

RESEARCH ARTICLE

Preliminary evaluation of a Bangladesh-adapted Kuppuswamy socioeconomic status scale in rural hypertensive adults



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Abstract

Background: A Bangladesh-adapted Kuppuswamy socioeconomic status (SES) scale was developed by modifying the education, occupation, and income domains of the original instrument but had not undergone empirical evaluation. We aimed to examine its structural coherence (intercorrelation of the three components), the agreement between fixed and empirically derived component weights, convergent association with respondents' own education, exploratory associations with health-related outcomes, and the consequences of collapsing the five SES categories into three.

Methods: Secondary analysis of 461 hypertensive adults from a single rural sub-district of Bangladesh. Component intercorrelation was described with Spearman correlations and Factor Analysis using the Principal Component extraction method; agreement between fixed and PCA-derived weights was assessed; convergent association was examined against respondents' own education; associations with medication adherence and blood pressure were examined across three SES categories as exploratory health-related associations; and category-collapse was checked with linear contrasts and a Jonckheere–Terpstra test.

Results: The three components were positively but modestly intercorrelated (Spearman rho 0.28–0.39). Fixed and PCA-derived weights ranked participants near-identically (rho=0.989). The composite correlated weakly, and only partly independently, with respondents' education (rho=0.253; 0.274 after removing the education overlap). Medication adherence rose across SES categories ($\eta^2=0.142$), driven mainly by the lowest group; blood pressure did not differ ($P=0.08$ and 0.23). The true upper SES range was essentially untested ($n=2$).

Conclusion: In this single rural, hypertensive sample the adapted scale showed positive intercorrelation among its components, weak and only partly independent convergent association with education, and a modest association with adherence at the lower socioeconomic range. These findings are promising but preliminary; further evaluation across the full socioeconomic range, in urban as well as rural settings, and against an independent wealth criterion is needed before routine use.

Key messages

Bangladesh lacks a widely accepted, standardized Kuppuswamy socioeconomic status measure, forcing inconsistent ad hoc approaches. This work provides a locally adapted Kuppuswamy instrument with a ready-to-use scoring tool and first empirical evidence on its behaviour in a rural sample. Further evaluation against an independent wealth index is needed before routine use.

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Introduction

Socioeconomic status (SES) is a well-established determinant of health behaviour and outcomes, including hypertension awareness, treatment, and control [1]. In South Asia, the Kuppuswamy socioeconomic status Index, developed by B. Kuppuswamy in 1976 for urban India, remains one of the most widely used composite SES instruments, combining education, occupation of the head of household and total monthly household income into an ordinal classification [2]. Because its income component uses absolute currency thresholds, it requires periodic recalibration as prices rise; successive Indian revisions have updated the income brackets to keep pace with inflation [3–5].

To our knowledge, no widely accepted, nationally standardized SES classification has been established for Bangladesh; researchers have relied on ad hoc asset indices or simplified income cut-offs that limit comparability [6]. The original or Indian-revised Kuppuswamy scale cannot be applied directly to Bangladesh, given differences in educational structure (including the parallel general, Alia, and Qawmi madrasa systems), occupational distribution, and income levels. We therefore adapted the index to the Bangladeshi context, revising the education, occupation, and income domains while retaining the original scoring weights and five-tier classification. The full adaptation is described in the Methods, with the complete instrument in Table 1.

The adaptation was a methodological, classification-based exercise; its measurement properties were not examined at development. Using data from the quantitative component of a larger exploratory sequential mixed-methods study of hypertensive adults in Kamalganj sub-district, Moulvibazar, Bangladesh—available as a preprint [7]—the present study takes a first step toward evaluating the adapted index. Because the scale is a formative composite, the sample is rural and range-restricted, and the income component was not measured against an external criterion, we frame this as a preliminary, internal evaluation rather than a validation.

Specifically, we set out to: (i) examine the interrelationships among the adapted SES components; (ii) evaluate the agreement between fixed and empirically derived weights; (iii) assess convergent association against respondents' own education; (iv) examine exploratory associations with medication adherence and blood pressure; and (v) evaluate the consequences of collapsing the five categories into three.

Methods

Design, setting and participants

This is a secondary analysis of the quantitative component of a larger exploratory sequential mixed-methods study [7]. The parent survey was a community-based, cross-sectional study conducted in Kamalganj sub-district, Moulvibazar district, Bangladesh, December 2025–February 2026. Participants were selected by random sampling from community health registers and local clinic records to ensure representativeness across age, sex, geographic

location within the sub-district, and socioeconomic status, and were approached door-to-door. Eligible participants were adults aged 18 years and above with previously diagnosed or newly identified hypertension (self-reported diagnosis, or systolic blood pressure ≥ 140 mmHg and/or diastolic ≥ 90 mmHg at the survey, or current use of antihypertensive medication). Non-residents and those unable to participate because of mental or physical disability were excluded. Of 501 eligible adults approached, 461 (92.0%) provided informed consent and completed the survey. Because the sample comprised hypertensive adults from a single rural sub-district, the scale was evaluated only in this specific rural, clinical population and cannot yet be generalized to urban or national populations.

Of the 461 participants, 446 contributed to medication-adherence analyses; 15 taking no antihypertensive medication were excluded from adherence analyses because adherence is undefined without treatment. Blood-pressure analyses used all 461.

The Bangladesh-adapted Kuppuswamy scale

SES was assessed using a Bangladesh-adapted version of the Kuppuswamy scale, built on the original framework [2]. The original scale classifies households into five socioeconomic classes (Upper, Upper-Middle, Lower-Middle, Upper-Lower, Lower) from three weighted domains—education of the head of household (score 1–7), occupation of the head of household (score 1–10), and total monthly household income (score 1–12)—summed into a composite score (possible range 3–29). We retained this scoring structure and five-tier classification unchanged and adapted the content of each domain, as below; the complete instrument is in Table 1.

The head of household was defined as the person recognised by the household as head; total household income was recorded as the combined monthly income of all members. The adaptation was carried out by the author team using national reference classifications; no external expert panel or formal content-validation procedure (e.g., Delphi) was used, and the instrument was not pilot-tested.

The adapted content (the category definitions) was developed by rational, classification-based mapping and is not empirically validated here. We examine only: the intercorrelation of the three components; the practical influence of the fixed versus empirical weights on ranking; convergent association with an external education measure; and exploratory associations with health outcomes. The five-tier classification was collapsed for analysis and is not evaluated, and, because the Kuppuswamy scale is a formative composite, we do not treat internal structure or dimensionality as evidence of construct validity.

Because education, occupation, and income are distinct but complementary indicators of socioeconomic position, the scale treats them as causal (formative) components that jointly define SES rather than as interchangeable items reflecting a latent trait; each contributes unique information, so high internal consistency is neither expected nor required [8, 9].

Education of the head of household

The Bangladeshi education system comprises both the conventional general pathway and a parallel madrasa system [10]. We reclassified the education categories using nationally recognized terminology while keeping the original Kuppuswamy scale, mapped madrasa-stream equivalence across levels, [11] and added a category for those who began but did not complete primary education—a group not clearly captured in the original scale.

Occupation of the head of household

Bangladesh Standard Classification of Occupations-2020 and International Standard Classification of Occupations [12, 13] classify occupations but do not rank them by socioeconomic position; we therefore retained the original Kuppuswamy rank order and 1–10 scoring and mapped each BSCO-2020 major group onto the corresponding Kuppuswamy tier by skill level and typical socioeconomic position. The non-hierarchical 'Armed forces' group, which spans several skill levels, was excluded, and the unemployed were assigned the lowest occupational score (1), reflecting absence of the head's own labour-market position while household position is still captured through income and education.

Total monthly household income

We retained the original Kuppuswamy income scores (12, 10, 6, 4, 3, 2, 1) and redefined the corresponding monthly income bands in Bangladeshi Taka. Bands were anchored to the 2022 Household Income and Expenditure Survey mean monthly household income—26,163 BDT (rural) and 45,757 BDT (urban)—the most recent national figures (2021–2022 base year), and informed by the prevailing general inflation rate (8.17%), [14, 15] with round-number boundaries for field use. Separate rural and urban bands reflect the ~75% rural–urban disparity. This anchor-and-inflation approach differs from the formal consumer-price-index multiplication used in recent Indian updates; [4, 5] we note this, and the absence of an external wealth criterion, as limitations. Because the setting was rural, income was scored using the rural bands only.

Owing to small cell counts in the extreme strata (Upper $n = 2$, 0.4%; Lower $n = 44$, 9.5% in the five-category scheme), categories were collapsed into three for analysis: Upper (Upper + Upper-Middle), Middle (Lower-Middle), and Lower (Upper-Lower + Lower). This data-driven collapse means the analyses characterize a three-category derivative rather than the five-tier classification, which was not itself evaluated.

Table 1 The Bangladesh-adapted Kuppuswamy socioeconomic status scale in rural hypertensive adults: Scoring instrument (rural)

Category	Score
A. Education of the head of household	
Professional education	7
Bachelor's / Master's/Fazil/Kamil / Takmil / Dawra-e-Hadith	6
Higher Secondary / Diploma / Alim / Sanabi	5
Secondary / Dakhil / Mutawassitah	4
Junior Secondary / Ibtidaiyah (Grades 6–8)	3
Primary / Ibtidaiyah (Grades 1–5)	2
Illiterate / incomplete primary education	1
B. Occupation of the head of household (mapped to BSCO ^a -2020/ISCO ^b)	
Managers and senior officials	10
Professionals	9
Technicians and associate professionals	8
Clerical support workers	7
Service and sales workers	6
Skilled agriculture, forestry, fisheries	5
Craft and related trades workers	4
Plant/machine operators and assemblers	3
Elementary occupations	2
Unemployed	1
C. Total monthly household income — rural (BDT, 2021–2022 base year)	
≥ 100,000	12
70,000–99,999	10
50,000–69,999	6
35,000–49,999	4
22,000–34,999	3
12,000–21,999	2
< 12,000	1
D. Socioeconomic class from the summed composite (range 3–29)	
26–29	Upper (I)
16–25	Upper-Middle (II)
11–15	Lower-Middle (III)
5–10	Upper-Lower (IV)
<5	Lower (V)

Income scores follow the original Kuppuswamy weighting (12, 10, 6, 4, 3, 2, 1). ^aBangladesh Standard Classification of Occupations; ^bInternational Standard Classification of Occupations

Variables used for the evaluation

The three component sub-scores, the composite, and the collapsed three-category classification were the variables examined. For convergent evidence, the respondent's own educational attainment—recorded independently of the household head's education used within the composite—was the sole external comparator; individual income was not collected. No asset- or durable-goods-based wealth index—the conventional external criterion for SES instruments in low- and middle-income settings [16, 17]—was collected, so land, savings, and other non-income wealth were not captured; this is the study's headline limitation.

As exploratory health-related associations, we used the continuous Bangladesh Medication Adherence Scale (BMAS) score, categorical adherence status (optimal/sub-optimal), [18] and mean blood pressure. Adherence and blood pressure are not criterion measures of SES and, in a cross-sectional design, cannot establish predictive validity; we therefore treat these strictly as exploratory associations, noting that SES inputs, the education comparator, and adherence are all self-reported by the same respondent (possible common-method variance).

Blood pressure was measured with OMRON HEM-7120 automated blood pressure machine on the right arm, with the participant seated and rested for at least five minutes; two readings were taken at five-minute intervals and averaged. Newly identified hypertension was defined as systolic ≥ 140 and/or diastolic ≥ 90 mmHg, in line with WHO and International Society of Hypertension guidance [19].

Statistical analysis

Analyses used IBM SPSS Statistics version 31 (bootstrap confidence intervals from 1,000 resamples). As this scale is a formative composite, internal-consistency reliability (Cronbach's alpha) is

Table 2 Correlation matrix (Spearman) among the three Kuppaswamy components in rural hypertensive adults (n=461)

Component	Education	Occupation	Income
Education	1.00		
Occupation	0.39	1.00	
Income	0.36	0.28	1.00

All correlations $P < 0.001$. Supporting PCA: KMO = 0.64; Bartlett's $P < 0.001$; first component eigenvalue 1.78, 59.2% of variance; loadings 0.81 (education), 0.79 (occupation), 0.70 (income). A dominant first component is expected for positively correlated inputs and is not evidence of construct validity. A PCA-weighted composite and the fixed-weight composite ranked participants near-identically (Spearman rho=0.99).

conceptually inapplicable and is not reported as evidence of validity; [20] the single-timepoint design precludes test-retest assessment, so no design-appropriate reliability estimate was available.

Intercorrelation (descriptive)

Spearman correlations among the three components were used as the primary structural description, supplemented by principal component analysis (PCA; principal-components extraction, one component, no rotation) with KMO, Bartlett's test, variance explained by the extracted factor, and factor loadings. The Principal Component extraction method was used rather than Maximum Likelihood estimation because the objective was descriptive dimensionality assessment rather than confirmatory latent-trait modelling, and Maximum Likelihood estimation assumes multivariate normality that could not be assumed for this set of ordinal socioeconomic indicators. A dominant extracted factor is expected for three positively correlated inputs and, consistent with the formative treatment of the index, is not treated as evidence of construct validity

Weight agreement

To assess whether the fixed integer weights distort ranking, a PCA-derived weighted composite (regression scores) was compared with the fixed-weight composite using Spearman correlation and the resulting three-category classifications were also compared.

Convergent association

Spearman correlation with bootstrap 95% CIs were used to assess the association between the composite and respondents' education, and, to remove the structural education overlap, with the education component, between respondents' education and the non-education sub-score (occupation + income).

Exploratory health associations

One-way ANOVA was used to compare mean BMAS scores and blood pressure across the three SES categories, with Levene's test for homogeneity of variance and Welch's robust test where appropriate. Chi-square tests with Cramér's V were used for categorical adherence and the SES-education cross-tabulation; for the latter, a Monte Carlo exact test was used because of sparse cells.

Category-collapse checks (exploratory, post-hoc)

A linear contrast across the three ordinal categories and a Jonckheere-Terpstra test across the uncollapsed five categories, were performed after the omnibus analyses and interpreted only as descriptive checks on the collapse. Statistical significance was set at $P < 0.05$ (two-sided). The Holm-Bonferroni correction was applied across the primary family of tests (convergent association, BMAS ANOVA, adherence chi-square, SBP and DBP ANOVAs). Effect sizes (η^2) are reported with 95% confidence intervals.

Results

In the five-category classification, the sample was 69.4% Lower, 21.7% Middle, and 8.9% Upper, with the true extremes sparse (Upper $n=2$, 0.4%; Lower $n=44$, 9.5%). The upper SES range is therefore essentially untested, and the analytic 'Upper' group is overwhelmingly Upper-Middle. Analyses use the collapsed three categories (Lower $n=320$; Middle $n=100$; Upper $n=41$).

Table 3 Convergent association and exploratory health-related associations of the Bangladesh-adapted Kuppaswamy socioeconomic status scale in rural hypertensive adults

Comparator/outcome	n	Statistic (95% confidence interval)	Effect size	P	Note
Respondent education versus composite	446	rho = 0.25 (—)	—	<0.001	Weak; partly structural overlap; attenuated by range restriction
Respondent education versus occupation+income	446	rho=0.27 (0.18–0.36)	—	<0.001	Independent convergence; not an artefact of overlap
Socioeconomic status × education (3-cat)	446	$\chi^2=83.1$, df=4; Monte Carlo exact	Cramér's V=0.300	<0.001	22.2% cells expected <5; exact test confirms association
BMAS by SES mean (standard deviation)	443	Lower 18.3 (4.6); Middle 21.9 (4.2); Upper 22.9 (4.4)	$\eta^2=0.142$ (0.085–0.199)	<0.001 Levene 0.37 Middle vs upper 0.47	
Optimal adherence by SES	446	32.5% / 65.3% / 82.5%; $\chi^2=58.7$	Cramér's V=0.363	< 0.001	Survives Holm-Bonferroni
Systolic blood pressure by SES mean (standard deviation)	458	Lower 142.4 (19.5); Middle 141.3 (21.3); Upper 135.0 (18.5)	$\eta^2=0.011$ (0.000–0.035)	0.08 0.47	
Diastolic blood pressure by SES mean (standard deviation)	458	Lower 87.6 (11.9); Middle 88.5 (12.6); Upper 84.7 (10.7)	$\eta^2=0.006$ (0.000–0.025)	0.23 0.32	

Adherence and blood pressure are exploratory health-related outcomes, not criterion measures of SES; the cross-sectional design cannot establish predictive validity. BMAS: Bangladesh Medication Adherence Scale; n is different, because of missing values.

Component intercorrelation and weighting

The three components were positively but only modestly intercorrelated (Spearman rho: education–occupation 0.39, education–income 0.36, occupation–income 0.28; all $P < 0.001$), consistent with distinct but complementary indicators (Table 2). Factor Analysis using the Principal Component extraction method yielded one factor with eigenvalue above unity (59.2% of variance; KMO = 0.635; Bartlett's $P < 0.001$); as noted, this is expected for positively correlated inputs and does not establish construct validity. A PCA-weighted composite ranked participants almost identically to the fixed-weight composite (Spearman rho = 0.989); every participant classified Middle or Upper by the fixed weights fell in the upper third of the PCA-weighted distribution, and only 10 of 320 Lower-SES participants did, indicating that the fixed weights do not materially distort ranking.

Convergent association

The composite correlated weakly with respondents' own education (Spearman rho = 0.253, $P < 0.001$; ~6% shared variance) (Table 3). This association is only partly independent, as the comparator overlaps the composite's education component, and the restricted SES range attenuates correlations; correlating the comparator with the non-education sub-score gave a similar, marginally stronger value (rho=0.274, 95% CI 0.18–0.36), indicating the convergence is not merely structural. The SES–education crosstabulation was significant (Cramér's $V=0.300$; Monte Carlo exact $P < 0.001$; linear-by-linear $P < 0.001$) despite 22.2% of cells having expected counts < 5 , and the exact test confirms the association is not an artefact of sparse cells. No discriminant comparator was available.

Exclusion check: Untreated participants

The 15 untreated participants were distributed across SES categories ($X^2=0.84$, $P=0.66$). Given the small number and low power of this test, their exclusion is unlikely to have materially biased the SES–adherence association, though it cannot be excluded with certainty.

Exploratory health-related associations

Variance homogeneity held for all three outcomes (Levene's $P=0.37$, 0.47, 0.32), so standard ANOVA was appropriate; Welch's test gave the same conclusions. Medication adherence rose across SES categories ($F(2,443)=36.56$, $P < 0.001$, $\eta^2=0.142$, 95% CI 0.085–

0.199), but post hoc tests showed the Lower group differing from Middle and Upper ($P < 0.001$) while Middle and Upper did not differ ($P=0.47$)—a Lower-versus-rest pattern rather than a graded gradient. Optimal-adherence prevalence rose from 32.5% to 65.3% to 82.5% (Cramér's $V=0.363$, $P < 0.001$). Both adherence findings and the convergent association survived Holm–Bonferroni correction. Blood pressure showed no association with SES (SBP $P=0.08$; DBP $P=0.23$; $\eta^2 < 0.011$, intervals including zero) and did not survive correction; an exploratory post-hoc SBP linear contrast ($P=0.02$) is not interpreted given the null omnibus, trivial effect, and multiplicity.

Category-collapse checks

As post-hoc checks, a Jonckheere–Terpstra test across all five strata showed a significant ordered adherence trend (standardised $J-T=8.78$, $P < 0.001$), suggesting the dose–response pattern preceded the collapse. Because the true Upper stratum contained only two participants, all five-category estimates are unstable and are reported as descriptive only (Table 4).

Discussion

In this single rural sample, the three components of the adapted scale were positively intercorrelated, and fixed and empirically derived weights ranked participants almost identically. The composite showed a weak, only partly independent convergent association with respondents' education. It was associated with medication adherence mainly at the lower end of the distribution (Lower-versus-rest) rather than as a graded gradient, and showed no association with blood pressure.

Rationale and appropriateness of the adaptations

The Kuppaswamy scale was designed for the Indian population, and earlier Bangladeshi studies applied it with occupational categories from non-local frameworks and uncalibrated income cut-offs [21] Bangladesh has a large madrasa-educated population—over four million students, disproportionately rural [22]—so we built madrasa equivalence into the education domain and added an 'illiterate / incomplete primary education' category to reduce misclassification. Occupation was aligned with the national BSCO-2020 classification, and income bands were recalculated for the Bangladeshi economy with separate rural and urban columns. These changes aim to make the scale contextually

Table 4 Exploratory, post-hoc category-collapse checks (five-to-three) in Bangladesh-adapted Kuppaswamy socioeconomic status scale in rural hypertensive adults

Outcome	n	Test	Statistic	P	Note
BMAS ^a across all 5 strata	446	Jonckheere–Terpstra	$J-T=8.78$	< 0.001	Ordered trend present before collapse
BMAS continuous	443	Linear contrast (–1,0,1)	$t=6.09$	< 0.001	Direction retained after collapse
Mean systolic blood pressure	458	Linear contrast (–1,0,1)	$t=-2.27$	0.02	Weak; omnibus non-significant; interpret cautiously
Mean diastolic blood pressure	458	Linear contrast (–1,0,1)	$t=-1.44$	0.15	No trend
Adherence category	446	Linear-by-linear	$\chi^2=57.12$	< 0.001	Ordinal trend retained after collapse

These post-hoc analyses describe the behaviour of the collapse and are not independent corroboration of the index. Because the true Upper stratum contained only two participants, five-category estimates are unstable and are descriptive only. ^aBangladesh Medication Adherence Scale; n is different, because of missing values.

appropriate while leaving the original scoring weights unchanged for comparability. The adaptation was, however, a content-based exercise by the author team without external expert review or field piloting.

Relation to the wider Kuppuswamy literature

Kuppuswamy-based scale have rarely had their measurement properties tested directly; the Indian revisions [3–5, 23] have mainly updated income brackets rather than examined the scale statistically. That the three domains are positively intercorrelated is consistent with their treatment as complementary formative indicators [8, 9].

Treating the scale as formative has three practical implications for how it should be evaluated and used. First, the components are constitutive rather than interchangeable: education, occupation, and income each define part of socioeconomic position, so dropping or reweighting a domain changes the construct itself. Internal-consistency reliability and dimensionality statistics are therefore inappropriate as validation evidence, and a high or low Cronbach's alpha carries no meaning for this scale. Second, because the composite is a summary index rather than a reflective measure of a latent trait, appropriate evaluation rests on external and criterion evidence—chiefly agreement with an independent wealth or asset measure—rather than on internal structure; this is why the absence of a wealth criterion here is the central limitation, and why our intercorrelation and PCA results are presented as descriptive rather than validating. Third, the practical value of a formative SES index lies in ranking households consistently, which the near-identical ranking under fixed and empirical weights ($\rho=0.989$) supports: users can apply the simple fixed weights without loss of ranking accuracy.

Large multi-country surveys instead use a PCA-based asset wealth index as an external criterion [16, 17]—the independent comparator absent here. Our income bands were set by anchor-and-inflation adjustment rather than the formal consumer-price-index multiplication of recent Indian updates, [4, 5] a difference we treat as a limitation and a target for future refinement.

Implications for use of the adapted index

These findings offer cautious, preliminary support for use of the index in comparable rural Bangladeshi research, with important caveats. The weak convergent association suggests the composite is not redundant with respondent education, though range restriction limits this inference, and the absence of a blood-pressure association suggests the index relates more to health behaviour than to a downstream physiological outcome. The five-tier classification was not evaluated, and the urban income bands were not applied or evaluated and should not yet be used. Further evaluation in larger, more socioeconomically diverse rural and urban samples is required before routine use. For researchers wishing to apply the index, The Bangla version of the complete instrument is given in [Supplementary Table S1](#).

Limitations

This study had several limitations. There was no independent measure of household wealth to compare with the adapted SES scale, and the scale did not undergo formal expert or field validation. Income bands relied on an approximate inflation adjustment, and fieldwork lagged the 2021–2022 base year by 3–4 years. Our only comparator (education) overlaps the index's own education domain, narrowing the evidence base.

KMO (0.635) was modest, but the Factor Analysis was used descriptively, not as validity proof. No expert panel, Delphi process, or pilot testing was conducted.

Only $n=2$ fell in the Upper stratum, so the top tier and full five-category structure remain untested; we used a collapsed three-category version instead. SES reflects only the household head, not all members.

Reliability metrics don't apply to a formative, cross-sectional scale and self-reported outcomes may share common-method variance with SES. Findings come from one rural hypertensive sample and may not generalise.

Conclusion

In this single rural, hypertensive sample, the Bangladesh-adapted Kuppuswamy scale showed positive intercorrelation among its components, near-identical ranking under fixed and empirical weights, weak and only partly independent convergent association with education, and a modest association with medication adherence at the lower socioeconomic range. Together with a ready-to-use scoring instrument, these findings are promising but preliminary.

Further evaluation—across the full SES range, in urban as well as rural settings, and against an independent wealth criterion—is required before the scale can be recommended for routine use. Future work should collect an independent asset/wealth index to enable criterion evaluation of the income component; sample across the full SES range, including genuine upper-stratum households, to test the five-tier structure; re-derive the income bands using formal Bangladesh price-index data; evaluate the urban bands in an urban sample; and conduct a test–retest study.

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None

Author contributions

Concept or design of the work; or the acquisition, analysis, or interpretation of data for the work: MTI, MKU, MMHK, SMA, MAH. *Drafting the work or reviewing it critically for important intellectual content:* MTI, MKU, MMHK, SMA, MAH. *Final approval of the version to be published:* MTI, MKU, MMHK, SMA, MAH. *Accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved:* MTI.

Conflict of interest

We do not have any conflict of interest.

Data availability statement

We confirm that the data supporting the findings of the study will be shared upon reasonable request.

AI disclosure

We used an AI-based assistant to support language editing and reference formatting during manuscript preparation. All study design, data collection, analyses, interpretations, and final content were performed and verified by the authors, who take full responsibility for the work.

Supplementary file

Supplementary Table S1

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