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Research Article:

# Knowledge, Attitude, and Practice of Preschool Children in Rural Areas on Handwashing and Toothbrushing

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## ABSTRACT

Establishing lifelong hygienic practices begins in early childhood, particularly in rural areas where access to health education and resources may be limited. However, the level of pre-schoolers' knowledge, attitudes, and practices (KAP) about basic hygiene practices in rural areas needs to be better understood. This study investigates the KAP of preschool children in Sik, Kedah, regarding handwashing and toothbrushing. Using a case study design with a qualitative approach, the study involved 16 children, focusing on six for detailed data collection through observations, video recordings, and interviews. The results show that while some children forget to use soap on occasion, these children understand the importance of handwashing as a way to get rid of germs and avoid getting sick. Since they express satisfaction and enjoyment from feeling clean, they have positive attitudes regarding handwashing. Although handwashing is typically performed before meals and after using the restroom, soap use varies. Similar to toothbrushing, children show that brushing is essential for maintaining oral health, which includes avoiding tooth decay and foul breath. The majority of them also understand the significance of brushing twice a day. After brushing, children show enjoyment and a feeling of freshness, and their attitudes are generally positive. Although the frequency varies from person to person, practices are consistent and frequently supervised by the teacher. While pre-schoolers generally show good knowledge and attitudes regarding hygiene practices, inconsistent application emphasises the need for ongoing health education and better resources to improve hygiene practices and health outcomes in rural areas. The implication of this study is that there is a need for enhanced education and resources in rural areas to reinforce consistent hygiene practices and improve overall health outcomes.

**Keywords:** Preschool, knowledge, attitude, practice, handwashing, toothbrushing

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## INTRODUCTION

The Knowledge, Attitude, and Practice (KAP) model serves as a critical framework for assessing hygiene behaviours among young children, particularly in rural settings. This study focuses on understanding the KAP of preschool children in rural areas regarding essential hygiene practices, such as handwashing and toothbrushing, which are fundamental to preventing diseases and promoting long-term health.

In rural communities, these practices are influenced not only by children's knowledge but also by their attitudes, the availability of resources, and the guidance of teachers and caregivers. Most people agree that one of the best ways to prevent the spread of infectious diseases is to wash your hands. However, there is frequently a significant disconnect between what children (and households) know and what they do. For example, in spite of interventions and awareness campaigns, a recent community-based study conducted in rural Ethiopia revealed that only 28.8% of households reported "good hand hygiene practice" (Gizaw et al., 2023). Furthermore, research on how children wash their hands in rural areas reveals that actual practice is greatly influenced by variables like water availability, parental or caregiver education, and soap accessibility (Admasie et al., 2022). Hygiene authorities advise that proper technique is crucial for maximum effectiveness, such as washing hands with soap for at least 20 seconds. Although previous research concentrated on general populations, the same principle applies to young children: the more faithfully the hand-washing procedure is followed, the more health benefits are obtained.

In addition, promoting children's health also requires good oral hygiene, especially brushing their teeth. The significance of supervised brushing and early parental involvement in enhancing pre-schooler outcomes has been highlighted by recent research. For instance, a 2024 cross-sectional survey conducted in Lithuania revealed that, although there were still gaps in routine practice and supervision, parental involvement in their children's dental care had significantly improved over 12 years (Kavaliauskienė, 2024). Furthermore, recent studies have shed light on how contemporary lifestyle factors, such as like screen time, could affect pre-schoolers' oral hygiene practices. For example, a Turkish study conducted in 2024 found a link between problematic screen exposure and worse oral hygiene practices (like brushing only once or twice a week) in children ages 3 to 6 years old (Mustuloğlu et al., 2024).

### Problem Statement

In rural areas, children's ability to practice good hand hygiene is severely restricted by limited access to basic resources like soap, clean water, and proper sanitation. Maintaining hygiene practices is seriously hampered by the fact that only a small percentage of rural communities have access to sufficient sanitation facilities (Gizaw et al., 2023). Even with a relatively high level of awareness regarding the significance

of hygiene, there is still a persistent gap between knowledge and practice. According to research conducted in rural Ethiopia, only a small percentage of children regularly wash their hands with soap, even when they are aware of the advantages of doing so (Admasie et al., 2022; Gizaw et al., 2023).

Children's handwashing behaviours and knowledge have been demonstrated to improve with educational interventions, especially those that incorporate caregivers. The comprehension and practical application of handwashing practices have been improved by programs like structured hand hygiene modules (Mohd Rani et al., 2020; Tengku Jamaluddin et al., 2020). According to Dangis et al. (2023), real-time feedback interventions have a positive impact on young children's handwashing behaviour, self-efficacy, and motivation. This emphasises the importance of education and supportive infrastructure in promoting sustainable hand hygiene practices.

There is also a lot of space for improvement in the oral hygiene habits of pre-schoolers in rural areas. According to Pullishery et al. (2013), only about 62% of pre-schoolers use a toothbrush and toothpaste on a regular basis, and many of them do not have proper supervision when brushing. Children's inconsistent oral hygiene is a result of caregivers' lack of knowledge about good dental practices (Kaushik & Sood, 2023; Mustuloğlu et al., 2024). Aiuto et al. (2022) and Kavaliauskienė (2024) have found that better oral hygiene practices in pre-schoolers are consistently linked to higher parental knowledge and involvement, indicating that caregiver education is also a critical factor. This highlights the necessity of family-friendly dental hygiene initiatives in rural regions.

Both studies show that although pre-schoolers in rural areas might know the fundamentals of hygiene, however, caregiver involvement, education, and resource availability have a significant role in handwashing and toothbrushing habits. To address this gap, the purpose of this study is to investigate pre-schoolers' current hand-washing and toothbrushing KAP in rural areas. The study specifically seeks to respond to the following question: What is the present hand-washing and tooth-brushing KAP of pre-schoolers in rural areas?

## LITERATURE REVIEW

### Children's KAP on Handwashing

Research consistently reveals gaps between knowledge and practice, even though handwashing is one of the most affordable and effective ways to prevent disease in young children. While 73% of school children in Guatemala understood that handwashing keeps germs at bay, only 53% were aware of the proper handwashing duration (Pieters et al., 2023). The fact that Malaysian pre-schoolers showed a high level of competency in handwashing procedures but regularly neglected crucial steps like rubbing their thumbs

and fingertips further suggests that knowledge is not always translated into appropriate behaviour (Mohamed et al., 2022). Having access to facilities is essential for promoting good hygiene; children who have regular access to water, soap, and organised hygiene routines have better developmental outcomes, such as more developed cognitive and socioemotional abilities (Petermann-Rocha et al., 2023).

Additionally, it has been demonstrated that interventions like visual cues and real-time reminders greatly increase pre-schoolers' frequency and accuracy of handwashing (Dangis et al., 2023). But according to the most recent UNICEF (2024) report, many rural preschools still lack basic handwashing facilities, which makes it harder for kids to practice good hygiene even when they know enough about it. This is in line with the earlier findings of Vivas et al. (2010), who discovered that while Ethiopian children understood the value of handwashing, only 36.2% of them regularly used soap. All of these studies show that although pre-schoolers generally have good knowledge and positive attitudes about handwashing, the consistent adoption of good hygiene practices is hampered by things like poor infrastructure, little teacher reinforcement, and limited access to resources.

**Children's KAP on Toothbrushing**

Pre-schoolers generally demonstrate good knowledge and positive attitudes regarding brushing, according to research, but there are still gaps in the regularity and quality of their brushing habits. Even though 98% of children in Pakistan understood that brushing their teeth twice a day helps prevent dental issues, only 43% actually did so, and poor brushing habits were widespread because of a lack of supervision (Jabeen & Umbreen, 2017). Children are more likely to brush regularly when their caregivers know proper oral hygiene practices, according to a recent Italian study that found caregiver knowledge to be a strong predictor of children's oral hygiene behaviour (Aiuto et al., 2022).

Similarly, a systematic review found that many parents do not know enough about their kids' dental health, which leads to unsupervised brushing and irregular routines (Kaushik & Sood, 2023). Children's brushing habits have been shown to improve with school-based toothbrushing interventions. For example, a cluster-randomised study conducted in the Philippines revealed that the combination of fluoride toothpaste and toothbrushes, along with structured school routines, greatly enhanced children's independent brushing practices (Duijster et al., 2020). Technique is just as important as routine. Hwang et al. (2023) showed that children who practiced brushing with visual aids removed more dental plaque and showed greater interest and motivation to brush. According to the literature, pre-schoolers generally have positive attitudes and basic knowledge about brushing their teeth, but consistent and successful practice requires structured reinforcement through school-based programmes, caregiver supervision, and resource availability.

### Albert Bandura 's Social Learning Theory

To strengthen the theoretical justification, this study draws on Albert Bandura's Social Learning Theory (SLT), which emphasises that children learn behaviours not only through direct instruction or first-hand experience but also by watching, copying, and modelling the behaviours of others. Children often imitate their parents', teachers', and peers' handwashing and toothbrushing habits when it comes to hygiene. According to Bandura (1977), learning happens through four processes: motivation, attention, retention, and reproduction. This means that children need to observe the behaviour, remember it, be able to replicate it, and feel inspired to keep doing it. Observational learning is especially powerful in schools.

For instance, a previous study conducted in Kenya revealed that children's hand hygiene practices increased dramatically when they watched their peers wash their hands. This was because of peer modelling and visual cues at sink areas (Pickering et al., 2014). Similarly, it has been demonstrated that group toothbrushing routines in hygiene programs increase children's brushing consistency by inspiring them to participate through peer influence (Duijster et al., 2020). Thus, SLT demonstrates that hygiene behaviour is socially learned rather than merely taught, showing that children in rural preschools are more likely to develop consistent hygiene habits when peers and adults provide modelling, encouragement, and structured routines.

## METHODOLOGY

### Design and Participants

This study employs a case study design with a qualitative approach. A qualitative approach is adopted to provide deep insights and a thorough understanding of real-world issues (Moser & Korstjens, 2017). This approach includes meticulous data collection from diverse sources such as observations, interviews, audio-visual materials, documents, and reports (Creswell, 2007).

In this study, the population is a preschool class in Sik, Kedah, with about 16 children around six years old. A sample of six children was selected from this class using purposive sampling, which involves choosing individuals who best match the study's needs, especially when the population is small (Bhardwaj, 2019). The preschool was selected due to the purpose of the study and family backgrounds, as these align with the study's focus on rural areas. The selection was also influenced by the researcher's previous visit, evaluation of the environment, and support from the preschool's principal and teacher.

**Instruments**

In this study, to address research questions related to children's knowledge, attitudes, and practices on handwashing and toothbrushing, the researcher gathered information using qualitative instruments such as observation checklists, video recordings, and semi-structured interviews.

**Observation Checklist**

In this study, observation checklists are the primary data collection method. Observation, a fundamental scientific inquiry method, involves monitoring subjects or research situations (Kumar, 2022). The observation process is focused on two health units. Each unit is divided into three specific aspects used to observe children's knowledge, attitudes, and practices related to health.

The observation checklist categorises children's knowledge, attitudes, and practices into three levels:

1. Good: Children at this level demonstrate a strong understanding of the health module topics. Their responses show high comprehension and proficiency in applying the concepts taught. They consistently provide accurate and insightful answers, indicating mastery of the material. The score for this level is 3.

2. Average: Children at this level have a moderate understanding of the health module topics. Their answers are neither exceptional nor poor, reflecting a fair grasp of the material. They may need some assistance with certain aspects. The score for this level is 2.

3. Low: Children at this level struggle to understand the health module topics. Their responses indicate difficulties with the material, and they may require additional support to improve their understanding. The score for this level is 1.

**Video Recording**

Video recording is a widely used method for systematically observing and analysing various behaviours exhibited by children (Sparrman, 2005). In this study, video recordings were employed alongside diary records to provide a comprehensive view of children's behaviour during each unit conducted by the teacher. The primary purpose of using video recordings was to allow the researcher to review the children's actions in detail during the implementation of the health unit. This instrument facilitates a thorough examination of the children's behaviours, enhancing the analysis of their engagement and interactions within the learning environment.

**Semi-Structured Interviews**

Semi-structured interviews are a key method for gathering valuable insights and information through open dialogue (Ruslin et al., 2022). In this study, semi-structured interviews are used to investigate children's knowledge, attitudes, and practices about the health unit's activity. The interviews follow a structured format similar to the observation checklists, with three questions each focusing on knowledge, attitudes, and practices. According to Ruslin et al. (2022), these interviews provide a valuable opportunity for individuals to openly share their experiences, emotions, and perspectives, offering in-depth insights into various aspects of their lives.

**Data Collection Procedures**

This section describes how data were acquired using observations, interviews, and video recordings, but first, ethical considerations and researcher reflexivity were addressed.

**Ethical Considerations**

This study followed all ethical research standards involving young children. The study adhered to the Albukhary International University ethical guidelines for research involving human participants. Before data collection, formal permission was also obtained from the Ministry of Education (MOE) through the Educational Research Application System (eRAS), the preschool principal, the classroom teacher, and the parents of all the children. The researcher provided clear information sheets and consent forms describing the study objectives, procedures, and the voluntary nature of participation. Parental written consent and children's verbal assent were secured before any observation, interview, or video recording took place. The study protocol and instruments were reviewed and approved by the Ministry of Education (MOE) (Approval no: KPM. 600-3/2/3-eras (22876)).

All participants were assured that their identities would remain confidential. Initials were used for each child, and no identifiable personal data was disclosed in any reports or publications. Video and interview data were stored securely in password-protected files accessible only to the researcher. To minimise risk and ensure children's comfort, all activities were conducted within their regular classroom setting and under teacher supervision.

**Researcher Reflexivity**

The researcher acknowledges her dual role as both an observer and interpreter. Before the study, she had visited the preschool during earlier field observations, which helped to establish rapport with the teachers and children. This familiarity supported natural

interactions during data collection but also raised the possibility of observer influence (children performing "good behaviour" when watched). To reduce this bias, the researcher used video recordings to verify behaviours objectively after the sessions and maintained a reflexive journal to note assumptions, reactions, and contextual factors that might affect interpretation. Periodic discussions with a peer qualitative researcher were held to check analytic decisions and enhance interpretive credibility. The researcher remained mindful of her position as an adult and outsider to the children's daily life, ensuring sensitivity, respect, and empathy throughout the research process.

**Observation Checklist**

The researcher employed two checklists, one for toothbrushing and one for handwashing, to carry out the observation checklist and keep an eye on six kids while they engaged in the activities. These observations, which focused on the kids' reactions, involvement, and behaviour, were made during the hygiene lessons (handwashing and brushing). The purpose of the observation checklists is to explore the children's knowledge, attitudes, and practices regarding the activities. The entire class was recorded by the researchers to document how each child performed handwashing and toothbrushing, their comprehension of the procedure, their degree of independence, and any instances in which they required assistance or correction.

**Video Recording**

A video recording was made as complementary data during the health activity (handwashing and toothbrushing), which allows the researcher to review the footage if any uncertainties arise during the observation. The researcher can gather complete and accurate information, ensuring all important details are noticed by re-watching the video.

**Semi-structured Interviews**

The researcher developed a structured list of interview questions for six children, conducted face-to-face after each health unit. Each interview lasted 5 to 10 minutes, with the children taking turns answering questions in separate rooms following the completion of the activities. Each child was required to answer nine questions: three assessed their knowledge, three evaluated their attitudes, and the final three focused on their practices related to handwashing and toothbrushing. This approach ensured that the researcher could gather comprehensive insights into each child's understanding and behaviour regarding these essential hygiene practices. Additionally, the interviews were recorded to capture the responses accurately, allowing the researcher to review the discussions later for further analysis.

### Validity and Reliability

Validity in qualitative research refers to the appropriateness of the tools, methods, and data used (Leung, 2015). On the other hand, reliability in research means that a method should produce consistent results when used repeatedly (Brink, 1993). In this study, both lessons and instruments (observation checklist, video recording, and semi-structured interview questions) were reviewed by two experts and two practitioners in early childhood education. These instruments were assessed for authenticity to ensure their validity in identifying preschool children's KAP regarding the clarity of the items and their suitability for measuring the intended constructs, appropriateness for children, suitability for the level and age, and clarity of language use. Based on the comments and feedback from the experts, the researcher modified and improved the study instruments.

### Data Analysis Procedures

Data analysis involves examining raw data to conclude (Bhatia, 2017). In this research, a thematic analysis approach is employed for data analysis. Thematic Analysis (TA) is a systematic approach for identifying, organising, and providing insight into patterns of meaning (themes) across a dataset. TA has been used to analyse the observation checklist, interviews, and video recordings (as complementary data).

## RESULTS

This section will discuss the data obtained by the researcher utilising a qualitative approach, which included the use of an observation checklist and semi-structured interviews. To gather the data and answer the following research question (RQ) on the current KAP of preschool children in rural areas regarding proper handwashing and toothbrushing.

### Preschool Children's KAP on Handwashing

This section identified children's KAP (knowledge, attitude, and practice) obtained from both observation and interview data regarding handwashing (Unit 1).

#### *Knowledge*

Table 1 reveals children's knowledge of key handwashing practices: using soap while washing hands, washing hands before eating, and washing hands after using the toilet. All six children consistently demonstrate a Good Knowledge (GK) across all three indicators. Specifically, the children can state the importance of using soap during

handwashing, emphasising its role in proper hygiene. Similarly, they exhibit a strong awareness of the need to wash hands before meals and after using the toilet, showcasing their understanding of essential hygiene practices. The thematic analysis confirms that all children display a GK of these practices, indicating a high level of knowledge.

**Table 1.** Observation: Children's knowledge of handwashing

| Children | Item 1: Stating the use of soap while washing hands | | | Item 2: Stating washing of hands before eating | | | Item 3: Stating hand washing after using the toilet | | | Theme | Findings |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LK | AK | GK | LK | AK | GK | LK | AK | GK | | |
| 1 | | | / | | | / | | | / | Q1 GK<br>Q2 GK<br>Q3 GK | Good knowledge |
| 2 | | | / | | | / | | | / | Q1 GK<br>Q2 GK<br>Q3 GK | Good knowledge |
| 3 | | | / | | | / | | | / | Q1 GK<br>Q2 GK<br>Q3 GK | Good knowledge |
| 4 | | | / | | | / | | | / | Q1 GK<br>Q2 GK<br>Q3 GK | Good knowledge |
| 5 | | | / | | | / | | | / | Q1 GK<br>Q2 GK<br>Q3 GK | Good knowledge |
| 6 | | | / | | | / | | | / | Q1 GK<br>Q2 GK<br>Q3 GK | Good knowledge |

*Notes.* Low Knowledge (LK): Children at this level find it hard to understand on handwashing; Average Knowledge (AK): Children at this level show a moderate understanding on handwashing; Good Knowledge (GK) : Children at this level have a strong understanding on handwashing.

Table 2 shows that children generally have a good understanding of the importance of washing hands with soap. Many children explained that handwashing helps remove dirt and germs, stay clean, and avoid getting sick. For example, responses like "to remove dirt and germs" and "to stay clean" were common, reflecting their awareness of hygiene practices. In terms of timing, many children identify key moments for handwashing, such as before eating, after playing, or after using the toilet. However, there was

variation in the frequency mentioned, with some children washing their hands multiple times a day, while others indicated less frequent handwashing, such as twice a day or vaguely mentioned as "every day." When asked why washing hands after using the toilet is important, most children linked it to preventing sickness or avoiding germs, with responses such as "to avoid getting sick" and "because hands get dirty."

**Table 2.** Interview: Children's knowledge of handwashing

| Children | Q1: Why do we need to wash our hands with soap? | Q2: When should we wash our hands? | Q3: Why do we need to wash hands after using the toilet? | Theme | Findings |
|---|---|---|---|---|---|
| 1 | Because there are germs on the hands | Before eating, five times a day | To avoid getting sick, because of germs | Q1 GK<br>Q2 GK<br>Q3 GK | GK |
| 2 | To stay clean | Ten times a day, before eating | To stay clean | Q1 GK<br>Q2 GK<br>Q3 AK | GK |
| 3 | To remove dirt and germs | After playing, before eating | To stay clean, so hands aren't dirty | Q1 GK<br>Q2 GK<br>Q3 GK | GK |
| 4 | To keep hands clean | Three times a day, before and after meals | To keep hands clean because they get dirty | Q1 GK<br>Q2 GK<br>Q3 GK | GK |
| 5 | To be clean and remove germs | Twice a day, before and after meals | Germs make your hands dirty | Q1 GK<br>Q2 AK<br>Q3 GK | GK |
| 6 | To avoid dirt | Before eating, every day | Because hands get dirty | Q1 GK<br>Q2 AK<br>Q3 AK | AK |

*Notes.* Low Knowledge (LK): Children at this level find it hard to understand on handwashing; Average Knowledge (AK): Children at this level show a moderate understanding on handwashing; Good Knowledge (GK): Children at this level have a strong understanding on handwashing.

### *Attitude*

Table 3 highlights the attitudes of six children towards handwashing, categorised into three indicators: showing enjoyment in washing hands, showing enjoyment in using soap, and showing happiness after washing hands. Overall, all children consistently

demonstrate a good attitude when washing hands and expressing happiness after completing the activity. However, in the second indicator, which focuses on enjoyment in using soap, some children exhibit an Average Attitude (AA). Despite this, most children show a Good Attitude (GA) overall.

**Table 3.** Observation: Children's attitude on handwashing

| Children | Item 1: Showing enjoyment in washing hands | | | Item 2: Showing enjoyment in using soap while washing hands | | | Item 3: Showing happiness after washing hands | | | Theme | Findings |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LA | AA | GA | LA | AA | GA | LA | AA | GA | | |
| 1 | | | / | | / | | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 AA | |
| | | | | | | | | | | Q3 GA | |
| 2 | | | / | | / | | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 GA | |
| | | | | | | | | | | Q3 GA | |
| 3 | | | / | | / | | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 AA | |
| | | | | | | | | | | Q3 GA | |
| 4 | | | / | | | / | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 GA | |
| | | | | | | | | | | Q3 GA | |
| 5 | | | / | | | / | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 GA | |
| | | | | | | | | | | Q3 GA | |
| 6 | | | / | | | / | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 GA | |
| | | | | | | | | | | Q3 GA | |

Notes: Low Attitude (LA): Children at this level show less interest on handwashing; Average Attitude (AA) : Children at this level show a moderate interest on handwashing; Good Attitude (GA): Children at this level show a more interest on handwashing.

Table 4 shows the responses of six children regarding their attitudes toward handwashing. For Q1, "Do you like washing hands?" All six children responded, "Yes, I like it" showing a good attitude toward handwashing. For Q2, "Do you like using soap?" All six children gave the same answer: "Yes". As for Q3: How do you feel after washing hands? All six children's responses were uniformly good attitude.

**Table 4.** Interview: Children's attitude on handwashing

| Children | Q1: Do you like washing hand? | Q2: Do you like using soap | Q3: How do you feel after washing hand? | Theme | Findings |
|---|---|---|---|---|---|
| 1 | Yes, like it | Yes | Feel comfortable and clean | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |
| 2 | Yes, like it | Yes | Feel fresh and clean | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |
| 3 | Yes, I like it | Yes | Feel fresh | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |
| 4 | Yes, I like it | Yes | Feel happy and clean | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |
| 5 | Yes, I like it | Yes | Feel clean and happy | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |
| 6 | Yes, I like it | Yes | Feel healthy | Q1 GA | GA |

*Notes:* Low Attitude (LA): Children at this level show less interest on handwashing; Average Attitude (AA): Children at this level show a moderate interest on handwashing; Good Attitude (GA): Children at this level show a more interest on handwashing.

### *Practice*

Table 5 reveals children's practices of handwashing, specifically examining whether they wash their hands before eating, use soap during handwashing, and wash their hands in the proper place. The findings indicate that all six children demonstrate a Good Practice (GP) in washing hands before eating and ensuring they do so in the proper place. However, when it comes to using soap while washing hands, their practice shows some variation, with children demonstrating an Average Practice (AP) in this aspect.

**Table 5.** Observation: Children's practice on handwashing

| Children | Item 1: Washing hands before eating | | | Item 2: Using soap when washing hands | | | Item 3: Washing hands in the proper place | | | Theme | Findings |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LP | AP | GP | LP | AP | GP | LP | AP | GP | | |
| 1 | | | / | | / | | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 AP | |
| | | | | | | | | | | Q3 GP | |
| 2 | | | / | | / | | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 AP | |
| | | | | | | | | | | Q3 GP | |
| 3 | | | / | | / | | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 AP | |
| | | | | | | | | | | Q3 GP | |
| 4 | | | / | | / | | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 AP | |
| | | | | | | | | | | Q3 GP | |
| 5 | | | / | | / | | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 AP | |
| | | | | | | | | | | Q3 GP | |
| 6 | | | / | | / | | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 AP | |
| | | | | | | | | | | Q3 GP | |

*Notes.* Low Practice (LP): Children at this level show less practice of handwashing; Average Practice (AP): Children at this level show a moderate practice of handwashing; Good Practice (GP): Children at this level show good practice of handwashing.

Table 6 shows that all children consistently wash their hands before eating, with varying frequencies ranging from three times a day to ten times a day. All the children also reported using soap during handwashing. When describing the steps of handwashing, most children provided detailed and comprehensive responses. Commonly mentioned steps include turning on the water, applying soap, rubbing palms, fingers, nails, and between fingers, rinsing thoroughly, and drying hands. However, one child mentioned occasionally forgetting to use soap but trying to remember it for subsequent handwashing.

**Table 6.** Interview: Children's practice on handwashing

| Children | Q1: Do you wash your hands before eating? | Q2: Do you use soap when washing hands? | Q3: Can you describe the steps of handwashing? | Theme | Findings |
|---|---|---|---|---|---|
| 1 | Yes, five times a day | Yes | Turn on water, wash hands, rub fingers, rub nails, wash palms, rinse, dry hands | Q1 GP<br>Q2 GP<br>Q3 GP | GP |
| 2 | Yes, 10 times a day | Yes | Wash, apply soap, rinse, dry, rub palms, rinse again, dry | Q1 GP<br>Q2 GP<br>Q3 GP | GP |
| 3 | Yes, before and after eating | Yes | Wash hands, use soap, rub fingers, nails, palms, rinse, dry | Q1 GP<br>Q2 GP<br>Q3 GP | GP |
| 4 | Yes, three times a day | Yes | Wash hands, apply soap, rub hands, rub nails, rub fingers, rinse with water, dry until fully dry | Q1 GP<br>Q2 GP<br>Q3 GP | GP |
| 5 | Yes, before and after meals | Yes | Turn on water, wash hands, use soap, rub palms, between fingers, and nails, rinse, dry | Q1 GP<br>Q2 GP<br>Q3 GP | GP |
| 6 | Yes, every day | Yes | Wash hands, use water only, sometimes forgets soap but remembers to use it next time | Q1 GP<br>Q2 GP<br>Q3 GP | GP |

*Notes.* Low Practice (LP): Children at this level show less practice of handwashing; Average Practice (AP): Children at this level show a moderate practice of handwashing; Good Practice (GP): Children at this level show good practice of handwshing.

## Preschool Children's KAP on Toothbrushing

This section will analyse children's KAP (Knowledge, Attitude, and Practice) obtained from both observation and interview data regarding toothbrushing (Unit 2).

### *Knowledge*

Table 7 shows the observation results of children's knowledge on toothbrushing based on three specific items. For Item 1: State the importance of brushing teeth,

all six children achieved 'Good Knowledge' (GK). For Item 2: State the difference between clean and dirty teeth, one child demonstrated 'Low Knowledge', three children demonstrated 'Average Knowledge', and two children demonstrated 'Good Knowledge' (GK). For Item 3: Stating the impression of not brushing teeth, one child demonstrated 'Low Knowledge' (LK), three children achieved 'Average Knowledge' (AK), and two children achieved 'Good Knowledge' (GK). The theme findings for item 1 show that five children were categorised as having 'Good Knowledge,' while one child demonstrated 'Average Knowledge.' For item 2, the findings varied, with two children demonstrating 'Good Knowledge' (GK), three children demonstrating 'Average Knowledge' (AK), and one child categorised under 'Low Knowledge (LK).' For item 3, two children showed 'Good Knowledge' (GK), three children demonstrated 'Average Knowledge' (AK), and one child demonstrated 'Low Knowledge' (LK).

**Table 7.** Observation: Children's knowledge of toothbrushing

| Children | Item 1: State the importance of brushing teeth | | | Item 2: State the difference between clean and dirty teeth | | | Item 3: Stating the impression of not brushing teeth | | | Theme | Findings |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LK | AK | GK | LK | AK | GK | LK | AK | GK | | |
| 1 | | | / | | / | | | / | | Q1 GK | AK |
| | | | | | | | | | | Q2 AK | |
| | | | | | | | | | | Q3 AK | |
| 2 | | | / | / | | | | / | | Q1 GK | AK |
| | | | | | | | | | | Q2 LK | |
| | | | | | | | | | | Q3 AK | |
| 3 | | | / | | / | | | | / | Q1 GK | GK |
| | | | | | | | | | | Q2 AK | |
| | | | | | | | | | | Q3 GK | |
| 4 | | | / | | | / | | | / | Q1 GK | GK |
| | | | | | | | | | | Q2 GK | |
| | | | | | | | | | | Q3 GK | |
| 5 | | | / | | | / | | | / | Q1 GK | GK |
| | | | | | | | | | | Q2 GK | |
| | | | | | | | | | | Q3 GK | |
| 6 | | | / | | / | | / | | | Q1 GK | AK |
| | | | | | | | | | | Q2 AK | |
| | | | | | | | | | | Q3 LK | |

*Notes.* Low Knowledge (LK): Children at this level find it hard to understand toothbrushing; Average Knowledge (AK): Children at this level show a moderate understanding of toothbrushing; Good Knowledge (GK): Children at this level have a strong understanding of toothbrushing.

Table 8 presents the interview data on children's knowledge of toothbrushing based on three specific questions. For Q1: Why do we need to brush our teeth? All six children answered were categorised as 'Good Knowledge,' with responses such as keeping teeth clean, avoiding bad smells, and feeling fresh. For Q2: What happens if we do not brush our teeth? all six children categorised as a 'Good Knowledge,' mentioning consequences such as teeth becoming smelly, dirty, bad, or causing a toothache. For Q3: When to brush teeth? Four children provided specific times like "morning and night," while two children answered with general frequencies like "two or three times a day" or "four times" without specifying the exact time.

**Table 8.** Interview: Children's knowledge of toothbrushing

| Children | Q1: Why do we need to brush our teeth? | Q2: What happen if we don't brush our teeth? | Q3: When to brush teeth? | Theme | Findings |
|---|---|---|---|---|---|
| 1 | To make it does not smell bad | It becomes smelly | Moring before going to school and night before sleep | Q1 GK<br>Q2 GK<br>Q3 GK | GK |
| 2 | Because they get dirty | Germs will come, and it will cause a toothache | At night and in the morning | Q1 GK<br>Q2 GK<br>Q3 GK | GK |
| 3 | To keep them clean | It will cause a toothache | Four times (not mentioning a specific time) | Q1 GK<br>Q2 GK<br>Q3 GK | GK |
| 4 | To keep them clean | The tooth will become bad | At night and morning | Q1 GK<br>Q2 GK<br>Q3 GK | GK |
| 5 | To feel fresh and clean | Teeth will become dirty | Two or three times a day (No specific time) | Q1 GK<br>Q2 GK<br>Q3 GK | GK |
| 6 | Because they get dirty | It became smelly | At night and in the morning) | Q1 GK<br>Q2 GK<br>Q3 GK | AK |

*Notes.* Low Knowledge (LK): Children at this level find it hard to understand toothbrushing; Average Knowledge (AK): Children at this level show a moderate understanding of toothbrushing; Good Knowledge (GK): Children at this level have a strong understanding of toothbrushing.

***Attitude***

Table 9 presents observations of six children regarding their attitudes towards brushing their teeth based on three specific items. For Item 1: Expressing discomfort if they do not brush their teeth, all six children were categorized under 'Good Attitude'. For Item 2: Expressing joy after brushing their teeth, all six children demonstrated 'Good Attitude'. Similarly, for Item 3: Showing a happy face when the teeth are clean, all six children achieved 'Good Attitude'. The findings for Items 1, 2, and 3 consistently fall under the 'Good Attitude' theme for all participants.

**Table 9.** Observation: Children's attitude on toothbrushing

| Children | Item 1: Expressing discomfort if don't brush teeth | | | Item 2: Expressing joy after brushing teeth | | | Item 3: Showing a happy face when teeth are clean | | | Theme | Findings |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LA | AA | GA | LA | AA | GA | LA | AA | GA | | |
| 1 | | | / | | | / | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 GA | |
| | | | | | | | | | | Q1 G3 | |
| 2 | | | / | | | / | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 GA | |
| | | | | | | | | | | Q1 G3 | |
| 3 | | | / | | | / | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 GA | |
| | | | | | | | | | | Q1 G3 | |
| 4 | | | / | | | / | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 GA | |
| | | | | | | | | | | Q1 G3 | |
| 5 | | | / | | | / | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 GA | |
| | | | | | | | | | | Q1 G3 | |
| 6 | | | | / | | / | | | / | Q1 GA | GA |
| | | | | | | | | | | Q2 GA | |
| | | | | | | | | | | Q1 G3 | |

*Notes.* Low Attitude (LA): Children at this level show less interest in toothbrushing; Average Attitude (AA): Children at this level show a moderate interest in toothbrushing; Good Attitude (GA): Children at this level show more interest in toothbrushing.

Table 10 shows the responses of six children regarding their attitudes toward brushing their teeth. For Q1: Do you like brushing your teeth? All six children responded "Yes, I like it," which is categorised as "Good attitude." For Q2: How do you feel if you do not brush your teeth? The children expressed feelings such as "smelly," "toothache," "uncomfortable," "not happy," or concerns about getting a toothache, all of which were categorised under "Good attitude." For Q3: How do you feel after brushing your teeth? The responses included feeling "good," "clean," and "fresh," all of which are also categorised as "Good attitude." The findings across all three questions consistently fall under the 'Good Attitude' theme for all six children.

**Table 10.** Interview: Children's attitude on toothbrushing

| Children | Q1: Do you like brushing your teeth? | Q2: How do you feel if you do not brush your teeth? | Q3: How do you feel after brushing your teeth? | Theme | Findings |
|---|---|---|---|---|---|
| 1 | Yes, I like it | Smelly | Feel good | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |
| 2 | Yes, I like it | I get a toothache | Feel clean | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |
| 3 | Yes, I like it | Feels like I might get a toothache | Feel fresh | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |
| 4 | Yes, I like it | Not happy | Feel good | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |
| 5 | Yes, I like it | Feel uncomfortable | Feel fresh | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |
| 6 | Yes, I like it | Get a toothache | Feel fresh | Q1 GA | GA |
| | | | | Q2 GA | |
| | | | | Q3 GA | |

*Notes:* Low Attitude (LA): Children at this level show less interest in toothbrushing; Average Attitude (AA): Children at this level show a moderate interest in toothbrushing; Good Attitude (GA): Children at this level show more interest in toothbrushing.

***Practice***

Table 11 presents observations of six children's practice on toothbrushing. The table shows that all six children demonstrated good practices in brushing their teeth based on three specific items. For item 1: Brushing teeth following the instructions as taught. All six children achieved 'Good Practice'. For item 2: Rinse mouth properly after brushing teeth, all children also achieved 'Good Practice'. Similarly, with item 3: Wash toothbrush after use, all six children were categorised under 'Good Practice'. The findings based on the three items consistently indicate that the six children practice good brushing habits. The theme findings for Q1, Q2, and Q3 for all participants were classified as 'Good Practice.

**Table 11.** Observation: Children's practice on toothbrushing

| Children | Item 1: Brush teeth following the instructions as taught | | | Item 2: Rinse mouth properly after brushing teeth | | | Item 3: Wash the toothbrush after use | | | Theme | Findings |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LP | AP | GP | LP | AP | GP | LP | AP | GP | | |
| 1 | | | / | | | / | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 GP | |
| | | | | | | | | | | Q3 GP | |
| 2 | | | / | | | / | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 GP | |
| | | | | | | | | | | Q3 GP | |
| 3 | | | / | | | / | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 GP | |
| | | | | | | | | | | Q3 GP | |
| 4 | | | / | | | / | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 GP | |
| | | | | | | | | | | Q3 GP | |
| 5 | | | / | | | / | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 GP | |
| | | | | | | | | | | Q3 GP | |
| 6 | | | / | | | / | | | / | Q1 GP | GP |
| | | | | | | | | | | Q2 GP | |
| | | | | | | | | | | Q3 GP | |

*Notes.* Low Practice (LP): Children at this level show less practice of toothbrushing; Average Practice (AP): Children at this level show a moderate practice of toothbrushing; Good Practice (GP): Children at this level show good practice in toothbrushing.

Table 12 shows the responses from six children regarding practices on toothbrushing. For Q1: Do you brush your teeth every day? All children answered "Yes" and provided additional details, such as brushing every day in the morning and at night, also emphasising the use of toothpaste daily. For Q2: How many times do you brush your teeth? Five children answered, brushing their teeth "Two times" or "Twice a day" while one child mentioned brushing teeth "Four times a day". For Q3: Can you describe how you usually brush your teeth? All six children are describing the steps, such as putting toothpaste on the toothbrush, brushing the teeth, making a circular motion, rinsing the mouth with water, and then washing the toothbrush. Based on the three questions, the responses were consistently categorised under the theme findings as 'Good practice' for Q1, Q2, and Q3.

**Table 12.** Interview: Children's practice on toothbrushing

| Children | Q1: Do you brush your teeth every day? | Q2: How many times a day you brush your teeth? | Q3: Can you describe how you usually brush your teeth? | Theme | Findings |
|---|---|---|---|---|---|
| 1 | Yes | Two times | First, put on toothpaste, then brush the teeth, after that rinse and wash the toothbrush | Q1 GP<br>Q2 GP<br>Q3 GP | GP |
| 2 | Yes, I brush my teeth every day at night and in the morning | Two times | First, brush the teeth, then make a circular motion, after that rinse with the water | Q1 GP<br>Q2 GP<br>Q3 GP | GP |
| 3 | Yes | Four times | First, put on toothpaste, then brush the teeth, after that rinse | Q1 GP<br>Q2 GP<br>Q3 GP | GP |
| 4 | Yes, every day | Two, two times | First, put on toothpaste, then brush, brush until its clean | Q1 GP<br>Q2 GP<br>Q3 GP | GP |
| 5 | Yes, every day | Twice a day | All round, first put the toothpaste | Q1 GP<br>Q2 GP<br>Q3 GP | GP |
| 6 | Yes, every day and use toothpaste every day | Twice a day | Put toothpaste, brush and then rinse | Q1 GP | GP |

*Notes.* Low Practice (LP): Children at this level show less practice of toothbrushing; Average Practice (AP): Children at this level show a moderate practice of toothbrushing; Good Practice (GP): Children at this level show good practice in toothbrushing.

## DISCUSSION

The results show that children in preschool in this rural area generally showed good handwashing knowledge. All six children demonstrated a thorough understanding of the fundamentals of handwashing, including the use of soap, washing hands before meals, and washing hands after using the restroom. Although the frequency varied, they were able to explain the benefits of handwashing, which include avoiding illness, keeping clean, and eliminating germs. According to Mohamed et al. (2022), the majority of children showed a positive disposition toward handwashing, demonstrating enjoyment in the activity and expressing satisfaction afterward. Variations in attitude were reflected in the moderate enjoyment of soap use by a few children (Pieters et al., 2023). Despite certain variations in soap usage, observations and interviews showed that children generally washed their hands properly before eating and in the appropriate places (Dangis et al., 2023). This is consistent with the knowledge-practice gap that has been documented in earlier research (WHO & UNICEF, 2018). Translating knowledge into consistent practice required the assistance of teachers, resources, and the environment (Petermann-Rocha et al., 2023). According to Bandura's Social Learning Theory, children pick up handwashing techniques through modelling, imitation, and observation. Children learn appropriate handwashing practices from watching their teachers and peers during regular activities, which encourages them to follow suit (Bandura, 1977). Peer modelling and structured demonstrations strengthen the practical application of handwashing as well as the cognitive comprehension of the practice (Pickering et al., 2014).

Children also showed good knowledge of toothbrushing, understanding its importance and the consequences of poor oral hygiene, which is similar to the previous result. Although their capacity to differentiate between clean and dirty teeth varied (Hwang et al., 2023), they also understood the recommended brushing times (morning and night) (Duijster et al., 2020). Children's attitudes toward brushing were consistently positive; they expressed happiness after brushing and discomfort when their teeth were left un-brushed. This shows a high level of involvement and a favourable opinion of dental hygiene (Jabeen & Umbreen, 2017). In terms of practice, children tended to brush twice a day, rinse their toothbrushes properly, and follow brushing instructions; one child even brushed four times a day. In order to maintain consistent oral hygiene practices, these findings highlight the significance of structured reinforcement, caregiver involvement, and school-based routines (Duijster et al., 2020). These behaviours are explained by Bandura's Social Learning Theory, which holds that children pick up toothbrushing skills by imitating and observing their teachers, peers, and caregivers (Bandura, 1977). Children are motivated, and their retention of appropriate techniques is strengthened through social reinforcement produced by group modelling and demonstrations (Duijster et al., 2020).

## CONCLUSION

This study investigated pre-schoolers' knowledge, attitudes, and practices about handwashing and toothbrushing in a rural area. It found that while there were some small gaps, like inconsistent soap use and differences in children's understanding of clean versus dirty teeth, overall, the kids showed good knowledge, positive attitudes, and good hygiene practices. The results show that children learn hygiene behaviours mostly by watching and copying their teachers, classmates, and caregivers. They are also motivated and able to regularly practice good handwashing and toothbrushing when they are exposed to structured routines and demonstrations in the preschool setting. In general, the study emphasises how crucial school-based guidance, behaviour modelling, and hands-on reinforcement are in assisting children in internalising healthy habits that will last a lifetime and bridging the knowledge and practice gap.

## CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

## DATA AVAILABILITY

The datasets generated and/or analysed during the current study are not publicly available due to participants' confidentiality, but are available from the corresponding author on reasonable request.

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## CONTRIBUTIONS OF AUTHORS

Auliantika Selian: Conceptualisation, Methodology, Data collection, Analysis, Writing – Original draft preparation.

Nor Hashimah Hashim: Writing – Review and editing.

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