Midwifery, Sebelas Maret University, Surakarta, Central Java, Indonesia



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**Abstract**

Anemia in pregnant women is a significant health problem because it has a direct impact on the mother and fetus, including increasing the risk of low birth weight, premature birth, and maternal and infant mortality. One risk factor that is often overlooked is exposure to cigarette smoke, especially from the household environment. Pregnant women in Klaseman Village, Sukoharjo, still face exposure to cigarette smoke from their home-smoking partners. Therefore, educational interventions are needed that can increase awareness among pregnant women to avoid exposure to cigarette smoke and prevent anemia. This study used a qualitative method to evaluate the effectiveness of the MANTRA educational media (MAri hiNdari Terpapar asap Rokok, cegah Anemia), namely leaflets containing information about the definition of anemia, symptoms, impacts, prevention methods, and the relationship between cigarette smoke exposure and the incidence of anemia. Empowerment activities were carried out on five pregnant women who attended the integrated health post through lectures, distribution of MANTRA, and interviews two weeks after education. The results showed an increase in knowledge of pregnant women regarding the dangers of cigarette smoke and changes in attitudes, such as moving away from sources of smoke, neutralizing the air in the house, and educating husbands not to smoke in the house. Evaluation using the Ottawa Charter approach showed that MANTRA successfully covered five elements of health promotion: supportive public policy, supportive environment, individual skill development, health service reorientation, and community action.





**Corresponding Author:**
✉ Nafira Zenina
Department of Midwifery, Sebelas Maret University, Surakarta, Central Java, Indonesia
Email: nafira.zenina@student.uns.ac.id

## INTRODUCTION

Klaseman Village is one of the areas in Gatak District, Sukoharjo Regency, Central Java, Indonesia, with demographic characteristics dominated by an agrarian community. This village has seven hamlets with a total population of 2,055 as of February 2025. The aspect of maternal and child health, especially anemia in pregnant women, is still a challenge in Klaseman Village. Based on data from the Sukoharjo Regency Health Profile in 2023, there were 579 pregnant women in Gatak District, of which 32 had anemia (Dinkes Kabupaten Sukoharjo, 2024). This problem requires targeted promotive and preventive interventions.

Anemia in pregnancy is a common condition that can be dangerous for both the mother and the fetus. Clinically, anemia in pregnant women is defined as hemoglobin (Hb) levels less than 11 g/dL in the first and third trimesters and less than 10.5 g/dL in the second trimester. Factors that cause anemia in pregnancy can be divided into direct factors, such as iron deficiency, folic acid deficiency, and acute bleeding, and indirect factors, such as exposure to cigarette smoke. Exposure to cigarette smoke interferes with iron absorption, damages red blood cells, and affects the general nutritional status of the mother (Hermaliana et al., 2024). Ironically, this exposure often occurs in the home environment, especially from partners who smoke.

Cigarettes contain harmful substances such as tar and nicotine, which can cause bone marrow damage and hemolysis of erythrocytes (Safitri & Syahrul, 2015). Secondary smokers, including pregnant women, are at greater risk of health problems than active smokers because they are directly exposed without filters like those in cigarettes (Rosdianah et al., 2023). WHO data shows that more than 1.2 million deaths are caused by exposure to secondhand smoke every year (Listyorini, 2023). In Indonesia, the results of the 2021 Global Adult Tobacco Survey (GATS) showed a high prevalence of secondhand smoke in various settings, including homes (59.3%) and restaurants (74.2%) (Ambarwati et al., 2024). This fact shows that efforts to protect pregnant women from exposure to cigarette smoke must be a priority.

The impact of anemia in pregnancy is not limited to the mother but also to the fetus. Several studies show that anemia contributes to an increased risk of low birth weight, preterm birth, miscarriage, and maternal and infant death. Pregnant women with Hb levels <10 g/dL have a 2.25-fold increased risk of giving birth to a low birth-weight baby, and this risk increases up to 4.2-fold in cases of severe anemia. In addition, anemia also increases the risk of maternal death by 3.5 times (Nadia et al., 2022). Therefore, it is important to evaluate possible environmental risk factors, such as cigarette smoking, and integrate them into anemia prevention programs.

The Klaseman Village Government, together with the Gatak District Health Center, has implemented the “Pregnant Women Without Anemia” program, which focuses on hemoglobin screening, provision of iron tablets (TTD), and nutrition education. However, this program has not specifically targeted controlling exposure to cigarette smoke in the household environment of pregnant women. In fact, based on the results of community service, it is known that the majority of pregnant women are still exposed to cigarette smoke from their husbands. This shows that there is a gap that can be filled through educational interventions using effective visual media, such as leaflets, to increase awareness of mothers and families about the dangers of cigarette smoke as a risk factor for anemia.

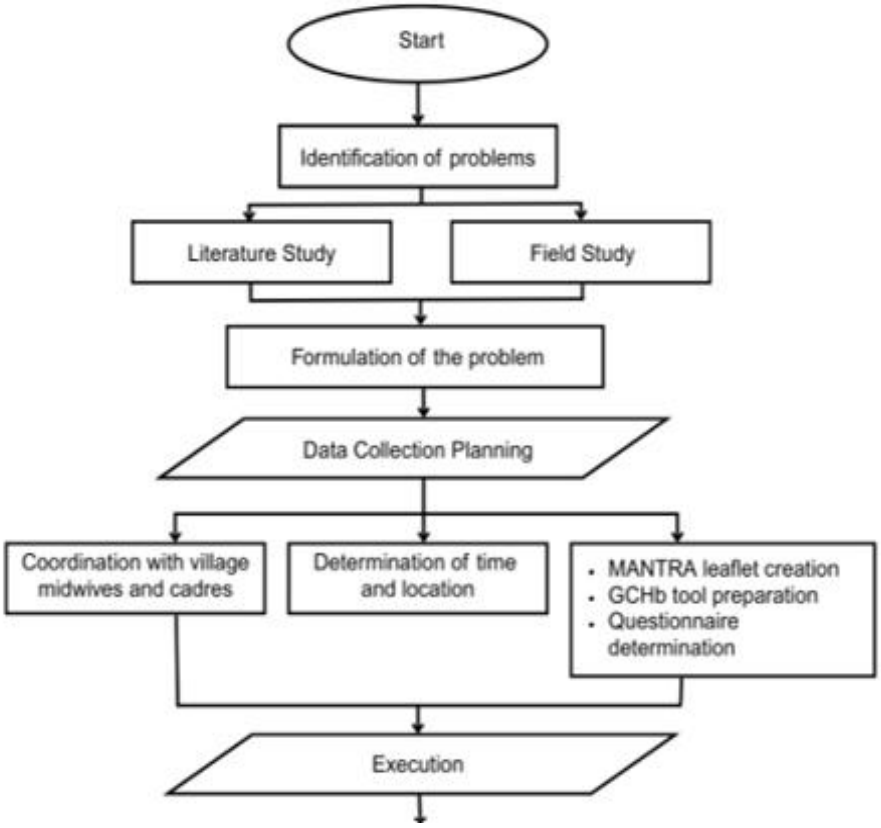
MANTRA (MAri hiNdari Terpapar asap Rokok, cegah Anemia) is an educational material in the form of a booklet containing materials related to the definition, symptoms, impacts, and ways to prevent anemia and anemia due to cigarette smoke exposure, the content of cigarette smoke, the effect of cigarette smoke exposure on pregnancy, and the importance of avoiding cigarette smoke exposure, and it comes with a blood pressure tablet intake control chart and a questionnaire on cigarette smoke exposure. The use of posters

and leaflets is effective because it allows the information to be presented in a visually appealing and easily understandable manner. The leaflets provide a short but concise summary of the information, depending on the preference for information directly related to the issue. An added benefit is that posters and leaflets can be saved and re-referenced, making them an easy-to-use reference resource to promote healthier understanding and behavior change (Al Rahmad et al., 2023).

This study uses an Ottawa Charter-compliant perspective to comprehensively evaluate the implementation of the MANTRA educational media program at Klaseman Village Health Post, Gatak District, Sukoharjo Regency, Central Java, Indonesia. The strategy outlined in the Ottawa Charter is based on five points of agreement, namely, supportive environment, public health policy, health service reorientation, personal skills, and community action. This agreement is a form of health promotion, namely, community empowerment (Aji & Yudianto, 2020).

## METHOD

This study used a qualitative study method with the aim of exploring and evaluating pregnant women's awareness of cigarette smoke exposure as a risk factor for anemia. Community empowerment activities were carried out at the primary service integration (ILP) integrated service post (Posyandu) of Klaseman Village, Gatak District, Sukoharjo Regency, Central Java, Indonesia. Respondents numbered 5 people who were determined by a sampling technique using total sampling, namely all pregnant women who participated in the ILP Posyandu activities in Klaseman Village. The selection of informants was carried out intentionally with the criteria that informants knew and were involved in the process of community empowerment activities.



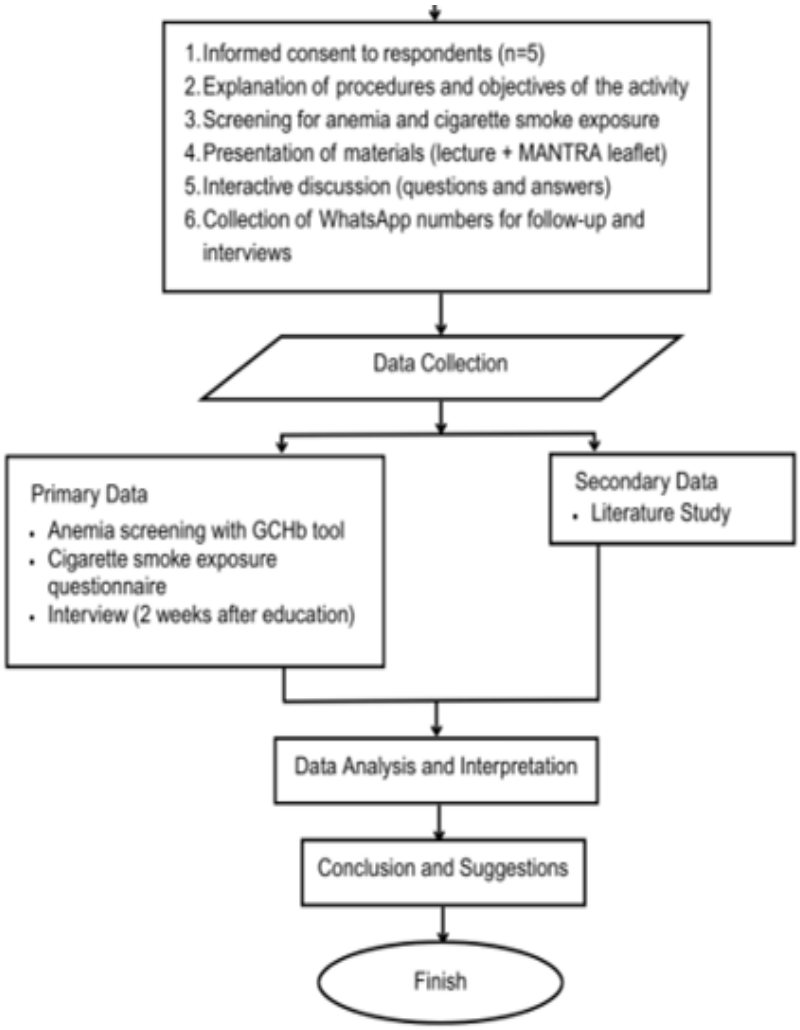



**Figure 1.** Flowchart for implementing community empowerment activities.

Community organization is done through a joint planning process involving midwives and village cadres. The planning process includes identifying health needs and problems, especially midwifery in Klaseman Village; contacting midwives and village cadres; planning empowerment programs; implementing empowerment programs; and evaluation. The data collection method used was primary data, conducted through in-depth interviews with informants, as well as screening and surveys to detect the incidence of anemia in pregnant women in Klaseman Village. Observation is done by directly observing the research site and the information provided by the interviewees. Data processing and presentation are done by collecting all the same data/information, and can represent the desired information. After collecting various data, qualitative analysis techniques are used to analyze them, including three elements: data reduction, data presentation, and conclusion to redescribe the collected data regarding the knowledge and behaviors aimed at avoiding exposure to cigarette smoke to prevent anemia, implemented by the community after MANTRA education. The processed data is then presented in the form of a script (narration) and visual documentation (photos).


**Figure 2.** Front view of MANTRA leaflet


**Figure 3.** Back view of MANTRA leaflet

This study is focused on raising awareness among pregnant women about the importance of avoiding exposure to cigarette smoke as a form of anemia prevention and on evaluating the influence of MANTRA as an educational tool in accordance with the five points of the Ottawa Charter, namely public health policy, supportive environment, reorientation of health services, personal skills, and community action.

## RESULTS AND DISCUSSION

Respondents in this activity were pregnant women who were classified as active in participating in Posyandu activities, so they have the potential to be more responsive to educational interventions. The age range of 20-30 years is included in the healthy and ideal reproductive age for pregnancy, meaning that neonatal mortality is 2-5 times higher at the age of less than 20 years and increases at the age of 30-35 years (Agustina, 2023). Good nutritional status (upper arm circumference ≥23.5 cm) indicates that the majority of respondents have adequate nutritional adequacy. In addition, a good level of compliance with the consumption of iron tablets (TTD) indicates that pregnant women have an initial awareness of the importance of preventing anemia.

The parity of the interviewees, most of whom were nulliparous (never pregnant before), 4 people, proved to be more sensitive and open to health education interventions, considering that it was their first pregnancy. The interviewees, most of whom were in the first and second trimesters of pregnancy, stated that education was provided during the crucial period of fetal organ formation and maternal blood volume increase. From the second to the eighth week, the main organs and systems of the body develop rapidly. This is a critical time. Organs or structures that are still developing at the time of exposure are more likely to be affected (Aprilia, 2020). We are entering the second trimester of pregnancy. At this stage, the blood volume in the pregnant woman's body increases by up to 35%. This volume is equivalent to approximately 450 mg of iron, which is necessary to support the process of producing red blood cells. These changes have significant implications, as red blood cells must maintain higher levels of oxygen transport to meet the demands of increasingly rapid fetal growth (Devi et al., 2023).

Overall, the characteristics of respondents, such as the majority of pregnant women being housewives who spend more time at home while their husbands are more active outside the home, support the effectiveness of the intervention because the duration of contact between the mother and her family or husband, who is a smoker, is minimal, which will also minimize the frequency of exposure to cigarette smoke in the mother.

**Figure 4.** Anemia screening

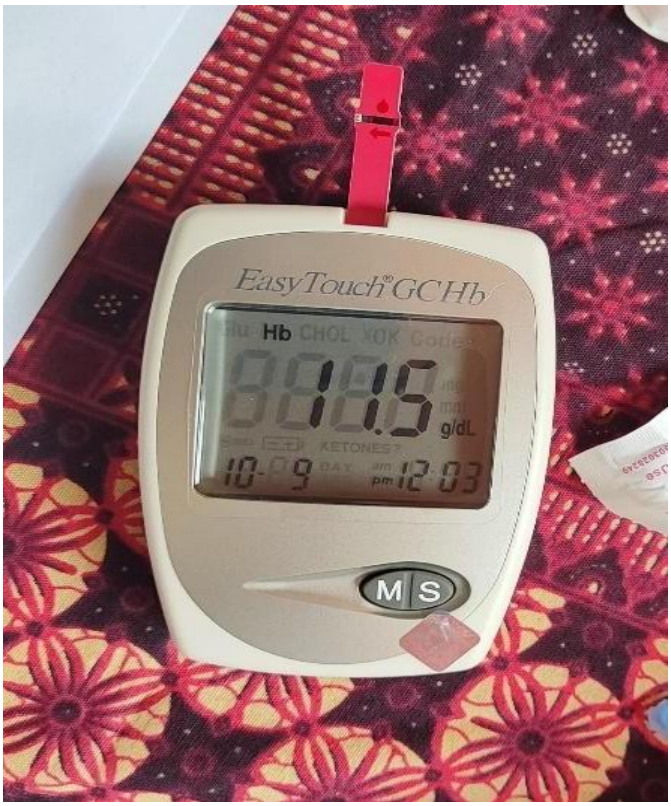



**Figure 5.** Anemia screening result with the EasyTouch GCHb device

Anemia screening using the GCHb tool showed that the majority of respondents did not experience anemia, with hemoglobin (Hb) levels ranging from 10.0 to 13.6 g/dL and an average of 12 g/dL, with only one respondent identified as having anemia. The variation in Hb levels also indicates the need for a preventive and promotive approach on an ongoing basis. This screening is important as a basis for assessing educational needs and as an indicator of the success of anemia prevention programs through environmental and behavioral approaches.

The results of screening with a questionnaire on exposure to cigarette smoke by Safitri & Syahrul (2015) showed that the majority of respondents were exposed to cigarette smoke, especially from husbands who were active smokers. The number of respondents exposed to cigarette smoke was 4 people, and 1 respondent was not exposed to cigarette smoke. Respondents with cigarette smoke exposure have categories starting from trimester 1 of 4 people, a duration of exposure of ≤15 minutes/day of 2 people and ≥15 minutes/day of 2 people, and all respondents have categories of the number of active smokers at home of 1-2 people; the category of active smokers is husbands of 4 respondents, and active smokers other than husbands are 0 respondents with the number of husbands smoking 1-5 cigarettes/day of 4 people. Family-based education is very important to address this problem because pregnant women, as passive smokers, cannot avoid it without family support, especially from their partners. This finding strengthens the need for specific interventions involving husbands in pregnancy health education programs.


**Figure 6.** Participant education with MANTRA leaflet

Education with MANTRA media is carried out individually, with educational materials including the definition, symptoms, impacts, and how to prevent anemia and anemia due to exposure to cigarette smoke, cigarette smoke content, the dangers of cigarette smoke exposure to pregnancy, and the importance of avoiding exposure to cigarette smoke. MANTRA is also equipped with a TTD consumption box that will make it easier for mothers to control TTD consumption during the 9 months of pregnancy. The MANTRA design is made attractive and interactive with pink and purple, which are typical women's colors, as the main colors of MANTRA and representative illustrations that will help mothers understand the material provided.

Follow-up interviews were conducted two weeks later after education to determine the picture of respondents' awareness of cigarette smoke exposure as a risk factor for anemia. The following is a picture of the knowledge and attitudes of pregnant women towards cigarette smoke exposure after education.

**Knowing the Dangers of Cigarette Smoke Exposure**

Education using MANTRA focuses on providing insight into the dangers of cigarette smoke exposure, one of which is anemia. The content of cigarette smoke inhaled by pregnant women can affect the well-being of the mother and fetus and even increase the risk of morbidity and mortality in both. In post-education interviews, several respondents recalled the material explained during education with MANTRA:

> "...in fact, if inhaled, cigarette smoke is dangerous because it contains tar and nicotine which can disrupt red blood cells and result in anemia" (A, 22 years old)

Cigarette smoke contains several harmful substances, including tar and nicotine, which can have negative effects on blood health. Tar can damage the bone marrow and produce free radicals that cause hemolysis of red blood cells, while nicotine can increase oxidative stress in erythrocytes, which can affect blood quality and contribute to anemia. In addition, exposure to cigarette smoke is also associated with decreased levels of folate in the blood, an important factor in the formation of red blood cells (Stefanoni et al., 2020).

> "If I get anemia, I'm afraid something bad will happen to the baby in my stomach, such as a low birth weight or premature birth" (N, 30 years old)

Thus, this is in line with the impact of anemia during pregnancy on the unborn child will cause premature birth, low birth weight, a reduction in their ability to survive outside the womb, and a reduction in their intelligence level in the future. In addition, pregnant women who suffer from anemia have mild asphyxia (33%), moderate asphyxia (47%), and severe asphyxia (20%) (Handayani, 2022).

**Avoiding Exposure to Cigarette Smoke**

Direct contact between active smokers and passive smokers will certainly occur in various public spaces, such as terminals, stations, airports, public transportation, tourist attractions, and others. In these places, where there are rooms without partitions separating smokers from other non-smokers, cigarette smoke is eventually inhaled not only by smokers but also by other people around them, involuntarily (Setiadin et al., 2024). Respondents provided information on actions taken when exposed to cigarette smoke:

> "Now, if my husband is smoking, I stay away" (F, 20 years old)

Therefore, it is important to know the safety distance needed to avoid the dangers of cigarette smoke. The recommended safety distance from cigarette smoke is at least 3 meters (about 10 feet). Within a distance of 3 meters, exposure to cigarette smoke can be significantly reduced, minimizing health risks (Nopriani & Roza, 2024).

**Neutralizing Cigarette Smoke**

The content of cigarette smoke that is spread and mixed in the air will certainly become a pollutant and cause pollution. These substances can even create an uncomfortable feeling in the senses of people who are exposed, and direct reactions such as coughing and shortness of breath. So, steps are needed to neutralize the air in a room exposed to cigarette smoke so that it can restore a comfortable feeling in the room. Respondents described their actions in reducing or neutralizing rooms that have been exposed to cigarette smoke:

> "I asked my husband that if he was going to smoke, he should do it near the window and turn on the fan" (A, 22 years old)

Cigarettes are very effective in spreading toxic chemicals. This is because the smoke produced by cigarettes can get trapped inside the house and fill it with toxic substances, such as nicotine, carbon monoxide, and carcinogens. All these substances are not only present in the place where you smoke. All rooms, including those of children and infants, are at risk of contamination by various dangerous substances. In addition, cigarette smoke can remain in the air for a long time, about 2-3 hours, even if the ventilation of the house or the windows is open. The toxins present in cigarette smoke can also settle on the body, clothes, hair, and hands (Nopriani & Roza, 2024).

**Educating Families**

A family is often understood as a person or group of people who are bound together so that they can interact both physically and verbally. This interaction results in the chain of

life, one of which, in this case, is the chain of disease. Bad habits carried out by one person in a family can have fatal consequences for other family members. So there needs to be counseling and understanding of the dangers of exposure to cigarette smoke, not only for people at risk of disease but also for their families and those around them. Several respondents provided information related to how they educate their families who smoke:

> "I told my husband, don't smoke in the house" (S, 27 years old)
>
> "I asked my husband to stop smoking, because it is dangerous for the baby in the stomach" (D, 23 years old)

The role of families and managers in creating a smoke-free home includes not providing support to smokers, such as not giving money to buy cigarettes, not providing opportunities to smoke at home, and not providing ashtrays. To create a smoke-free home, anti-smoking education is still needed. The role of families and health workers is to promote smoke-free homes by informing about the dangers of smoking, fostering family agreement, reprimanding family members who smoke, and not encouraging smoking at home. Parents also need to be role models in avoiding smoking for health reasons, not economic ones (Cahyani et al., 2024)

Based on the results of the post-teaching interviews, MANTRA was then evaluated for its effectiveness in light of the Ottawa Charter. In terms of the supportive environment aspect, MANTRA helps create a supportive environment by raising awareness of the dangers of cigarette smoke exposure, encouraging pregnant women and families to stay away from smokers, or designating smoke-free areas in the home. From a public health policy perspective, the information provided in MANTRA encourages the establishment of informal policies at the household level, such as smoking bans in the home, which also support health regulations. In reorienting health services, the use of MANTRA shifts health services from curative to promotional and preventive, expanding the role of integrated health centers to become community-based educational venues. MANTRA also improves life skills, providing pregnant women with the knowledge and skills to recognize risks and act accordingly, such as avoiding cigarette smoke or providing education to family members. Finally, in the context of community action, MANTRA becomes a stimulus for collective action in society, especially through the role of managers and families in disseminating information and supporting the creation of smoke-free homes.

## CONCLUSION

Community empowerment activities in Klaseman Village, Gatak District, Sukoharjo Regency showed that the majority of pregnant women were still exposed to cigarette smoke, especially from their husbands, as active smokers. Anemia screening showed that one in five respondents had anemia, while the other four had Hb levels within normal limits. Education using MANTRA media has proven effective in raising awareness among pregnant women about the dangers of cigarette smoke exposure as a risk factor for anemia. This is reviewed through the five points of the Ottawa Charter, such as changes in behavior after education seen from the mother's efforts to avoid cigarette smoke, such as staying away from smoking areas, asking her husband to smoke outside the home, and looking for a smoke-free environment when doing activities outside, making this intervention a relevant strategy to be implemented in family and community-based anemia prevention.

As a follow-up, it is recommended to develop a smoke-free home program that involves families, especially husbands, as well as the provision of ongoing visual education media in public facilities. Health cadres can be involved in the routine monitoring of pregnant women who are still exposed to cigarette smoke. For educational institutions such as

Sebelas Maret University, this activity can be integrated into the health promotion curriculum, replicated in other fostered villages, and used as the basis for further qualitative research to measure the effectiveness of long-term education. In addition, students are encouraged to publish the results of this activity in scientific journals. For midwifery practitioners, MANTRA can be used as part of the Standard Operating Procedure (SOP) for pregnant women's education, accompanied by training in the use of visual media and recording of cigarette smoke exposure in the maternal and child health (KIA) book. Innovation in digital educational media can also be developed to expand the reach of information.

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