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Mental health of parents of children with repaired cleft lip in urban and rural Indonesia: a multicenter cross-sectional study

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Abstract

Background

Parents of children with cleft lip carry a psychological burden that may persist after repair, but urban–rural evidence from low- and middle-income countries is scarce. We compared the mental health of urban and rural parents of children after cleft lip repair in Indonesia and examined its sociodemographic correlates.

Methods

In this multicenter cross-sectional study, 236 parents (126 rural, 110 urban) from four cleft centers (Makassar, Bandung, Jakarta, Padang) completed the Indonesian 18-item Mental Health Inventory (MHI-18) online between July 2023 and July 2024. Scores (0–100; higher = better) were compared with Mann–Whitney U tests; associations with age, education, and occupation were examined with Kruskal–Wallis tests and multivariable linear regression, with Holm correction.

Results

Urban parents had higher behavioral/emotional control scores than rural parents (53.5 ± 14.9 vs. 47.7 ± 15.2; mean difference 5.85, 95% CI 1.99–9.72; Holm-adjusted p = 0.018). Anxiety, depression, positive affect, and total scores did not differ after correction. After adjustment, rural residence remained associated with lower behavioral/emotional control (β = −5.25, 95% CI − 9.48 to − 1.02), but not after Holm correction (adjusted p = 0.075). Age, education, and occupation were unrelated to all MHI scores. Internal consistency was poor (Cronbach's α − 0.27 to 0.47).

Conclusions

Parental mental health after cleft lip repair was broadly similar in urban and rural Indonesia and unrelated to age, education, or occupation, although rural parents may have lower behavioral/emotional control. Given the instrument's poor reliability, these findings are preliminary; psychosocial support should be offered to all families in cleft care.

Background

Orofacial clefts are among the most common congenital anomalies, affecting approximately 1 in 700 live births worldwide [1, 2]. Most affected children are born in low- and middle-income countries (LMICs), yet relatively little cleft research comes from these settings, and much of it is led from high-income countries [3].

Compared with parents of unaffected children, parents of children with cleft lip and/or palate report more parenting stress, anxiety, and depressive symptoms [4–7]. Mothers describe sadness and worry about social support and about their child's future [8]. These difficulties are not limited to infancy: differences in family functioning and parental well-being have been reported into the child's adolescence [9, 10]. Among caregivers, depression is linked to parenting stress, hope, and perceived social support [11, 12], and parents with less education perceive more stigma [13]. Caregivers of children with clefts also report poorer psychological well-being than caregivers of unaffected children [14, 15].

Primary lip repair corrects the visible defect, but most children go on to need further surgery, speech therapy, orthodontic treatment, and long-term follow-up. Parenting stress falls after surgery but stays higher than in parents of unaffected children [5, 7]. In many countries, families also report that distance, transportation, cost, and lack of information make continued care difficult [16]. A recent review of the caregiving literature called for multicenter studies that include families from a wider range of socioeconomic backgrounds [10].

In Indonesia, an archipelago where specialized cleft services are concentrated in urban referral centers, these barriers are pronounced. Rural families in South Sulawesi who are referred to the provincial capital face high costs, and treatment is often delayed because families know little about the available treatment or hold sociocultural beliefs about what causes clefts [17, 18]. Education, economic resources, and place of residence are established social determinants of mental health [19, 20], but studies comparing rural and urban populations have produced inconsistent results [21, 22].

Previous Indonesian studies on this topic were qualitative or mixed-methods and focused on treatment pathways rather than on parental mental health [17, 18]. To our knowledge, no study has used a standardized instrument to compare the mental health of urban and rural parents after cleft lip repair, in Indonesia or elsewhere in Southeast Asia. Such data are needed to decide whether psychosocial support should be targeted by geography or offered to all families in cleft services.

We aimed (1) to compare the mental health of urban and rural parents of children who had undergone cleft lip repair in Indonesia, and (2) to examine whether parental age, education, and occupation were associated with mental health.

Methods

Study design and setting

This multicenter cross-sectional study is reported in accordance with the STROBE statement [23]. Data were collected between July 2023 and July 2024 at four cleft referral centers in Indonesia: Makassar (South Sulawesi), Bandung (West Java), Jakarta (Special Capital Region of Jakarta), and Padang (West Sumatra). Each center is a regional referral hub for cleft surgery and treats families from both urban and rural parts of its catchment area. We therefore classified setting (urban or rural) by the family's place of residence, not by the location of the recruiting center.

Participants

Eligible participants were parents (mothers or fathers) of children with non-syndromic cleft lip, with or without cleft palate, who had undergone primary cleft lip repair (cheiloplasty) at one of the participating centers. Inclusion criteria were: (a) the respondent was the parent who accompanied the child and was primarily responsible for the child's care; (b) the respondent was able to read and understand Indonesian; and (c) the respondent agreed to participate. Exclusion criteria were: (a) a child with a syndromic cleft or another major congenital anomaly; (b) a parent with a known psychiatric disorder or cognitive impairment that would prevent independent completion of the questionnaire; and (c) incomplete questionnaire responses. One parent per child completed the survey. Parents were recruited by consecutive sampling during postoperative follow-up visits at the participating centers. All 236 parents who returned the questionnaire (126 rural and 110 urban) had complete MHI data and were included in the analysis.

Sample size

No formal sample size calculation was performed before data collection; all eligible parents who attended the centers during the study period were invited. With 126 rural and 110 urban parents, the study had 80% power at a two-sided α of 0.05 to detect a standardized mean difference (Cohen's d) of 0.37 between settings.

Variables

The exposure was setting (urban vs. rural). The covariates were parental age in years, educational attainment (elementary school, junior high school, senior high school, or higher education [bachelor's or master's degree]), and occupation. Occupation was grouped as not working, homemaker, farmer, self-employed, or salaried/formal employment (civil servant, teacher, state-owned enterprise employee, or contract/honorary worker). For descriptive and bivariate analyses, age was also grouped as ≤ 19, 20–29, and ≥ 30 years.

Mental Health Inventory

Mental health was measured with the 18-item Mental Health Inventory (MHI-18), a short form of the 38-item MHI developed by Veit and Ware [24]. We used the Indonesian version of the MHI-18, which has previously been applied in Indonesian adults with the same four subscales and 0–100 scoring [25]. The Indonesian version of the full MHI-38, from which the MHI-18 items are drawn, has shown good internal consistency and construct validity in Indonesian samples [26, 27]. The questionnaire was administered as an online form (Google Forms), which parents completed on a mobile device at the participating centers, with a researcher available to clarify items when needed. The online version used a 5-point

frequency scale (never, very rarely, sometimes, often, very often), rather than the 6-point scale of the original instrument, and a different item order from the paper version.

Items were assigned to four subscales:

- anxiety: 5 items (feeling very nervous, tense, able to relax, restless, and anxious or worried);
- depression: 4 items (feeling sad, moody or brooding, low in spirits, and so down that nothing could cheer them up);
- behavioral/emotional control: 4 items (feeling depressed, emotionally stable, having nothing to look forward to, and being in firm control of behavior, thoughts, and feelings);
- positive affect: 5 items (daily life full of interesting things, feeling loved and wanted, calm and peaceful, cheerful and light-hearted, and being a happy person).

Items were assigned to subscales following the structure described by Veit and Ware and applied in the Indonesian MHI-18 [24, 25]. Negatively worded items were reverse-scored so that higher scores indicate better mental health. Subscale and total scores were linearly transformed to 0–100.

Statistical analysis

Analyses were performed in Python 3 (SciPy and statsmodels). Internal consistency was estimated with Cronbach's α [28]. Normality was assessed with the Shapiro–Wilk test. Because most scores were not normally distributed (Shapiro–Wilk $p < 0.05$), we used non-parametric tests. Scores are presented as mean ± standard deviation (SD) and median (interquartile range, IQR). Participant characteristics were compared between settings with the χ^2 test, with p-values confirmed by a Monte Carlo permutation test (20,000 permutations), and age with the Mann–Whitney U test.

MHI scores were compared between urban and rural parents with the Mann–Whitney U test. We report the mean difference (urban minus rural) with its Welch 95% confidence interval (CI) and Cohen's d. Within each setting, differences across age group, education, and occupation were tested with the Kruskal–Wallis test.

Multivariable linear regression was fitted for each MHI score in the pooled sample, with setting, age (per 10 years), education, and occupation as predictors. Heteroscedasticity-consistent (HC3) standard errors were used. Multicollinearity was assessed with the variance inflation factor (VIF).

Because five outcomes were tested for each comparison, p-values were adjusted with the Holm procedure [29]. Unadjusted p-values are also shown, given the exploratory nature of the analyses [30]. Statistical significance was set at a two-sided α of 0.05.

Ethical considerations

The study was approved by the Research Ethics Commission of the Faculty of Medicine, Hasanuddin University (No. 456/UN4.6.4.5.31/PP36/2023, 4 July 2023). The study was conducted in accordance with the Declaration of Helsinki. The first page of the online form explained the study's objectives, procedures, voluntary nature, and confidentiality, and participants gave electronic informed consent before the questionnaire items were displayed. Respondents younger than 18 years were married parents; under Indonesian law, a person who is or has been married is considered legally adult (Civil Code, Article 330), so these respondents gave their own informed consent. No identifying information was collected.

Use of large language models

During manuscript preparation, the authors used Claude (Anthropic) to assist with language editing and reference checking. The authors reviewed and edited all output and take full responsibility for the content of the manuscript.

Results

Participant characteristics

A total of 236 parents were included: 126 rural and 110 urban (Table 1). Rural parents were younger than urban parents (mean age 30.7 ± 13.3 vs. 33.9 ± 12.6 years; median 20.5 vs. 44.0 years; $p = 0.008$). The age distribution was bimodal in both settings: most parents were either about 20 years old or about 45 years old. Parents aged ≤ 19 years were more common in the rural group (30.2% vs. 6.4%; $\chi^2(2) = 21.94$, $p < 0.001$).

Table 1
Characteristics of participating parents by setting

Characteristic	Rural (n = 126)	Urban (n = 110)	p-value
Age, years			
Mean ± SD	30.7 ± 13.3	33.9 ± 12.6	0.008
Median (IQR)	20.5 (19–45)	44.0 (20–45)	
Range	16–49	17–48	
Age group, n (%)			< 0.001
≤19 y	38 (30.2)	7 (6.4)	
20–29 y	32 (25.4)	42 (38.2)	
≥30 y	56 (44.4)	61 (55.5)	
Educational attainment, n (%)			0.187
Elementary	28 (22.2)	13 (11.8)	
Junior high	15 (11.9)	14 (12.7)	
Senior high	65 (51.6)	68 (61.8)	
Higher education	18 (14.3)	15 (13.6)	
Occupation, n (%)			< 0.001
Not working	13 (10.3)	7 (6.4)	
Homemaker	12 (9.5)	17 (15.5)	
Farmer	25 (19.8)	0 (0.0)	
Self-employed	62 (49.2)	73 (66.4)	
Salaried/formal	14 (11.1)	13 (11.8)	

 Mann–Whitney U test. χ^2 test (age group $\chi^2(2) = 21.94$; education $\chi^2(3) = 4.80$; occupation $\chi^2(4) = 27.64$); Monte Carlo permutation p-values (20,000 permutations) were identical to three decimals. Higher education = bachelor's or master's degree. Salaried/formal = civil servant, teacher, state-owned enterprise employee, or contract/honorary worker. IQR, interquartile range.

Educational attainment did not differ between settings ($\chi^2(3) = 4.80$, $p = 0.19$). Senior high school was the most common level in both groups (51.6% rural, 61.8% urban). Occupation differed ($\chi^2(4) = 27.64$, $p < 0.001$), mainly because all 25 farmers were in the rural group. Self-employment was the most common occupation in both settings (49.2% rural, 66.4% urban).

Internal consistency

Internal consistency was poor. Cronbach's α was 0.47 for depression and 0.36 for positive affect, and negative for anxiety (− 0.15), behavioral/emotional control (− 0.14), and the total score (− 0.27). Several positively and negatively worded items correlated positively with each other, although they should correlate negatively. For example, "feeling emotionally stable" correlated with "feeling sad" at r = 0.73, and "able to relax" with "feeling sad" at r = 0.53. This pattern suggests that many respondents answered according to how often they experienced something in general, regardless of the direction of the item wording.

Mental health by setting

Table 2 compares MHI scores between settings. Urban parents had higher behavioral/emotional control scores than rural parents (53.5 ± 14.9 vs. 47.7 ± 15.2; mean difference 5.85, 95% CI 1.99–9.72; p = 0.004; Holm-adjusted p = 0.018; d = 0.39).

Table 2
Mental Health Inventory (MHI-18) scores in urban and rural parents

MHI score (0–100)	Cronbach's α	Urban (n = 110) mean ± SD median (IQR)	Rural (n = 126) mean ± SD median (IQR)	Mean difference (95% CI)[a]	p[b]	Holm p	Cohen's d
Anxiety	-0.15	61.1 ± 12.5 60.0 (50.0–70.0)	57.3 ± 14.2 55.0 (50.0–65.0)	3.83 (0.41 to 7.25)	0.040	0.135	0.29
Depression	0.47	66.9 ± 20.7 62.5 (56.2–75.0)	69.8 ± 19.3 68.8 (56.2–87.5)	−2.91 (−8.07 to 2.25)	0.300	0.599	−0.15
Behavioral/emotional control	-0.14	53.5 ± 14.9 56.2 (43.8–62.5)	47.7 ± 15.2 50.0 (37.5–62.5)	5.85 (1.99 to 9.72)	0.004	0.018	0.39
Positive affect	0.36	44.6 ± 13.3 45.0 (35.0–53.8)	45.1 ± 20.7 45.0 (31.2–60.0)	−0.53 (−4.94 to 3.88)	0.503	0.599	−0.03
Total score	-0.27	56.1 ± 6.1 55.6 (52.8–59.7)	54.6 ± 7.3 54.2 (50.0–59.7)	1.57 (−0.15 to 3.30)	0.034	0.135	0.23

Higher scores indicate better mental health. [a] Urban minus rural; Welch 95% CI. [b] Mann–Whitney U test; Holm correction across the five scores. Cronbach's α computed in the pooled sample (n = 236); negative values indicate that items did not measure a common construct.

Anxiety scores were also higher in urban parents (61.1 ± 12.5 vs. 57.3 ± 14.2; mean difference 3.83, 95% CI 0.41–7.25; p = 0.040). So were total scores (56.1 ± 6.1 vs. 54.6 ± 7.3; mean difference 1.57, 95% CI −0.15 to 3.30; p = 0.034). Neither difference remained significant after Holm correction (adjusted p = 0.135 for both). Depression (66.9 ± 20.7 vs. 69.8 ± 19.3; p = 0.30) and positive affect (44.6 ± 13.3 vs. 45.1 ± 20.7; p = 0.50) did not differ between settings.

Sociodemographic correlates

Within each setting, MHI scores did not differ by age group, education, or occupation (Table 3; all unadjusted $p \geq 0.076$; all Holm-adjusted $p \geq 0.38$).

Table 3
MHI-18 scores (mean ± SD) by sociodemographic category within each setting

Factor / category	n	Anxiety	Depression	Behavioral/ emotional control	Positive affect	Total score
Urban parents (n = 110)						
Age group						
≤19 y	7	57.9 ± 11.9	75.0 ± 16.9	57.1 ± 12.2	48.6 ± 12.5	58.9 ± 6.2
20–29 y	42	61.4 ± 13.1	70.7 ± 21.8	54.3 ± 14.2	41.2 ± 11.4	56.3 ± 5.7
≥30 y	61	61.2 ± 12.2	63.4 ± 19.9	52.6 ± 15.7	46.5 ± 14.3	55.7 ± 6.4
p (Holm p)		0.883 (1.000)	0.076 (0.379)	0.655 (1.000)	0.147 (0.588)	0.476 (1.000)
Education						
Elementary	13	58.5 ± 11.8	73.1 ± 21.9	51.4 ± 10.9	43.1 ± 11.6	55.9 ± 6.1
Junior high	14	61.8 ± 15.0	68.3 ± 18.3	53.6 ± 13.8	41.8 ± 9.3	55.9 ± 3.8
Senior high	68	61.1 ± 13.0	64.5 ± 20.5	54.4 ± 15.4	46.5 ± 14.5	56.3 ± 6.7
Higher education	15	62.7 ± 8.4	71.2 ± 22.9	51.2 ± 17.1	39.7 ± 10.9	55.6 ± 5.3
p (Holm p)		0.803 (1.000)	0.483 (1.000)	0.861 (1.000)	0.208 (1.000)	0.828 (1.000)
Occupation						
Not working	7	62.9 ± 14.1	75.0 ± 19.4	48.2 ± 16.8	39.3 ± 11.3	55.8 ± 5.1
Homemaker	17	62.9 ± 15.4	62.1 ± 21.4	58.8 ± 15.0	44.4 ± 16.6	56.7 ± 6.1
Farmer	0	–	–	–	–	–
Self-employed	73	60.3 ± 12.0	66.4 ± 21.1	53.7 ± 14.2	45.5 ± 12.8	56.1 ± 6.3

Kruskal–Wallis test; Holm correction across the five scores for each factor within each setting. Higher scores indicate better mental health.

Factor / category	n	Anxiety	Depression	Behavioral/ emotional control	Positive affect	Total score
Urban parents (n = 110)						
Age group						
Salaried/formal	13	61.9 ± 11.1	72.1 ± 18.3	48.6 ± 16.6	42.7 ± 13.0	55.9 ± 6.1
p (Holm p)		0.824 (1.000)	0.438 (1.000)	0.359 (1.000)	0.471 (1.000)	0.959 (1.000)
Rural parents (n = 126)						
Age group						
≤19 y	38	56.3 ± 13.1	67.4 ± 19.2	48.8 ± 13.1	46.4 ± 20.3	54.4 ± 5.8
20–29 y	32	55.6 ± 15.4	71.1 ± 17.4	46.9 ± 17.3	42.2 ± 23.5	53.4 ± 10.1
≥30 y	56	58.8 ± 14.2	70.8 ± 20.6	47.3 ± 15.6	45.9 ± 19.4	55.3 ± 6.4
p (Holm p)		0.545 (1.000)	0.563 (1.000)	0.745 (1.000)	0.778 (1.000)	0.198 (0.989)
Education						
Elementary	28	56.1 ± 13.8	71.2 ± 17.3	49.1 ± 12.6	46.1 ± 19.7	55.1 ± 5.2
Junior high	15	63.3 ± 13.8	71.2 ± 23.2	46.2 ± 14.7	47.0 ± 18.2	56.8 ± 7.2
Senior high	65	56.3 ± 14.5	68.8 ± 20.3	47.0 ± 16.2	44.9 ± 20.6	53.8 ± 7.7
Higher education	18	57.5 ± 13.7	70.5 ± 16.3	49.0 ± 16.9	42.8 ± 25.3	54.4 ± 9.0
p (Holm p)		0.266 (1.000)	0.916 (1.000)	0.820 (1.000)	0.958 (1.000)	0.271 (1.000)
Occupation						
Not working	13	59.6 ± 13.6	77.4 ± 18.1	43.8 ± 17.7	35.8 ± 25.1	53.4 ± 7.8

Kruskal–Wallis test; Holm correction across the five scores for each factor within each setting. Higher scores indicate better mental health.

Factor / category	n	Anxiety	Depression	Behavioral/ emotional control	Positive affect	Total score
Urban parents (n = 110)						
Age group						
Homemaker	12	61.2 ± 11.3	73.4 ± 18.3	49.0 ± 9.2	39.6 ± 19.9	55.2 ± 7.9
Farmer	25	58.6 ± 13.1	67.8 ± 16.8	46.2 ± 15.0	45.6 ± 16.4	54.3 ± 6.7
Self-employed	62	56.2 ± 15.9	68.3 ± 20.7	48.2 ± 15.8	46.1 ± 21.4	54.3 ± 7.5
Salaried/formal	14	53.9 ± 10.8	70.1 ± 19.6	50.4 ± 16.0	53.2 ± 19.0	56.5 ± 7.5
p (Holm p)		0.478 (1.000)	0.591 (1.000)	0.866 (1.000)	0.344 (1.000)	0.660 (1.000)
Kruskal–Wallis test; Holm correction across the five scores for each factor within each setting. Higher scores indicate better mental health.						

In the multivariable models (Table 4), rural residence was associated with lower behavioral/emotional control (β = −5.25, 95% CI − 9.48 to − 1.02; p = 0.015) and lower anxiety scores (β = −3.92, 95% CI − 7.71 to − 0.12; p = 0.043), independent of age, education, and occupation. After Holm correction across the five outcomes, neither association remained significant (adjusted p = 0.075 and 0.172, respectively). Age, education, and occupation were not significantly associated with any MHI score. The models explained little variance (adjusted $R^2 \leq 0.018$). The maximum VIF was 2.15.

Table 4
Multivariable linear regression of MHI-18 scores (β, 95% CI; n = 236)

Predictor	Anxiety	Depression	Behavioral/ emotional control	Positive affect	Total score
Rural (ref. urban)	**−3.92 (− 7.71 to − 0.12)** p = 0.043	2.29 (− 3.53 to 8.12) p = 0.440	**−5.25 (− 9.48 to − 1.02)** p = 0.015	1.34 (− 3.47 to 6.15) p = 0.586	−1.37 (− 3.27 to 0.52) p = 0.155
Age, per 10 years	0.78 (− 0.61 to 2.17)	−0.82 (− 2.90 to 1.27)	−0.51 (− 2.04 to 1.01)	0.87 (− 0.98 to 2.72)	0.16 (− 0.53 to 0.85)
Education: junior high (ref. elementary)	6.08 (− 0.98 to 13.14)	−1.40 (− 11.26 to 8.46)	−1.73 (− 8.56 to 5.10)	−1.30 (− 9.38 to 6.78)	0.63 (− 2.40 to 3.66)
Education: senior high	2.10 (− 3.06 to 7.27)	−3.66 (− 10.96 to 3.64)	−1.16 (− 6.13 to 3.82)	−1.98 (− 8.70 to 4.74)	−1.04 (− 3.46 to 1.39)
Education: higher education	5.40 (− 1.72 to 12.52)	−1.01 (− 11.98 to 9.96)	−1.68 (− 9.82 to 6.45)	−10.12 (− 20.98 to 0.73)	−1.91 (− 5.81 to 1.99)
Occupation: not working (ref. self-employed)	4.04 (− 2.57 to 10.64)	7.56 (− 1.99 to 17.10)	−5.38 (− 13.75 to 2.98)	−10.31 (− 20.93 to 0.31)	−1.26 (− 4.75 to 2.23)
Occupation: homemaker	3.88 (− 1.59 to 9.35)	−0.29 (− 8.74 to 8.15)	3.30 (− 2.27 to 8.87)	−3.73 (− 10.99 to 3.52)	0.71 (− 2.09 to 3.51)
Occupation: farmer	3.17 (− 3.56 to 9.89)	−1.63 (− 10.25 to 6.98)	−2.48 (− 9.82 to 4.87)	−2.22 (− 10.50 to 6.07)	−0.65 (− 4.03 to 2.73)
Occupation: salaried/formal	−2.12 (− 7.91 to 3.67)	3.26 (− 6.53 to 13.05)	−0.82 (− 8.35 to 6.71)	6.67 (− 2.72 to 16.06)	1.81 (− 1.61 to 5.23)
Holm p for rural	0.172	0.881	0.075	0.881	0.466
Adjusted R^2	0.017	−0.006	0.018	0.015	−0.011

Unstandardized β coefficients with HC3 robust 95% confidence intervals; bold, $p < 0.05$. Holm correction applied to the rural coefficient across the five scores. Maximum variance inflation factor 2.15.

Discussion

In this multicenter study of 236 Indonesian parents whose children had undergone cleft lip repair, urban parents had moderately higher behavioral/emotional control scores than rural parents. This was the only difference that remained significant after correction for multiple testing. It was slightly smaller after adjustment for age, education, and occupation and was no longer significant after correction across outcomes. Anxiety, depression, positive affect, and total scores were broadly similar in the two settings, and none of the sociodemographic characteristics we examined was associated with any dimension of mental health. Because the adapted MHI-18 had poor internal consistency, all of these findings should be read as preliminary.

The behavioral/emotional control subscale reflects a person's sense of being in control of their own thoughts, feelings, and behavior. Lower scores in rural parents fit the way cleft care is organized in Indonesia. Families who live outside the provincial capitals must travel long distances to referral centers, pay substantial out-of-pocket costs, and deal with sociocultural beliefs that can delay treatment [17, 18]. Similar barriers related to distance, cost, transportation, and information have been reported worldwide [3, 16]. In Vietnam, timely access to cleft surgery depended as much on socioeconomic factors such as parental education as on geography [31]. Managing a multistage treatment pathway from a distance, with limited information and uncertain costs, could weaken parents' sense of control over their child's care and their own lives. Among Indonesian patients with tuberculosis, behavioral/emotional control was also the only MHI-18 subscale that differed across sociodemographic groups [25], so this dimension may be especially sensitive to social circumstances in Indonesia.

The urban–rural difference in behavioral/emotional control weakened after adjustment, which suggests that part of it reflects differences in who the rural and urban parents were. Rural parents were much younger (median age 20.5 vs. 44 years), and all the farmers in the sample lived in rural areas. Young parenthood is itself a risk factor for poor mental health: in a national Indonesian survey, postpartum depression among young mothers was associated with a lack of family support in both urban and rural areas, and with unwanted pregnancy and pregnancy complications in rural areas [32]. Younger parents may also have fewer economic resources and less experience with the health system. Separating the effects of place of residence from those of parental life stage will require larger samples with more detailed sociodemographic data.

Apart from behavioral/emotional control, urban and rural parents had similar mental health scores, and several explanations are possible. Every child in our sample had already undergone primary lip repair. Parenting stress is lower after surgery than before it [7], and in a large prospective cohort, caregivers' psychological well-being and quality of life improved between the child's birth and five years of age, reaching or exceeding population norms [33]. Dutch parents of children with cleft lip with or without palate likewise reported less distress and parenting stress than normative samples [34]. Many families appear to adjust well once the period of diagnosis and surgery has passed [5]. Parents of children with clefts can also show resilience and posttraumatic growth. Growth has been associated mainly with positive coping and social support [35], and fathers and mothers draw on different resilience resources [36]. Rural communities may also offer stronger cognitive social capital, which protects against common

mental disorders [37], although we did not measure social support or social capital and so cannot test this explanation. Finally, population studies show that rural–urban differences in mental health are small and inconsistent once individual circumstances are considered [21, 22], and in Indonesia maternal depression is a concern in urban and rural areas alike [38].

In both settings, positive affect had the lowest mean score, whereas depression scores were comparatively favorable. Many parents may therefore lack positive well-being without showing overt psychological distress. This fits reports that a substantial minority of caregivers still have clinically significant distress years after diagnosis, even when the group average looks favorable [33]. In Malaysia, about one in five Malay parents of children with clefts experienced stress, and avoidant coping was more common among those who were stressed [39]. Given the measurement problems described below, we interpret this profile cautiously.

Parental age, education, and occupation were not associated with mental health. This contrasts with frameworks that treat socioeconomic position as a determinant of mental health [19, 20]. In studies of caregivers of children with clefts, psychological factors seem to matter more than demographic ones. Caregiver depression depends mainly on parenting stress, hope, perceived social support, and coping style [11, 12, 35]. Long-term adjustment is predicted by life orientation, negative appraisals of the cleft, and satisfaction with health care [33]. Education has been linked mainly to perceived stigma [13] and to timely access to care [31], rather than directly to parental mental health. Economic hardship, which we did not measure, also predicts poor mental health more strongly than occupational category alone [40]. The low reliability of our instrument would, in addition, have biased any true associations toward the null.

Measurement is the main limitation of this study. The MHI-18 was administered online with a 5-point rather than a 6-point scale and in a different item order from the paper version. Its internal consistency was poor, with negative Cronbach's α values for three of the five scores [28]. Several positively and negatively worded items correlated positively with each other, although they should correlate negatively. This pattern points to reversed-item bias arising from acquiescence, careless responding, or misunderstanding of the item wording [41, 42]. Careless responding is a well-documented problem in self-administered online surveys [43], and scales with fewer response categories tend to discriminate less well between respondents [44]. By comparison, the Indonesian MHI-38 showed good reliability (α = 0.89) and construct validity in adolescents [26], and the Indonesian MHI has been used successfully in adult clinical and community samples [25, 27]. The problem in our study therefore most likely lies in the modified administration format rather than in the translated items. Before the MHI-18 is used in this population again, its online version should undergo formal cross-cultural adaptation, including cognitive interviewing, and its factor structure and reliability should be tested [45, 46].

Because parental mental health did not differ markedly by setting, routine psychological screening and integrated psychosocial support should be offered to all families in cleft care rather than targeted by geography, as recent reviews and cohort studies recommend [10, 33]. Little is known about which psychosocial interventions work in cleft care specifically [47], but brief psychological treatments

delivered by trained non-specialist health workers have had moderate to strong effects on common mental disorders in LMICs [48]. Such approaches could be built into Indonesian cleft teams and primary care, in line with calls to integrate mental health into health services [49]. For rural families, telehealth has been used successfully in international cleft care for education and for pre- and postoperative follow-up [50], and it could reduce the travel burden that may be undermining rural parents' sense of control.

Strengths and limitations

The study was conducted at four centers, included both urban and rural parents, had complete MHI data for every participant, and used multivariable models with correction for multiple testing.

Apart from the poor reliability of the adapted MHI discussed above, the study has other limitations. The cross-sectional design does not allow causal inference. The centers were selected purposively and participants were not sampled probabilistically, which limits generalizability, and because the recruiting center was not recorded for each respondent, we could not model clustering by center. We did not record the child's age, cleft type, or time since surgery, or the parent's sex, household income, social support, or perceived stigma, any of which may confound or mediate the associations we observed. Reported ages clustered at 20 and 45 years, which suggests approximate reporting, and some respondents were adolescents. There was no comparison group of parents of unaffected children. Completing the questionnaire at the center may also have introduced social desirability bias. Future studies should use validated instruments, measure clinical and economic factors, and follow families over time.

Conclusions

In this multicenter study, the mental health of Indonesian parents whose children had undergone cleft lip repair was broadly similar in urban and rural settings and was not associated with age, education, or occupation. Rural parents may have lower behavioral/emotional control, but this difference lost significance once the adjusted estimates were corrected for multiple testing. Because the adapted MHI had poor reliability, firm conclusions will require a validated instrument. Until then, routine psychosocial screening and support should be offered to all families in cleft care.

Abbreviations

CI
Confidence interval
HC3
Heteroscedasticity-consistent standard errors (type 3)
IQR
Interquartile range
LMICs

Low- and middle-income countries
MHI
Mental Health Inventory
MHI-18
18-item Mental Health Inventory
MHI-38
38-item Mental Health Inventory
SD
Standard deviation
STROBE
Strengthening the Reporting of Observational Studies in Epidemiology
VIF
Variance inflation factor

Declarations

Ethics approval and consent to participate

The study was approved by the Research Ethics Commission of the Faculty of Medicine, Hasanuddin University (No. 456/UN4.6.4.5.31/PP36/2023, 4 July 2023) and was conducted in accordance with the Declaration of Helsinki. All participants gave electronic informed consent before completing the questionnaire. Respondents younger than 18 years (none was younger than 16) were married parents, who are legally adults under Indonesian law (Civil Code, Article 330), and therefore gave their own informed consent.

Consent for publication

Not applicable.

Clinical trial number

Not applicable.

Availability of data and materials

The de-identified dataset supporting the findings of this study is available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing financial interests or personal relationships that could have influenced the work reported in this study

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Authors' contributions

AT: conceptualization, methodology, validation, supervision, formal analysis, investigation, writing – original draft, writing – review and editing. MIR: investigation, formal analysis, writing – review and editing. Nurwahida: investigation, validation, writing – review and editing. Hadira: investigation, validation, writing – review and editing. HM: investigation, validation, writing – review and editing. All authors read and approved the final manuscript.

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