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# Improvement of Mother's Knowledge to Common 65s`Cold Treatment in Children Using Leaflet Through CBIA Method In Tamansari Village

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**ABSTRACT**

The common cold is a frequently occurring disease in children. An approach to control the disease is through health education using the Cara Belajar Ibu Aktif (CBIA) method alongside a leaflet media. Family knowledge, particularly that of the mother, plays a crucial role in preventing the transmission of the common cold in children. Knowledge is formed as a result of new understanding. This study used quantitative quasi-experimental design with a one-group pretest–posttest approach. The study population consisted of mothers in Tamansari Village, Tlogowungu Subdistrict, Pati Regency. Samples were selected using simple random sampling based on predefined inclusion and exclusion criteria. Data were collected door-to-door using structured questionnaires administered before and after the educational intervention. The results showed that maternal knowledge was generally poor before the intervention. Following the CBIA-based health education, maternal knowledge significantly improved. The proportion of mothers with good knowledge increased from 58.6% to 73.7%, while the proportion with poor knowledge decreased from 32.3% to 9.0% Statistical analysis using Wilcoxon Signed-Rank Test revealed a significant difference in maternal knowledge before and after the intervention ($p = 0.000 < 0.05$). Health education using the CBIA method supported by leaflet media is an effective approach for improving maternal knowledge regarding the treatment of the common cold in children.

Keywords:Common Cold, Leaflet, CBIA, Knowledge

## Introduction

The common cold is one of the most prevalent upper respiratory tract infections in children and remains a significant public health concern worldwide. Children are particularly vulnerable due to immature immune systems and frequent exposure in communal environments such as schools and daycare centers. Globally, acute respiratory infections contribute substantially to school absenteeism, increased healthcare utilization, and diminished family well-being (Boracchini et al., 2024). Epidemiological evidence consistently shows that viral pathogens—particularly rhinovirus/enterovirus—are the predominant causes of common colds in children, accounting for nearly one-third of cases, with higher prevalence observed among children under five years of age (Khales et al., 2025).

The diversity of viral etiologies, including rhinovirus, respiratory syncytial virus, adenovirus, parainfluenza virus, and seasonal coronaviruses, explains the absence of a definitive curative therapy for the common cold (Eccles, 2023; Geppe *et al*., 2023). Consequently, management strategies focus primarily on symptomatic relief, preventive measures, and supportive care rather than antiviral treatment. Despite this, acute respiratory infections remain among the leading causes of pediatric outpatient visits, increasing the likelihood of inappropriate medication use, particularly antibiotics (Boracchini et al., 2024). Inappropriate antibiotic use for viral respiratory infections continues to be a global problem and is a key contributor to antimicrobial resistance. Several international studies report persistent antibiotic prescribing and self-medication for viral upper respiratory tract infections in children, despite clear clinical guidelines discouraging such practices (Houten et al., 2019). Similar patterns have been observed in Indonesian community settings, where misconceptions regarding antibiotic use are strongly associated with limited caregiver knowledge and irrational drug practices at the household level (Pratiwi & Anggiani, 2020; Pratiwi et al., 2025). These findings underscore the importance of caregiver-focused educational interventions to promote rational management of common childhood illnesses.

Maternal knowledge plays a central role in the prevention, early recognition, and appropriate management of childhood common colds. Previous studies demonstrate that improved caregiver health literacy is associated with better home management of childhood illnesses, reduced unnecessary healthcare utilization, and more appropriate medication use (Milne-Ives *et al*., 2021). Community-based health education approaches are therefore essential, particularly in settings with limited access to formal healthcare services. The *Cara Belajar Ibu Aktif* (CBIA) method is a community empowerment approach designed to actively engage mothers in learning about health and medication use through interactive sessions supported by educational media, such as leaflets (Widiastuti, 2021). Educational leaflets that are clear, accurate, and visually engaging can enhance comprehension and information retention, particularly when aligned with WHO guidelines and evidence-based recommendations. Many mothers resorted to over-the-counter drugs and dietary supplements for their children without proper medical guidance, which could pose risks to child health (Aksoy *et al*., 2024). Care-seeking behavior among mothers varies widely across different regions and contexts. A meta-analysis conducted in Ethiopia by Tekalign *et al*., (2022) revealed that only about 60% of mothers sought appropriate care for their children's common illnesses. Factors such as maternal education and marital status significantly influenced this behavior.

Moreover, even nursing students, who are future health professionals, may not always demonstrate optimal knowledge and practices regarding common cold management. A study in China by Shi *et al*., (2024) found that while nursing students generally showed good levels of knowledge, attitude, and practice (KAP), variations existed depending on their educational background, gender, and lifestyle factors.

Additionally, educational leaflets should be clear, accurate, visually engaging, and easy to understand. The Leafletsused in this study provided information about

the symptoms, causes, prevention, and treatment of the common cold, in conformity with the guidelines from the World Health Organization (WHO) and related literature.

This study aims to determine the effect of the CBIA method combined with leaflet media on maternal knowledge levels regarding the treatment of the common cold in children in Tamansari. This study is significant because it addresses a critical gap in community-based pediatric health education by evaluating an accessible and low-cost intervention aimed at improving caregiver knowledge. The findings are expected to contribute empirical evidence to support the development of effective, sustainable health education strategies, promote rational management of common childhood illnesses, and reduce inappropriate treatment practices at the community level.

In Indonesia, data from the Basic Health Research (Riskesdas, 2023) indicate a 25% prevalence of upper respiratory tract infections among children, with a prevalence of 15.04% in Central Java. Children under five years of age are particularly vulnerable due to underdeveloped immune systems and environmental risk factors such as poor sanitation and air pollution. In Tamansari Village, Tlogowungu Subdistrict, Pati Regency, preliminary observations revealed limited maternal knowledge regarding the causes, symptoms, and appropriate treatment of the common cold, along with persistent misconceptions about antibiotic use. Symptoms of the common cold typically include nasal congestion, sneezing, a runny nose, a sore throat, and a slight fever. The incubation period ranges from 12 hours to 5 days after exposure. The disease is predominantly self-limiting; however, complications may arise if not appropriately treated. Often, antibiotic therapy is used in cases where it is not needed, adding to antibiotic resistance (Centers for Disease Control and Prevention, 2019).

Educational interventions are therefore crucial, especially for mothers who care for children. The level of maternal knowledge was initially low (74.38%) but significantly improved (87.50%) after educational sessions. The CBIA method, alongside media lealets, further helps empower the community (Widiastuti, 2021). Furthermore, this approach strengthens understanding and guides appropriate medication usage.

Although previous studies have demonstrated the effectiveness of health education in improving caregiver knowledge and promoting rational medication use, most research has focused on general health promotion or medication literacy without specifically evaluating structured, participatory learning models at the community level. Evidence on the effectiveness of the CBIA method combined with leaflet-based education in improving maternal knowledge regarding the management of the common cold in children remains limited, particularly in rural Indonesian settings. Moreover, few studies have employed a pretest–posttest design to quantitatively assess changes in maternal knowledge following such interventions. Therefore, this study addresses a critical gap by systematically evaluating the impact of a CBIA-based educational intervention supported by leaflet media on maternal knowledge of common cold treatment in children in Tamansari Village. The novelty of this study lies in its integration of an active learning approach with standardized educational materials in a community-based setting, providing empirical evidence for

a low-cost, scalable, and culturally appropriate health education strategy. The findings are expected to inform future community health programs and contribute to the development of sustainable interventions aimed at reducing inappropriate treatment practices and improving child health outcomes.

Tamansari Village, Tlogowungu Subdistrict, Pati Regency, was selected due to its high number of children under five. Currently, there are 224 children in RW 2 of Tamansari. The preliminary survey revealed limited maternal knowledge about the symptoms, causes, and treatment of the common cold. This condition occurs due to misconceptions about antibiotic usage, which can contribute to resistance. Thus, educational intervention is needed.

Health education employing the CBIA method and Leaflets is expected to enable mothers to care for their children more appropriately, following guidelines from the WHO and related literature. Leaflets with clear messages and appropriate illustrations aid understanding. Furthermore, this approach involves the community directly, strengthening their ability to manage their health care needs.

Through empowerment, families can provide proper care to children with colds, thereby improving their health and reducing health care expenses. Furthermore, the results can aid policy makers in developing health education programs for the community. Implementing community-engaged methods can enable health care initiatives to reach a wider population more effectively.

This study is expected to contribute significantly, not only to Tamansari's community, but also to other communities. An appropriate approach, like the CBIA method, can maximize health education's reach and impact.

**Methodology**

This study used a quantitative approach with a quasi-experimental one-group pre-test and post-test design, which enabled the assessment of changes in maternal knowledge before and after the educational intervention using the *Cara Belajar Ibu Aktif* (CBIA) method supported by leaflet media.

The study was observational and analytical in nature. The data were collected by visiting respondents' homes (door to door) to conduct both the pre-test and post-test. The observation was carried out twice-first before the intervention and then after the intervention. The respondents were surveyed using a questionnaire before the intervention, and subsequently, the same questionnaire was administered after the intervention.The questionnaire used in this study was developed based on a review of relevant international literature and clinical guidelines concerning the management of the common cold in children. The development process aimed to ensure that the instrument accurately measured maternal knowledge relevant to appropriate home-based management and prevention of complications.The questionnaire consisted of structured, closed-ended questions designed to assess key domains of knowledge related to the treatment of the common cold in children. Content validity of the questionnaire was evaluated through expert judgment by health professionals with backgrounds in public health and pediatric care, who assessed the relevance, clarity, and appropriateness of each item. Revisions were made based on their feedback to improve clarity and ensure alignment with study

objectives.Prior to data collection, the questionnaire was pilot-tested on a group of mothers with similar characteristics to the study population but who were not included in the final sample. Reliability testing demonstrated acceptable internal consistency, indicating that the instrument was suitable for measuring maternal knowledge regarding the treatment of the common cold in children.

The population for this study consisted of all mothers with children under the age of 1–5 years who reside in Tamansari Village, Tlogowungu Subdistrict, Pati Regency. This location was chosen due to its large number of children. According to the data available, there are 200 children registered under the Family Card in RW 2. The inclusion criteria for the study were: the mother is willing to become a participant, able to read the lealet, and is a caregiver for a child under the age of 1–5. The exclusion criteria were: the mother is unwilling to sign the consent form, is not a permanent resident of Tamansari RW 2, or cannot communicate effectively.

The questionnaire was developed based on a review of relevant international literature and clinical guidelines related to the management of the common cold in children. It consisted of structured, closed-ended multiple-choice questions covering key knowledge domains, including causes, symptoms, prevention, and appropriate treatment. Content validity was assessed through expert judgment by public health and pediatric professionals, who evaluated item relevance, clarity, and alignment with study objectives. Revisions were made based on their feedback. Prior to the main study, the questionnaire was pilot-tested on mothers with similar characteristics who were not included in the final sample. The total score was then classified into knowledge categories: poor (< 56%), fair (56–75%), and good (76–100%). Reliability testing demonstrated acceptable internal consistency, with a Cronbach's alpha > 0.7.

The intervention was implemented through health education employing the Cara Belajar Ibu Aktif (CBIA) method alongside media Leaflets. The leaflets provided information about the symptoms, causes, prevention, and treatment of the common cold, following guidelines from the World Health Organization and related literature. The educational sessions were designed to enable active participation by the mothers, allowing them to ask questions, share their experiences, and apply their understanding in practice.

Groups of 10–12 respondents received education in two sessions. The data were subsequently analyzed using statistical software. The data analysis included:

1) Data were analyzed using statistical software. Univariate analysis was performed to describe the frequency distributions and percentages of respondents' characteristics and knowledge levels. Prior to inferential analysis, data normality was assessed using the Kolmogorov–Smirnov test. Because the knowledge score data were not normally distributed, nonparametric analysis was applied.
2) Bivariate analysis was performed using the Wilcoxon Signed-Rank Test to evaluate differences in maternal knowledge scores before and after the intervention. This test was selected because it is appropriate for paired, non-normally distributed data and aligns with the one-group pre-test–post-test study design. Statistical significance was determined at a p-value of <0.05.

## Result and Discussion

### Instrument Validation

Before the intervention was implemented, the instruments-namely the leaflet and questionnaire-were first evaluated for validity and reliability. The expert judgment was performed by two experienced pharmacists who rated the instruments' content. The expert judgment scores for the leaflet resulted in an average of 3.892, indicating its validity and readiness for use in the study. Furthermore, the validity and reliability testing for the questionnaire was conducted with 30 respondents in Tamansari RW 1, Tlogowungu Subdistrict, Pati Regency. All questionnaire items were found to be valid (r-calculated > r-table of 0.361), and Cronbach's alpha exceeded 0.7, demonstrating high internal consistency.

**Table 1. Expert Test Result of Leaflet**

| Validator | Value of Questions Item | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pharmacist I | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 54 |
| Pharmacist II | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 55 |
| Total | | | | | | | | | | | | | | | 109 |
| Average | | | | | | | | | | | | | | | 3,892 |

Source : Processed primary data (2023)

### Respondents' Characteristics

**Table 2 Expert Test Resultof Leaflet**

| Respondents' Characteristics | Total | Percentage % |
|---|---|---|
| Age | | |
| 18-25 years (Late teens) | 23 | 17,3 |
| 26-45 years (Early adults) | 109 | 82,0 |
| 46-49 years (Late adults) | 1 | 0,8 |
| Total | 133 | 100 |
| **Education** | | |
| Elementary | - | - |
| Junior high | 8 | 6,0 |
| High school | 121 | 91,0 |
| University | 4 | 3,0 |
| Total | 133 | 100 |

Source : Processed primary data(2023)

Table 2 shows that the majority of respondents fell into the adult age group (26–45 years), with 109 respondents (82%). This condition occurs because women within this age range are typically in their reproductive period and are responsible for the care of their children.

Furthermore, the majority of respondents (91%) had a high school education. This can be influenced by policy (the 12-year Compulsory Basic Education) and by financial limitations, which make it difficult for many families to pursue higher education. This observation resonates with Wardani et al. (2020), who explained that geographic and financial factors contribute to low educational attainment in many communities.

**Maternal Knowledge Levels Before and After Leaflet Intervention**

**Table 3 Respondents' Knowledge Level Before Leaflet Distribution**

| Variable | Categori | Total | Percentage% |
|---|---|---|---|
| Before Leaflet Distribution | Good | 43 | 58,6 |
| | Enough | 12 | 9,0 |
| | Poor | 78 | 32,3 |
| Total | | 133 | 100 |
| AfterLeaflet Distribution | Good | 98 | 73.7 |
| | Enough | 23 | 17.3 |
| | Poor | 12 | 9,0 |
| Total | | 133 | 100 |

Source : Processed primary data(2023)

Table 3 presents the distribution of maternal knowledge levels regarding the treatment of the common cold in children before and after the leaflet-based educational intervention. Prior to the intervention, the largest proportion of respondents was classified in the poor knowledge category, accounting for 78 respondents (32.3%), while 43 respondents (58.6%) demonstrated good knowledge and 12 respondents (9.0%) were categorized as having fair knowledge. Following the educational intervention, a notable improvement in maternal knowledge was observed. The proportion of respondents with good knowledge increased from 58.6% to 73.7%, while the proportion with poor knowledge decreased substantially from 32.3% to 9.0%. Additionally, the percentage of respondents in the fair knowledge category increased from 9.0% to 17.3%. These findings indicate a positive shift in maternal knowledge levels after exposure to health education using the CBIA method supported by leaflet media.

**Mann-Whitney Test**

**Table 4 Results of Difference Test Before and After Leaflet Distribution**

| Measured | Sig | p.value | Explanation |
|---|---|---|---|
| Knowledge before and after leaflet distribution | 0,000 | < 0,05 | differs |

Source : Processed primary data(2023)

Table 4 shows the results of the Wilcoxon Signed-Rank Test, which indicate a significant difference in maternal knowledge before and after the intervention (p = 0.000 < p-value 0.05). This means there was a significant improvement in maternal knowledge about the treatment of the common cold in children after receiving health education through leaflets in Tamansari RW 2, Tlogowungu Subdistrict, Pati Regency.

Before the intervention, most respondents had poor knowledge about the treatment of the common cold in children, but after the intervention, their knowledge significantly improved. This improvement can be attributed to the health education provided, which was supported by Leaflets, delivering clear and comprehensive information about symptoms, causes, prevention, and appropriate treatment for the common cold.

**Discussion**

The Cara Belajar Ibu Aktif (CBIA) method, supported by media Leaflets, was shown to be effective in increasing maternal knowledge about the treatment of the common cold in children. Similar outcomes have been reported in other Indonesian community-based health education programs, where participatory educational approaches significantly improved caregivers' knowledge and engagement in child health management (Pratiwi et al., 2025).This result is in agreement with a study by (Widiastuti, 2021), which found a significant improvement in community knowledge following education employing a similar method.The magnitude of improvement observed in this study can be explained by the core principles of the CBIA method, which emphasizes active participation, dialogue, and experiential learning. Adult learning theory suggests that knowledge retention is enhanced when learners are actively engaged and able to relate new information to their daily experiences. Through group discussions and guided learning, CBIA enables mothers to critically reflect on existing beliefs—particularly misconceptions regarding antibiotic use—and replace them with evidence-based understanding. This mechanism is crucial in the context of the common cold, a condition that is often misunderstood and inappropriately managed at the household level(Albayrak et al., 2021).

The use of leaflets as a supporting educational medium further strengthened the intervention. Leaflets provide concise, structured, and visually supported information that can be revisited beyond the educational sessions, reinforcing learning and aiding comprehension among participants with varying literacy levels. Previous studies have shown that combining verbal education with written materials improves knowledge acquisition and recall, particularly in community-based settings. In this study, the leaflet functioned not only as an information source but also as a tool for sustaining knowledge after the intervention.Prior to the intervention, limited maternal knowledge was likely influenced by restricted access to accurate health information, low health literacy, and persistent misconceptions surrounding antibiotic use. These findings reflect broader global trends reported in the literature. The Centers for Disease Control and Prevention (Centers for Disease Control and Prevention, 2024) has emphasized that misunderstanding the viral etiology of the common cold remains a major driver of inappropriate antibiotic use. After the intervention, mothers demonstrated improved understanding of symptom-based management, appropriate medication choices, and the importance of avoiding unnecessary antibiotics, suggesting that CBIA-based education can directly contribute to more rational health decision-making.

The implications of these findings are particularly significant in relation to antimicrobial resistance, a growing global public health concern. International studies consistently report high rates of parental self-medication and inappropriate expectations for antibiotic prescriptions.Xu et al., (2020) found that in China, more than one-third of children had received antibiotics from parents prior to clinical consultation, largely driven by inadequate parental knowledge. Similarly, Saleh

Faidah et al., (2019) reported persistent misconceptions among parents in Saudi Arabia and Turkey regarding the effectiveness of antibiotics for viral infections. The substantial improvement in maternal knowledge observed in the present study suggests that community-based educational interventions such as CBIA may play a critical role in reducing inappropriate antibiotic use at the household level.

Furthermore, this study aligns with international evidence highlighting the importance of maternal knowledge, attitudes, and practices (KAP) in managing pediatric respiratory infections. Ha Manh et al., (2023) demonstrated that higher maternal education and better health literacy were strongly associated with improved management of acute respiratory infections in children under five. The CBIA approach, by providing accessible and inclusive education, has the potential to bridge knowledge gaps across different socioeconomic groups, thereby promoting more equitable health outcomes.

The findings also underscore the broader value of community empowerment through health education. By equipping mothers with practical, evidence-based knowledge, the intervention enhances their confidence and autonomy in managing self-limiting conditions such as the common cold. This empowerment may reduce unnecessary healthcare utilization, ease the financial burden on families, and optimize the use of healthcare resources—outcomes that are particularly relevant in resource-limited settings.

Despite these positive implications, the findings must be interpreted in light of the study's limitations. The absence of a control group and the short-term assessment of knowledge gains limit causal inference and preclude conclusions regarding long-term behavioral change. Nonetheless, the consistency of the results with existing international literature strengthens the credibility of the findings and supports the relevance of the CBIA method as a feasible and effective educational strategy.

In conclusion, this study contributes to the growing body of evidence supporting participatory, community-based health education as an effective means of improving maternal knowledge regarding the treatment of common childhood illnesses. The CBIA method, supported by simple educational media such as leaflets, represents a practical and scalable approach to enhancing health literacy, promoting rational treatment practices, and addressing the global challenge of antimicrobial resistance. Future studies should expand on these findings by incorporating control groups, longer follow-up periods, and behavioral outcome measures to further evaluate the sustainability and broader impact of CBIA-based interventions.

This improvement occurs because the CBIA method involves an interactive, participatory approach, which helps participants retain knowledge and apply it to their daily routines. Furthermore, employing leaflets as media aid contributes to delivering information in a clear, convenient, and easy-to-understand format.

Before the intervention, many mothers had limited knowledge due to poor access to health care information, low health literacy, and misconceptions related to antibiotic usage. After the intervention, there was a significant improvement in their understanding, which resulted in a more appropriate approach to treating the common cold in children, choosing proper medication, and avoiding antibiotic

resistance-a growing health concern(Centers for Disease Control and Prevention, 2024).

This study shows that health education employing the CBIA method alongside media leafllets is an effective way to empower the community, particularly mothers, in making health care decisions for their children. Furthermore, this approach contributes to reducing antibiotic resistance, which can pose a significant health threat in the future.

Other factors influencing the intervention's success include the respondents' educational background, motivation, and strong social support. The educational materials were presented in a clear, comprehensive, and visually helpful format, which made understanding easier for the respondents. Additionally, group sessions fostered interpersonal exchanges, further strengthening knowledge retention.Such health education programs can enable families to manage their children's health more effectively and reduce their reliance on health care services, which in turn may ease the financial burden on both families and health care institutions.

The results of this study are consistent with previous international findings that emphasize the effectiveness of community-based health education programs in improving maternal knowledge regarding the treatment of common cold in children. Recent evidence shows that nearly all adults practice self-care for common cold symptoms, often combining methods lacking clinical support. For example, Pietrusiewicz *et al.*, (2021) conducted a prospective analysis of pharmacist-recommended over-the-counter treatments in Poland and found that many self-care strategies—including herbal teas, vitamin C, nasal sprays, and lozenges—were often suggested without clear evidence of efficacy, especially when combined with conventional remedies such as analgesics and decongestants. These findings underscore the persistent prevalence of non-evidence-based self-care behaviors and highlight the critical need for structured health education programs to guide rational treatment choices and mitigate misconceptions. Further evidence from Ha Manh *et al*., (2023) demonstrated that mothers' knowledge, attitudes, and practices (KAP) are key determinants in the management of acute respiratory infections in children under five. Their study showed that higher maternal education and income levels were positively associated with better KAP scores. These findings support the need for accessible educational interventions targeting all socioeconomic strata. Despite moderate awareness of acute respiratory infection (ARI) symptoms, parental self-medication with antibiotics remains prevalent. Xu et al. (2020) reported that in China, 32.2% of children had already received antibiotics from their parents before visiting a clinic, and among these, 83.9% were subsequently prescribed antibiotics by a physician. This pattern was strongly associated with parental education and health literacy levels. The study emphasized that poor understanding of antibiotic use led to inappropriate self-medication and parental demand for unnecessary antibiotics. Previous studies have emphasized the critical role of pharmacists in guiding appropriate self-medication practices and improving rational drug use at the community level (Pratiwi et al., 2020).These findings underscore the importance of applying the Community-Based Interactive Approach (CBIA), as implemented in our study, to enhance health education and promote rational

antibiotic use, further justifying the application of the CBIA method as used in our study.

The findings of the present study are consistent with, and further reinforce, the body of evidence highlighted in the literature regarding persistent parental misconceptions about antibiotic use. Similar to the observations by Saleh Faidah *et al*., (2019) in Saudi Arabia, our findings indicate that a substantial proportion of parents continue to associate antibiotics with symptomatic relief for common illnesses, despite their predominantly viral etiology. This parallel suggests that expectations for antibiotic prescriptions are not limited to a single geographic or cultural context but represent a broader global challenge in antibiotic stewardship. The inability of parents to clearly differentiate between antibiotics and over-the-counter medications, as noted in previous studies, is also reflected in our results, underscoring the ongoing need for structured and comprehensible educational interventions. Furthermore, when compared with the findings of Oikonomou et al., (2021), our study demonstrates that increased exposure to health information alone may not be sufficient to correct entrenched misconceptions. Despite frequent public health messaging, misunderstandings regarding the effectiveness of antibiotics against viral infections persist, a trend that is echoed in our findings. This alignment suggests that the quality, clarity, and targeting of educational messages are as critical as their frequency. In particular, demographic-sensitive approaches—tailored to parental education level, age, and prior healthcare experiences—appear essential to effectively address gaps in understanding and to modify inappropriate expectations toward antibiotic use.In line with Albayrak et al., (2021), our results also reveal a notable discrepancy between reported behavior and underlying knowledge. While many parents claim not to use antibiotics without prescriptions, a considerable proportion still believe that antibiotics are effective for viral infections. This mirrors the persistent knowledge gap identified in Turkey and suggests that compliance with prescription regulations does not necessarily equate to adequate conceptual understanding of antibiotic resistance. Collectively, these comparisons indicate that the findings of this study corroborate previous international research and highlight a sustained global issue: parental knowledge about antibiotics remains insufficient, thereby necessitating continuous, targeted, and context-specific educational strategies to reduce antibiotic misuse and curb the progression of antimicrobial resistance.

These findings align with the theoretical underpinnings of the CBIA (Cara Belajar Ibu Aktif) method, which promotes interactive, maternal-centered learning. The use of structured leaflets tailored to culturally relevant content enables effective transmission of evidence-based health information. Pappas, (2020)also emphasized that rhinoviruses are the primary agents of the common cold and that symptomatic management is the mainstay of treatment, making non-antibiotic strategies the most appropriate approach. Several limitations should be considered when interpreting the findings of this study. First, the sample size was limited to 133 mothers from a single community in Tamansari Village, which may restrict the generalizability of the results to broader populations with different sociodemographic characteristics, healthcare access, or cultural practices. Consequently, the external validity of the

study is limited, and the findings may not be fully representative of mothers in other regions.the use of a self-administered questionnaire introduces the possibility of response bias, including social desirability bias, whereby respondents may provide answers they perceive as favorable rather than reflecting their true level of knowledge. Additionally, repeated exposure to the same questionnaire during the pre-test and post-test may have resulted in a testing effect, potentially inflating post-intervention scores independent of the educational intervention. The study employed a pre–post design without a control group, which limits the ability to attribute observed changes in knowledge exclusively to the CBIA method and leaflet intervention. External factors, such as exposure to other health information sources during the study period, cannot be fully ruled out. The assessment focused solely on short-term changes in maternal knowledge and did not evaluate long-term knowledge retention or actual behavioral changes in the management of the common cold in children. Future studies with larger, more diverse samples, the inclusion of control groups, and longer follow-up periods are recommended to strengthen causal inference and assess the sustainability of educational interventions.

Therefore, this study contributes to the growing body of literature that supports community-based interventions, particularly those aimed at empowering mothers with practical knowledge and behavioral skills to manage self-limiting conditions like the common cold. By improving maternal knowledge through evidence-informed strategies such as CBIA, inappropriate healthcare practices and antibiotic misuse can be significantly reduced, which is essential in the era of rising antimicrobial resistance.Furthermore, this study underscores the necessity for health care providers and policy makers to collaborate in developing community-based health education programs to improve health literacy at the community level.

## Conclusion

This study shows that health education employing the Cara Belajar Ibu Aktif (CBIA) method alongside media leafllets is an effective approach for improving maternal knowledge about the treatment of the common cold in children. This improvement in knowledge is expected to enable families to provide proper care for children suffering from the common cold, thereby reducing complications, improving health outcomes, and lessening financial pressures related to health care.

Furthermore, this intervention can contribute to reducing antibiotic resistance by promoting the appropriate use of medication. The study's results may serve as a policy consideration for designing health education programs at the community level. Providing health education with a participatory approach can empower families and enable them to manage health care more effectively, which is a key step toward improving community health as a whole.

## Declaration of Competing Interest

The author declares that they have no conflicts of interest in relation to this manuscript. The study was conducted in an independent manner, without monetary support, sponsorship, or engagement from pharmaceutical firms or commercial parties that could potentially introduce bias

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