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Physical Health Profile of Preschool Children: A Cross- Sectional Study on the Prevalence of Early Childhood Caries, Cerumen Impaction, and Strabismus

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Abstract

Background: Early childhood is a critical phase of growth and development that is highly vulnerable to health issues often overlooked, such as dental caries, cerumen impaction, and visual impairments. Failure to detect these problems early can impede school readiness and compromise a child's quality of life. **Objective:** This study aims to comprehensively map the physical health profile of preschool students and analyze the urgency of early intervention.

Methods: A descriptive cross-sectional study was conducted in January 2025 at a Playgroup (Kelompok Bermain) and Kindergarten (Taman Kanak-Kanak) in Temanggung. The sample included 181 preschool students (aged 2–7 years) selected via total sampling technique. Data were collected using physical examination sheets focusing on the head and neck region. Data analysis was performed using frequency distribution. **Results:** The study revealed a high prevalence of health issues among the students. The prevalence of Early Childhood Caries (ECC) reached 60 children (33%) characterized by severe caries and cavitation. Cerumen impaction was observed in 49 students (27%), with one identified case of functional unilateral hearing loss. Visual impairments, specifically strabismus, were detected in 13 children (7%), a rate exceeding the general population average. **Conclusion:** Preschool students face a dual burden of oral and sensory health challenges. It is necessary to revitalize the School Health Unit (UKS) through routine screening and collaboration with parents for medical referrals. An integrated referral system is crucial to mitigate long-term impacts on children's learning modalities.

Keywords: *Cerumen Impaction; Early Childhood Caries; Physical Health; Preschool Children; Strabismus.*

Introduction

The early childhood period (0–6 years) is a fundamental phase in the human life cycle that determines the quality of health, cognition, and productivity in the future. Law Number 17 of 2023 concerning Health affirms the right of every child to obtain the highest possible degree of health, prioritizing promotive and preventive efforts (RI, 2023). However, the 2024 early Childhood Profile Data indicates that Indonesian children still face complex health challenges, ranging from nutritional

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issues to sensory impairments that often go undetected ((BPS), 2024). Physical health issues that are not adequately addressed during the preschool years have been proven to negatively correlate with school readiness at the primary education level.

One of the most common yet frequently neglected health problems is oral and dental health, specifically Early Childhood Caries (ECC). This issue represents a major epidemiological challenge, evidenced by the 2023 Indonesian Health Survey (SKI) data, which recorded a prevalence of dental and oral problems in children aged 5-9 years reaching 84.8% (RI, 2023). Recent studies in 2025 emphasize that dental caries is not merely a local issue in the oral cavity but a strong predictor of stunting and malnutrition risks, as pain and impaired masticatory function hinder nutritional intake (Muharlina & Nuraskin, 2024; Saputri et al., 2025).

Furthermore, the integrity of sensory organs such as hearing and vision plays a crucial role as a gateway for information in the learning process. Cerumen impaction (cerumen prop) is often overlooked despite having a prevalence of 30-50% among school children in Indonesia, which can cause mild conductive hearing loss and impede speech development bicara (Hakim et al., 2023). On the other hand, visual impairments such as strabismus (squint) that are not corrected early pose a risk of causing permanent amblyopia (lazy eye), which impacts the child's psychosocial aspects (Lede & Silaen, 2025).

Although the government has launched the Early Detection of Growth and Development program (SDIDTK), its implementation in Early Childhood Education (PAUD) units is often constrained. This study aims to present empirical data regarding the health profile of students at a Playgroup (KB) and Kindergarten (TK) in Temanggung through periodic health screenings, to provide an accurate epidemiological overview as a basis for formulating school-based health interventions.

Systematic Literature Review: Physical, Sensory, and Oral Health in Early Childhood

Early childhood (0–8 years) is a critical developmental window. However, children in developing nations often face a double burden of disease. This cross-sectional observational study evaluated the physical, sensory, and oral health of 181 students (aged 3–7 years) at PAUD ELPIST, contextualizing local findings with global medical literature (2018–2026) to address "silent epidemics" that hinder school readiness.

Early Childhood Caries (ECC) emerged as a dominant crisis. Prevalence escalated with age, from 25.6% in playgroups to 66.0% in kindergarten B, exceeding the global average of 57.3% for similar age groups (Tschampl, 2018). This high prevalence is largely driven by socio-behavioral factors like nocturnal bottle feeding and poor oral hygiene (Javadzadeh et al., 2023; Zhai, 2025). Crucially, severe ECC has a bidirectional relationship with chronic malnutrition (stunting); the chronic pain restricts nutrient intake and disrupts growth hormone secretion, while malnutrition weakens enamel (Mulsin et al., 2024). Consequently, untreated ECC significantly degrades a child's Oral Health-Related Quality of Life (OHRQoL) and is increasingly recognized as a potential functional disability (Elsayed et al., 2025; Foláyan et al., 2025; Ramos-Jorge et al., 2014)

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Sensory impairments also pose significant barriers. The study found a 27.6% overall prevalence of cerumen (earwax) impaction, which spiked to 64.3% among pre-elementary students. This condition is primarily exacerbated by the "hygiene paradox"—the misuse of cotton buds that pushes wax deeper into the ear canal (Abraham & Dismas, 2024; Mabenda et al., 2019). The resulting mild conductive hearing loss disrupts speech perception and phonological awareness, significantly hindering cognitive and academic development (Angral et al., 2023; Manganye et al., 2025; Sugiura et al., 2014).

Furthermore, visual health is vital for classroom learning. Suspected strabismus was identified in 6.1% of the students. Strabismus frequently co-occurs with uncorrected refractive errors (Varshney et al., 2024; Wang et al., 2021). If left uncorrected before the neuroplasticity window closes around age 7, these conditions can lead to irreversible amblyopia (Blindness, 2016; Morse & Oatts, 2025). Therefore, transitioning to objective electronic vision screening is highly recommended (Chen et al., 2023; Magakwe et al., 2022).

To mitigate these interconnected health issues, schools must transition to the World Health Organization's Health Promoting Schools (HPS) framework (Ogasawara et al., 2022; World Health Organization, 2022). Effective school-based health interventions require professional medical follow-ups, daily supervised toothbrushing, and strict screening policies to safeguard students' educational futures (Levinson et al., 2019).

Research Method/Community Service Method

This research utilized a descriptive-analytic design with a cross-sectional approach. The study was conducted at ELPIST Playgroup and Kindergarten, Temanggung, in January 2025. The population in this study comprised all active students enrolled in the 2024/2025 Academic Year. The sampling technique used was total sampling with a sample size of 181 students, consisting of levels: Playgroup (KB), Kindergarten A (TK A), Kindergarten B (TK B), and Pre-Primary (Pra-SD), with an age range of 2 to 7 years.

Data were collected through physical examinations of the head performed by a health team consisting of lecturers and students from the Alkautsar Nursing Academy, Temanggung.

The physical examination included:

- a. Dental and Oral Examination: Using medical flashlights and tongue depressors to identify caries, gum swelling, and oral hygiene.
- b. Ear Examination (Otoscopy): Inspection of the ear canal to detect cerumen props or discharge.
- c. Eye Examination: Detection of eyeball position abnormalities (strabismus) through the corneal light reflex test (Hirschberg test) and visual observation.
- d. A health observation checklist was used to record the status of teeth (caries/healthy), ears (clean/cerumen/impacted), eyes (normal/strabismus), and personal hygiene. Data were analyzed univariately to produce frequency distributions and prevalence percentages of diseases per class category. Data are presented in tables and descriptive narratives. Research ethics were maintained by ensuring the confidentiality of student identities in data reporting.

Results and Discussion

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This study reveals that early childhood students in the ELPIST Temanggung Playgroup/Kindergarten environment face a significant “dual burden” of health issues, particularly regarding Early Childhood Caries, hearing impairment due to cerumen, and visual abnormalities (strabismus). The high prevalence findings across these three domains highlight an “iceberg phenomenon” in preschool health, which often escapes parental detection but has long-term implications for growth, development, and quality of life.

Prevalence of Dental and Oral Health Problems (Early Childhood Caries/ECC)

Screening results indicated that dental and oral health problems dominate student morbidity.

Table 1. Prevalence of Dental Problems (Caries/Cavities/Abscess) per Class

No.	Class	Total Students	Dental Problems (caries/cavities)	
			n	%
1.	PRA SD	14	9	64
2.	TK B4	15	12	80
3.	TK B3	13	10	77
4.	TK B2	13	8	62
5.	TK B1	12	10	83
6.	TK A5	15	7	47
7.	TK A4	15	8	53
8.	TK A3	15	13	87
9.	TK A2	16	1	6
10.	TK A1	14	5	36
11.	KB B3	10	1	10
12.	KB B2	10	3	30
13.	KB B1	10	2	20
14.	KB A	9	4	44
TOTAL		181	60	33%

The results showed that Early Childhood Caries (ECC) is the dominant health problem with a prevalence of 33%. Although this figure is lower than the national data from the 2023 Indonesian Health Survey (SKI), which reported a caries prevalence in children aged 5-9 years of 84.8% (RI, 2023), these findings still indicate an oral health emergency status. The high rate of caries at age 5-6 years in class TK A3 (87%) is consistent with research by Riono, (Riono, 2025), stating that the accumulation of cariogenic diet exposure and lack of parental supervision in tooth brushing exacerbates tooth damage at preschool age. These results are also consistent with global meta-analysis studies stating that ECC remains the most common chronic disease in children in developing countries, triggered by the nutritional transition towards high-sugar diets and lack of fluoride exposure (El Tantawi et al., 2018).

Analysis of clinical data found cases of caries accompanied by swelling (abscess) in TK B4 students. This aspect is most concerning as several studies have found a potential systemic impact of ECC on nutritional status. Research by (Fasya, 2024), indicates a chronic impact of toothache on decreased appetite and a critical risk of stress malnutrition (Cerezuela et al., 2020). Other studies also prove

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a bidirectional relationship between caries and stunting, where pain hinders the child's nutritional intake (Muharlina & Nuraskin, 2024). Research by (Ningsih et al., 2025) in Aceh also found a significant relationship between the number of carious teeth and the incidence of stunting. Chronic pain due to caries causes children to experience mastication (chewing) difficulties and sleep disturbances, which directly reduce the intake of macronutrients and micronutrients essential for growth (Folayan et al., 2024). Furthermore, a systematic review by (Sopianti et al., 2023). Confirmed this bidirectional relationship; children with malnutrition experience enamel hypoplasia making teeth more susceptible to caries, and conversely, severe caries worsens nutritional status through dietary restrictions.

The impact of ECC also extends to the child's Oral Health-Related Quality of Life. Susilawati et al, reported that children with untreated dental caries have a higher risk of experiencing social and emotional functional impairments, such as shyness, irritability, and decreased learning concentration in class (Susilawati et al., 2023).

Ear Hygiene Problems due to Cerumen Accumulation

Ear hygiene problems were found with varying prevalence across levels

Table 2. Prevalence of Ear Hygiene Problems per Class

No.	Class	Total Students	Dirty Ears/ Cerumen Impaction	
			n	%
1.	PRA SD	14	10	71
2.	TK B4	15	2	13
3.	TK B3	13	4	31
4.	TK B2	13	0	0
5.	TK B1	12	6	50
6.	TK A5	15	0	0
7.	TK A4	15	5	33
8.	TK A3	15	6	40
9.	TK A2	16	5	31
10.	TK A1	14	6	43
11.	KB B3	10	1	10
12.	KB B2	10	3	30
13.	KB B1	10	1	10
14.	KB A	9	0	0
TOTAL		181	49	27%

Ear hygiene issues in the form of dirty ears due to cerumen were found in 49 students (27%) out of 181, with the highest prevalence in Pre-Primary (71%). This figure far exceeds global prevalence estimates ranging from 10-20%, but aligns with findings by (Hakim et al., 2023) in Indonesia, who reported high prevalence in school children due to improper ear cleaning practices. The high incidence of cerumen props in school-age children indicates a lack of proper ear care. According to Hakim et al. (2023), the incorrect use of cotton buds by parents often pushes cerumen deeper (impaction). One critical case was found in a TK A5 student with a "totally occluded left ear" condition, potentially causing unilateral hearing loss.

(Briliani, 2021), states that cerumen blockage can lower the hearing threshold by 10-30 dB. In a noisy classroom environment, this can hinder a child's ability to distinguish speech consonants, risking language delays. A cross-sectional

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study by (Abraham et al., 2024), in Tanzania showed that cotton bud misuse is the most dominant risk factor pushing cerumen deeper into the ear canal, causing solid blockage. In the pediatric population, this blockage can cause mild to moderate conductive hearing loss (10–40 dB). Although often considered trivial, this minimal hearing loss can impede speech perception in noisy classrooms, leading to delayed language development and decreased academic achievement (Sulistiana, 2021). Therefore, educating parents to stop using cotton buds must be a priority for School Health Unit (UKS) interventions.

Eye Health Profile: Strabismus Detection

Table 3. Strabismus Case Findings

No.	Class	Total Students	Visual Impairment (Strabismus)	
			n	%
1.	PRA SD	14	1	7
2.	TK B4	15	3	20
3.	TK B3	13	2	15
4.	TK B2	13	1	8
5.	TK B1	12	0	0
6.	TK A5	15	1	7
7.	TK A4	15	0	0
8.	TK A3	15	1	7
9.	TK A2	16	0	0
10.	TK A1	14	0	0
11.	KB B3	10	1	10
12.	KB B2	10	3	30
13.	KB B1	10	0	0
14.	KB A	9	0	0
TOTAL		181	49	13%

A total of 13 students (7%) of the total sample population were identified as having strabismus, manifesting either clearly or as “slight squint” (intermittent/phoria). This prevalence is higher than the global figure, generally ranging from 2-4% (Lede & Silaen, 2025; Putri et al., 2023a). Strabismus cases were found ranging from age 3 (Playgroup) to 7 years. Early detection at school is vital because parents often do not realize this abnormality. Strabismus in early childhood is not just a cosmetic issue but a functional threat that can cause amblyopia (lazy eye) if not treated before the end of brain plasticity (around 7 years old) (Putri et al., 2023b). If untreated (e.g., with corrective glasses or patching), strabismus can cause cortical suppression in the deviating eye, leading to permanent amblyopia (Halimatussa’diyah et al., 2025). These findings emphasize the importance of immediate referral to an ophthalmologist.

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In addition to the risk of functional blindness (amblyopia), current literature highlights the psychiatric impact of strabismus. A comprehensive meta-analysis by (Tang et al., 2024), involving over 600,000 participants, revealed that children with strabismus have nearly double the risk (Odds Ratio 1.92) of experiencing mental health disorders, including anxiety, depression, and Attention Deficit Hyperactivity Disorder (ADHD), compared to children with normal eyes. This indicates that strabismus correction intervention (glasses or surgery) at an early age not only improves visual function but is also crucial for the child's psychosocial well-being.

The Strategic Role of UKS Revitalization

The high burden of these preventable diseases underscores the need for the revitalization of the School Health Unit (UKS) at the PAUD level. The implementation of Minister of Health Regulation No. 6 of 2024 concerning Minimum Service Standards requires the integration of more proactive health screening services (RI, 2024). Collective tooth brushing programs in schools, proven effective in reducing caries by up to 50% in various countries, must be adopted as a daily curriculum. Furthermore, collaboration with Community Health Centers (Puskesmas) for ear cleaning (irrigation) and eye referrals must be strengthened to break the chain of health impacts.

Conclusion and Recommendation

Conclusion

This study concludes that preschool students face a significant burden of physical health problems, specifically the high prevalence of ECC, ear hygiene issues due to cerumen impaction, and strabismus. These findings indicate that promotive and preventive efforts in school and household environments still need to be massively improved.

Recommendation

1. Revitalization of UKS: Schools need to mandate collective tooth brushing programs and routine ear examinations every 6 months.
2. Active Referral System: For students with strabismus and hearing impairments, schools must issue referral letters and monitor parental compliance in taking children to health facilities.
3. Parental Education: Special parenting sessions are needed regarding the prohibition of cotton bud usage and the importance of a low-sugar diet to prevent caries

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