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THE RELATIONSHIP BETWEEN PARENTS' SOCIOECONOMIC STATUS AND ORTHODONTIC TREATMENT NEED

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ABSTRACT

Background: According to Basic Health Research (Riskesdas) data in 2013, the proportion of malocclusion among individuals aged 15-24 years in South Kalimantan was 14.2%. The high proportion of malocclusion may increase orthodontic treatment need. Orthodontic treatment need can be influenced by several factors, including parents socioeconomic status. **Purpose:** To analyze the relationship between parents socioeconomic status and orthodontic treatment need using the ICON index among high school students in the urban area of Banjarmasin. **Methods:** This analytic observational study with a cross-sectional design involved 356 high school students aged 15-18 years in the urban area of Banjarmasin who were selected using simple random sampling. Orthodontic treatment need was measured using the Index of Complexity, Outcome, and Need (ICON) through study models, while parents socioeconomic status was assessed using a questionnaire based on Kuppuswamy's socioeconomic scale. **Results:** Most parents socioeconomic status was classified as lower-middle (39%). The mean ICON score was 39.77, indicating borderline/moderate orthodontic treatment need. Spearman correlation showed a significant negative relationship between parents socioeconomic status and orthodontic treatment need ($p < 0.05$; $r = -0.464$). **Conclusion:** There is a significant negative relationship between parents socioeconomic status and orthodontic treatment need among high school students in urban Banjarmasin. Students from lower socioeconomic families tended to have higher orthodontic treatment need.

Keywords: Adolescents; ICON; Orthodontic treatment need; Parents socioeconomic status

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INTRODUCTION

Malocclusion is an important oral health problem after dental caries and periodontal disease. Malocclusion is a mismatch in the relationship between opposing teeth when the jaws contact. According to Basic Health Research (Riskesdas) data in 2013, the proportion of malocclusion in South Kalimantan among individuals aged 15-24 years was high at 14.2%. The high prevalence of malocclusion indicates a high need for orthodontic treatment.¹ According to Day's 2014 research, among adolescents aged 15-17 years, the need for orthodontic treatment increased to 96%.² According to Proffit et al., internal and external factors can influence orthodontic treatment need during adolescence. Internal factors include age, sex, race, genetics, and psychosocial factors, while external factors include parental knowledge, demographic location, and parents' socioeconomic status.³

Socioeconomic factors influencing orthodontic treatment need are related to parents' income, occupation, and education. Parents' knowledge of dental and oral health, especially malocclusion, is influenced by their education level and occupation. Parents' income can also indirectly affect malocclusion through the family's ability to fulfill nutritional needs. Families with limited financial resources may have difficulty providing adequate nutrition. If the intake of essential minerals and proteins is insufficient, jaw growth and development can be impaired, resulting in tooth crowding.⁴ Research by Badran et al. in 2014 showed that adolescents with parents of low socioeconomic status had higher orthodontic treatment need.⁵ The need for orthodontic treatment can be measured using various indices, including the Index of Complexity, Outcome, and Need (ICON). The ICON is a multifunctional index developed by Daniels and Richmond in 2000. The ICON has five assessment components: aesthetic component, diastema/crowding, crossbite, vertical relation of the anterior teeth, and anteroposterior relation of the buccal segment. This index has high sensitivity and specificity and does not require special tools compared with several other indices.^{6,7}

Banjarmasin City is the largest city in South Kalimantan and has the 28th highest population in Indonesia, with

657,663 people. According to data from the Central Bureau of Statistics of South Kalimantan Province in 2022, Banjarmasin has a large adolescent population, with 58,827 adolescents.⁸ Adolescence is an important period for assessing orthodontic treatment need because awareness of dental appearance and demand for treatment tend to increase at this age. However, statistical data regarding adolescent orthodontic treatment need in the urban area of Banjarmasin are still unavailable, and studies specifically analyzing the relationship between parents' socioeconomic status and ICON-based orthodontic treatment need among high school students in urban Banjarmasin remain limited. This research is important because urban Banjarmasin has a large adolescent population with different socioeconomic backgrounds that may influence nutrition, dental health knowledge, access to oral health services, and early management of malocclusion. Therefore, this study aimed to analyze the relationship between parents' socioeconomic status and orthodontic treatment need using the Index of Complexity, Outcome, and Need (ICON) among high school/equivalent students in the urban area of Banjarmasin.

MATERIAL AND METHODS

This study was an analytic observational study with a cross-sectional design. Ethical approval was obtained from the Ethics Commission for Health Research of the Faculty of Dentistry, Lambung Mangkurat University (No. 152/KEPKG-FKGULM/EC/XII/2023). The target population comprised class X and XI high school/equivalent students aged 15-18 years in the urban area of Banjarmasin, covering North Banjarmasin and Central Banjarmasin districts. Based on data from the South Kalimantan Provincial Education Office, the sampling frame consisted of 21 high schools/equivalent schools with a total population of 9,859 students. Data collection was conducted in eight schools: SMAN 8 Banjarmasin, SMAN 12 Banjarmasin, SMAS Islam Sabilal Muhtadin, SMK Islam Sabilal Muhtadin, SMAN 1 Banjarmasin, SMAN 2 Banjarmasin, SMAS Kristen Kanaan, and SMKS Muhammadiyah 2 Banjarmasin.

The sample size was calculated using the Lemeshow formula for a known population, resulting in 356 respondents. Samples were selected using simple random sampling based on the specified inclusion and exclusion criteria. Inclusion criteria were students who lived in the urban area of Banjarmasin and had fully erupted permanent teeth up to the first molars. Exclusion criteria were students with a history of fixed or removable orthodontic appliance use, students currently wearing removable or fixed dentures, students who no longer had both parents, and students with limited mouth opening caused by jaw muscle contraction disorders such as trismus.

Parents' socioeconomic status was defined as the family's socioeconomic position based on parents' education, occupation, and monthly income. It was assessed using a questionnaire based on the modified Kuppuswamy's socioeconomic scale. The total score categorized respondents into lower (<5), upper-lower (5-10), lower-middle (11-15), upper-middle (16-25), and upper (26-29) socioeconomic status. The questionnaire validity and reliability were assessed using Pearson Product Moment and Cronbach alpha tests. Orthodontic treatment need was measured from study models using the Index of Complexity, Outcome, and Need (ICON) by two observers using the same ICON assessment criteria. The ICON components included aesthetic component, crowding/spacing, crossbite, open bite/overbite, and buccal segment anteroposterior relation. Data were processed using SPSS version 25.0. Normality was tested using the Kolmogorov-Smirnov test, which showed non-normal data distribution ($p < 0.05$). Therefore, Spearman correlation was used because parents' socioeconomic status was ordinal data and the ICON score was ratio data. Statistical significance was set at $p < 0.05$.

STEPS OF PROCEDURE

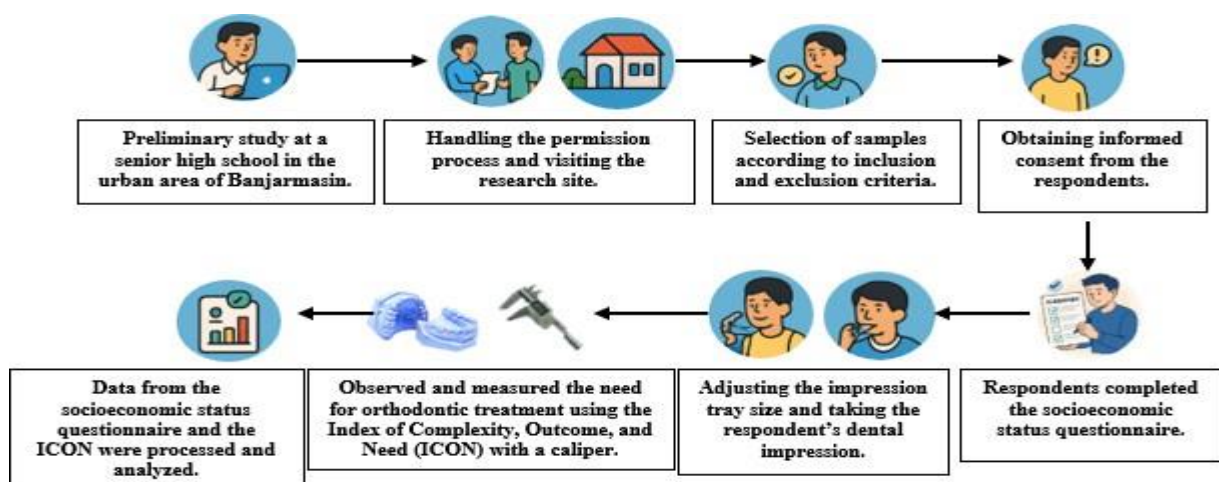


Figure 1. Research flowchart of the relationship between parents' socioeconomic status and orthodontic treatment need using the Index of Complexity, Outcome, and Need among senior high school students in urban areas of Banjarmasin. Source: author's own work.

RESULTS

This study involved 356 high school/equivalent students in the urban area of Banjarmasin. Table 1 shows the characteristics of respondents based on gender and age.

Table 1. Frequency and percentage distribution of respondents based on gender and age

Characteristics of respondents	Frequency (n)	Percentage (%)
Gender		
Male	15	44
Female	199	56
Age		
15 yea	115	32,02
16 yea	115	32,30
17 yea	88	23,88
18 yea	40	11,80
Total	356	100

Table 1 shows that the majority of respondents were female, with 199 students (56%). Based on age, most respondents were 16 years old, with 115 students (32.30%).

Table 2. Frequency distribution and percentage of respondents based on parents' socioeconomic status

Parents' socioeconomic status	Frequency (n)	Percentage (%)
Lower	3	1
Upper-lower	122	34
Lower-middle	140	39
Upper-middle	68	19
Upper	23	6
Total	356	100

Table 2 shows that the largest proportion of respondents was in the lower-middle socioeconomic category, with 140 students (39%).

Table 3. Distribution of mean ICON scores per component based on gender

Gender	ICON					Total ICON
	Aesthetic Component	Crowding/ Spacing	Crossbite	Openbite/ Overbite	Buccal segment anterior/posterior	
	$\bar{x} \pm SD$	$\bar{x} \pm SD$	$\bar{x} \pm SD$	$\bar{x} \pm SD$	$\bar{x} \pm SD$	$\bar{x} \pm SD$
Male	24,66±15,9	7,05±6,34	2,01±2,45	5,58±4,74	1,78±2,37	41,07±22,11
Female	21,95±15,2	7,29±5,58	2,21±2,49	5,63±4,79	1,67±2,32	38,75±20,97
Total	23,14±15,5	7,18±5,92	2,12±2,47	5,61±4,76	1,72±2,34	39,77±21,48

Table 3 shows that the mean orthodontic treatment need was higher among male adolescents (41.07) than female adolescents (38.75). The mean ICON score per component shows that the aesthetic component and buccal segment anteroposterior relation were higher among male adolescents.

Table 4. Distribution of mean ICON scores per component by age

Age	Mean ICON scores					
	Aesthetic Component	Crowding/ Spacing	Crossbite	Openbite/ Overbite	Buccal segment antero - posterior	Total ICON
	$\bar{x} \pm SD$	$\bar{x} \pm SD$	$\bar{x} \pm SD$	$\bar{x} \pm SD$	$\bar{x} \pm SD$	$\bar{x} \pm SD$
15 years	21,55±13,7	6,33±6,29	2,11±2,48	6,00±4,82	1,79±2,38	37,78±19,74
16 years	24,83±17,6	7,35±5,51	2,17±2,48	5,57±4,75	1,62±2,29	41,54±23,92
17 years	22,32±15,5	7,59±6,15	1,82±2,42	5,55±4,90	1,62±2,34	38,91±21,51
18 years	24,50±14,1	8,21±5,39	2,62±2,52	4,76±4,34	2,00±2,44	42,10±18,80

Table 4 shows that the mean orthodontic treatment need was highest at the age of 18 years (42.10). The mean ICON score per component shows that crowding/spacing, crossbite, and buccal segment anteroposterior relation were higher among 18-year-old respondents.

Table 5. Correlation test results between parents' socioeconomic status and orthodontic treatment need

Parents' socioeconomic status	Total ICON ($\bar{x} \pm SD$)	p-value	r
Lower	102.33±3.78	0.000	-0.464
Upper-lower	48.63±24.82	0.000	-0.464
Lower-middle	40.71±14.13	0.000	-0.464
Upper-middle	28.78±13.87	0.000	-0.464
Upper	11.43±4.44	0.000	-0.464

Table 5 shows that respondents in the lower socioeconomic category had the highest mean ICON score (102.33±3.78), while respondents in the upper socioeconomic category had the lowest mean ICON score (11.43±4.44). Spearman correlation showed a p-value of 0.000 ($p < 0.05$) and a correlation coefficient of -0.464, indicating a significant negative correlation between parents' socioeconomic status and orthodontic treatment need. Thus, the lower the parents' socioeconomic status, the higher the orthodontic treatment need.

DISCUSSION

This study showed a significant negative correlation between parents' socioeconomic status and orthodontic treatment need among high school/equivalent students in the urban area of Banjarmasin. The negative direction means that students from families with lower socioeconomic status tended to have higher ICON scores and greater orthodontic treatment need. The correlation coefficient ($r = -0.464$) indicates a moderate relationship, suggesting that socioeconomic status is related to orthodontic treatment need but is not the only factor involved.

The negative correlation may occur because socioeconomic status reflects the family's capacity to fulfill health-related needs, including nutrition, dental health information, and access to preventive or curative oral health services. Low family income can limit the ability to provide adequate nutrition. Inadequate protein, calcium, phosphorus, magnesium, and vitamins may affect craniofacial growth, tooth development, and jaw development, which can contribute to crowding and other malocclusion conditions.^{4,9}

Education and occupation may also explain this relationship. Parents with higher education generally have better access to health information and may identify malocclusion risk factors earlier, such as oral bad habits, caries, premature loss of teeth, and poor oral hygiene. Parents with better occupations may also have greater resources to seek dental care, including early consultation and preventive management. In contrast, limited knowledge and financial resources may delay dental visits until malocclusion becomes more severe.^{10,11}

The findings of this study are in line with previous studies reporting that higher socioeconomic status is associated with lower orthodontic treatment need. Sabrina et al. and Lubis et al. found a relationship between socioeconomic status and orthodontic treatment need, with lower need among adolescents from higher socioeconomic backgrounds.^{10,14} Similar findings were also reported by Badran et al., who showed that low socioeconomic status was associated with higher normative orthodontic treatment need.⁵ International studies by Ajmal et al. and Mylonopoulou et al. also support the role of parental education and socioeconomic background in the prevalence of malocclusion and orthodontic treatment need.^{12,13}

Other factors may also contribute to the orthodontic treatment need observed in this study. Male adolescents showed higher mean ICON scores than female adolescents, which may be related to lower concern for dental appearance and delayed oral health care among boys.¹⁵ The highest mean ICON score was found at 18 years of age, especially in crowding/spacing, crossbite, and buccal segment anteroposterior relation. Crowding can develop during adolescence,

and third molar eruption may contribute to limited space and anterior crowding.^{16,17}

Clinical observations also indicated that several students experienced caries and premature tooth loss. Caries and premature loss can alter dental arch width and tooth position, which may contribute to crowding, overjet, crossbite, and abnormal molar relation. Oral bad habits may also affect open bite and crossbite through altered muscle pressure and growth patterns.^{20,21,22} These variables may act as confounding factors, along with diet, nutritional status, access to dental services, heredity, and parental knowledge about malocclusion.

This study has several limitations. The cross-sectional design cannot establish a causal relationship between parents' socioeconomic status and orthodontic treatment need. The ICON index does not fully assess conditions related to space deficiency, such as tooth rotation or migration. This study also did not control several possible confounding factors, including diet, access to dental services, nutritional status, oral habits, caries status, heredity, and parental knowledge about malocclusion. Future studies should consider multivariate analysis and additional orthodontic indices to better explain the independent contribution of socioeconomic status to orthodontic treatment need.

CONCLUSION

Parents' socioeconomic status was significantly associated with orthodontic treatment need among high school/equivalent students in the urban area of Banjarmasin. Most respondents were in the lower-middle socioeconomic category, and the overall mean ICON score indicated borderline/moderate orthodontic treatment need. The lower the parents' socioeconomic status, the higher the orthodontic treatment need of the students.

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