







A Preliminary Assessment of The B40 Economic Well-Being Measurement Instrument: Validity, Reliability, and Normality Tests

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Abstract. This research introduces and tests a concise measurement tool designed to assess the economic well-being of B40 households in the post-COVID-19 environment. The instrument encompasses three core constructs: Financial Well-Being (FWB), Daily Spending Pattern (DSP), and Basic Government Effectiveness (BGE). Expert evaluation confirmed content validity, while pilot data from 42 respondents demonstrated strong internal reliability. The Cronbach's alpha values obtained were 0.94 (FWB), 0.78 (DSP), and 0.83 (BGE), indicating satisfactory to excellent consistency. Normality diagnostics using Kolmogorov–Smirnov and Shapiro–Wilk tests produced p-values below 0.05, supported by non-Gaussian trends observed in Q-Q plots and boxplots. Consequently, subsequent analyses employed non-parametric techniques. Overall, the pilot results verify the tool's suitability for broader empirical use and its potential contribution to evidence-based policies addressing the economic conditions of low-income households.

Keywords: Economic Welfare, B40, Validity, Reliability, Normality, Non-Parametric Statistics.

1 Introduction

Robust measurement is essential when profiling household welfare, particularly for Malaysia's B40 community. Two aspects are central: (i) whether the instrument covers the intended domain (content validity) and (ii) whether responses are internally consistent (reliability). In socio-economic datasets, variables such as income often deviate from normality; hence, procedures that do not assume Gaussian distributions are advisable (Field, 2013; Ghasemi & Zahediasl, 2012). This paper presents a preliminary validation of an Economic Well-being (EWB) instrument, documenting its reliability and distributional features. The pilot assessment serves as a foundational step prior to the full-scale validation involving a larger B40 sample (N = 390).

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2 Objectives of The Study

This study aims to:

1. Establish content validity of the EWB instrument spanning FWB, DSP, and BGE.
2. Assess internal consistency (Cronbach's α) for the three constructs.
3. Examine distributional properties to guide appropriate statistical tests.

3 Literature Highlights

3.1 Content validity

Content validity ensures that items comprehensively map to the construct of interest. For B40 welfare, prior work highlights financial position, spending behaviours, and policy support as key facets (Adi Jafar et al., 2021; Bank Negara Malaysia, 2022; Department of Statistics Malaysia, 2021). Expert review is a standard method for verifying coverage and adequacy of wording (DeVellis, 2016).

3.2 Reliability of instruments

Cronbach's α commonly indexes internal consistency; thresholds of ≥ 0.70 are generally adequate, ≥ 0.80 high, and ≥ 0.90 excellent in social research (DeVellis, 2016; Basu, 2021). Pilot testing on the target population before main data collection is recommended (Field, 2013).

3.3 Normality assessment

To examine the data distribution, normality was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk procedures. The result of these tests guided the selection of appropriate analytical techniques. Because income-related variables often display skewness, non-parametric methods such as Mann-Whitney U, Kruskal-Wallis H, and Spearman's rho tests were considered more suitable for subsequent analysis (Ghasemi & Zahediasl, 2012; Field, 2013). Accordingly, these theoretical perspectives informed the conceptualisation and operationalisation of the three core constructs; Financial Well-Being, Daily Spending Pattern, and Basic Government Effectiveness.

4 Methodology

4.1 Respondent background

A pilot study involved 42 B40 respondents from two settings: the Klang Valley (urban) and Sik, Kedah (semi-urban). Most were aged 35–54 (61.9%). The mean household income was RM 2,489.70; 76.2% of respondents reported receiving government assistance. Employment status comprised full-time (34.1%), self-employed (26.7%), unemployed (15.1%), home-based (11.3%), part-time (8.5%), and retired (4.4%).

4.2 Research Design

A quantitative survey using a structured questionnaire captured perceptions related to economic well-being in the post-pandemic period.

4.3 Sampling

Phase 1 comprised the pilot ($n = 42$). Phase 2 will extend to 390 purposively selected respondents representing diverse socio-economic contexts across the two locations. The pilot sample size of 42 respondents is consistent with methodological recommendations suggesting that 30 - 50 cases are adequate for preliminary reliability and instrument testing prior to large-scale data collection (DeVellis, 2016).

4.4 Instrument structure

The research utilised a structured questionnaire as the primary data-collection tool. The instrument consisted of four major components:

- **Section A:** Respondents' profile, covering demographic, socioeconomic, and employment information.
- **Section B:** Financial well-being (FWB).
- **Section C:** Daily spending patterns (DSP).
- **Section D:** Basic Government Effectiveness (BGE).

Sections B to D employed items rated on a four-point Likert scale, where responses ranged from 1 (*Strongly Disagree*) to 4 (*Strongly Agree*). Prior to field implementation, the instrument underwent expert validation to refine the wording and ensure conceptual accuracy. A pilot run was subsequently implemented to verify the clarity, reliability, and overall suitability of the questionnaire items for the main study (DeVellis, 2016).

4.5 Theoretical Framework and Instrument Validity

This study is anchored on three key theoretical perspectives: Neoclassical Economics Theory, Welfare Economics Theory, and Structuralist Theory to explain the main determinants that influence household living costs in Malaysia. The Neoclassical Economics Theory, advanced by *William Stanley Jevons*, *Carl Menger*, and *Léon Walras*, underscores the role of market forces in determining price levels through the interaction between supply and demand (Jevons, 1871; Menger, 1950; Walras, 1954). In this research, the framework serves to interpret how fundamental economic indicators such as inflation, income, and market pricing shape household expenditure patterns, particularly concerning housing affordability.

The Welfare Economics Theory, proposed by *Arthur Cecil Pigou* in *The Economics of Welfare* (1920), connects income distribution, resource allocation, and social well-being. This perspective offers a conceptual basis for understanding how fluctuations in living costs affect the welfare and satisfaction of households. Meanwhile, the Structuralist Theory, articulated by *Raúl Prebisch* and *Celso Furtado*, focuses on structural inequalities within the economic system that sustain developmental and social disparities (Prebisch, 1950; Furtado, 1964). Within the context of this study, the framework is applied to examine how socioeconomic imbalances and policy decisions collectively influence the cost-of-living burden faced by low-income groups.

To ensure alignment between theory and measurement, these frameworks guided the design of the questionnaire. The instrument subsequently underwent expert evaluation by economists and social scientists, confirming that all items were conceptually valid, empirically grounded, and consistent with the constructs of the study.

4.6 Measurement stability check (Reliability)

The researcher conducted a pilot test with 42 respondents to assess the reliability of the instrument's items across the three constructs. Accordingly, Table 1 presents the following findings:

Table 1. Cronbach's alpha by Construct.

Construct	Cronbach's alpha (α)	Interpretation
Financial Well-Being	0.94	Excellent
Daily Spending Pattern	0.78	Acceptable
Basic Government Effectiveness	0.83	High

Table 1 presents the results of a preliminary study conducted with 42 respondents to evaluate the reliability of the investigator-developed questionnaire. Cronbach's alpha (α) was employed to examine the internal consistency of three primary constructs. The analysis revealed that the Cronbach's alpha coefficients ranged from 0.78 to 0.94.

Specifically, the Financial Well-Being (FWB) construct demonstrated excellent reliability ($\alpha = 0.94$), and the Daily Spending Pattern (DSP) construct indicated acceptable reliability ($\alpha = 0.78$). In contrast, the Basic Government Effectiveness (BGE) construct achieved high reliability ($\alpha = 0.83$). These findings confirm that all three constructs possess satisfactory internal consistency, thereby supporting their suitability for application in the main study. The interpretation of the Cronbach's alpha value for this study is the interpretation scale suggested by DeVellis (2016), as shown in Table 2:

Table 2. Cronbach's Alpha Score Interpretation Schedule.

Cronbach's alpha (α) score	Level of Reliability	Interpretation
≥ 0.90	Very High	Excellent reliability
0.80-0.89	High	Good reliability
0.70-0.79	Low	Adequate reliability
0.60-0.69	Low	Weak reliability
0.50-0.59	Not acceptable	Very weak reliability
< 0.50	Not acceptable	Very weak reliability

Table 2 provides the interpretation scale for Cronbach's alpha values, where coefficients exceeding 0.80 demonstrate a high level of reliability, while values above 0.70 are commonly recognized in social science research. This guideline, all constructs in the present study demonstrate satisfactory internal consistency. These findings further confirm that the instrument is stable, reliable, and appropriate for application in the main study.

4.7 Data Normality Test (Normality)

To verify the suitability of the dataset for further statistical analysis, assessments of normality were carried out for the principal constructs of the instrument, Financial Well-Being (FWB), Daily Spending Pattern (DSP), and Basic Government Effectiveness (BGE). The Kolmogorov-Smirnov and Shapiro-Wilk tests were employed on the household income variable, which represented the overall data structure for these constructs (Field, 2013). Both tests produced significance levels of $p = 0.000$, $p = 0.000$, falling below the conventional criterion of 0.05 (Ghasemi & Zahediasl, 2012). This outcome indicates that the distribution of the data deviates from normality, leading to the rejection of the null hypothesis (H_0) that assumes a normal distribution.

Visual examinations of the histogram further supported this finding, showing a non-normal distribution pattern. Accordingly, non-parametric statistical techniques, including the Mann-Whitney U, Kruskal-Wallis H, and Spearman's rank correlation,

were selected as the most suitable analytical approaches, depending on the nature of the data and research objectives (Field, 2013). These procedures provide a more reliable interpretation of the results by accommodating the non-parametric characteristics of the dataset.

Table 3. Normality Test Results for the Income Variable

Test	Statistics	df	Sig. (p-value)	Interpretation
Kolmogoro v-Smirnov	0.207	42	0.00	The distribution is not normal.
Shapiro- Wilk	0.823	42	0.00	The distribution is not normal.

Table 3 presents the outcomes of the normality assessments. Both the Kolmogorov–Smirnov and Shapiro-Wilk test produced significance values of $p = 0.000$, which are below the conventional threshold of 0.05. These findings indicate that the household income variable deviates from a normal distribution, leading to the rejection of the null hypothesis (H_0) for normality. Visual inspections through the histogram further supported this conclusion. Given that household income served as the key representative variable, subsequent analyses employed non-parametric statistical procedures, namely the Mann-Whitney U test, Kruskal-Wallis H test, and Spearman’s rank correlation selected according to the study objectives and data characteristics. The interpretation of these normality test results is consistent with the guidelines proposed by Field (2013), as summarized in Table 4.

Table 4. Interpretation of Normality Test Decision (Shapiro-Wilk and Kolmogorov-Smirnov)

P-value	Interpretation
$p > 0.05$	Dataset follows a normal distribution
$p \leq 0.05$	Dataset does not follow a normal distribution.

Source: Ghasemi and Zahediasl (2012).

a. Histogram of Income

Figure 1 presents the histogram depicting the frequency distribution of respondents’ household incomes across defined ranges. The distribution displays a marked imbalance, with a concentration of respondents in the lower income categories, indicating a left-skewed pattern. This suggests that the data are not symmetrically or normally distributed. In contrast, a normally distributed dataset would exhibit a bell-shaped curve, which is clearly absent in Figure 1.

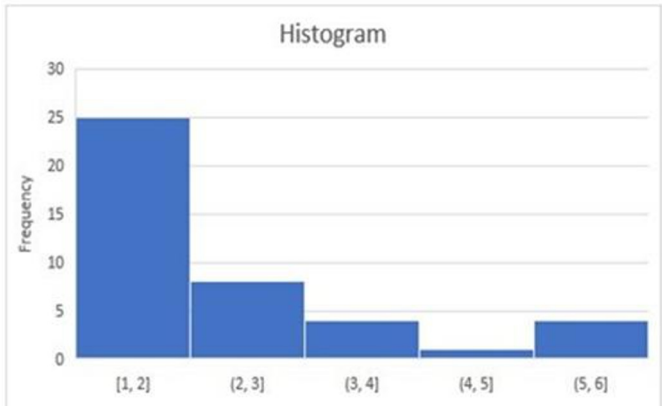


Fig. 1. Histogram of Population Income

b. Standard Q-Q Plot of Income

Figure 2: The Q–Q plot illustrates the comparison between the observed income values and the theoretical quantiles expected under a normal distribution. The plotted points deviate from the reference diagonal, particularly at the upper tail, indicating that the income distribution differs from the normal pattern. In a truly normal distribution, these data points would be positioned closely along the diagonal reference line; however, such alignment is not observed in this case.

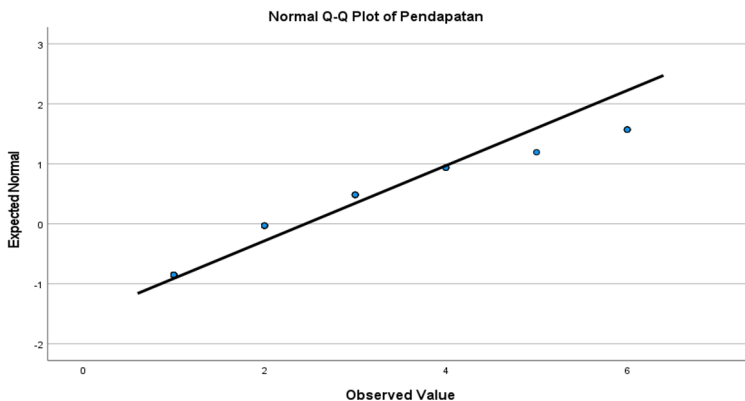


Fig. 2. Normal Q-Q Plot of Population Income

c. Detrended Normal Q-Q Plot of Income

As illustrated in Figure 3, the detrended Q-Q plot depicts how the observed income data diverge from the theoretical expectations of a normal distribution. The plotted points fluctuate around the zero baseline, showing larger deviations at both the upper and lower ends. This pattern indicates a noticeable departure from normality, particularly where higher-income observations display distinct positive shifts. Under a normal distribution, the data points would be closely aligned and nearly horizontal along the zero axis. The observed divergence, therefore, confirms that the income variable fails to meet the normality assumption.

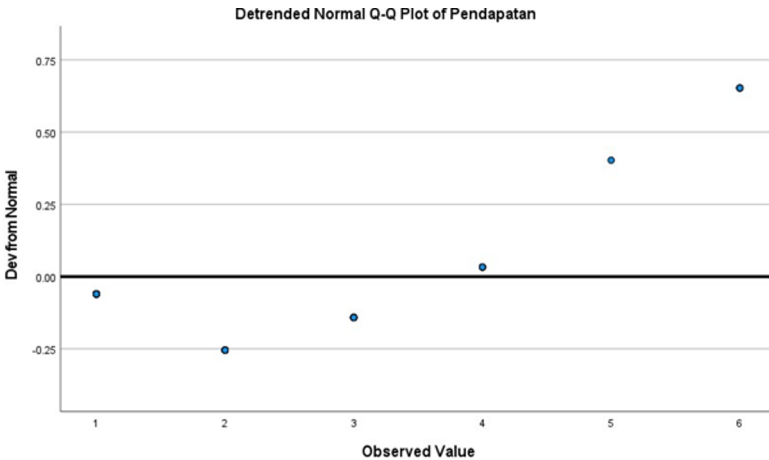


Fig. 3. Detrended standard Q-Q plot of income

d. Boxplot of Revenue

In Figure 4, the boxplot offers a concise visual overview of the income distribution, highlighting both the median and the overall range of values. The median line, located nearer to the lower boundary of the box, indicates that the distribution is asymmetric. Additionally, the upper whisker extends further than the lower one, reflecting a left-skewed (negatively skewed) tendency. Although no clear outliers are visible, the general configuration of the boxplot suggests that the income data are unevenly distributed and concentrated toward one side.

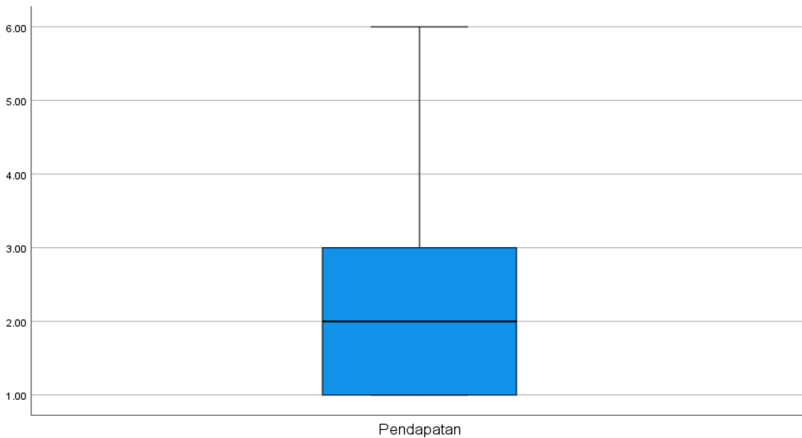


Fig. 4. Boxplot of population income

When assessed through all four visual methods, namely the histogram, Q-Q plot detrended Q-Q plot, and boxplot the income distribution revealed evident skewness and asymmetry, indicating irregularity from the expected normal pattern. These graphical outcomes collectively confirm that the income variable does not exhibit normality. Accordingly, non-parametric techniques were deemed more appropriate for subsequent statistical analysis.

5 Discussion

5.1 Instrument Validity

The questionnaire used as the main instrument in this study underwent a systematic validation process by subject-matter experts to establish both face validity and content validity. Each item was carefully examined to ensure clarity, contextual appropriateness, and alignment with the foundational theoretical perspectives utilized in this study, namely neoclassical economic theory, economic welfare theory, and structuralist theory. The validation results confirmed that all items were relevant, comprehensible, and theoretically consistent with the constructs measured.

5.2 Instrument Reliability

The reliability of the research instrument was evaluated using data from a pilot study involving 42 respondents. Cronbach's alpha coefficients were calculated for each construct. The Financial Well-Being (FWB) construct demonstrated excellent reliability with $\alpha = 0.94$, the Daily Spending Pattern (DSP) construct achieved acceptable reliability with $\alpha = 0.78$, and the Basic Government Effectiveness (BGE) construct showed high reliability with $\alpha = 0.83$. Consistent with psychometric conventions cited in prior literature, alpha values above 0.70 are considered acceptable for social science studies,

values above 0.80 indicate high reliability, and those above 0.90 reflect excellent internal consistency (DeVellis, 2016; Basu, 2021). Based on these guidelines, the results confirm that all three constructs possess satisfactory internal consistency, further supporting the stability and suitability of the instrument for application in full-scale studies.

5.3 Normality Test

Normality of the income variable was evaluated using the Kolmogorov-Smirnov and Shapiro-Wilk procedures. Both analyses produced significance levels of $p < .001$, well below the accepted 0.05 criterion, indicating a statistically significant deviation from normality. Supporting visual diagnostics, including the histogram, Q-Q plot, detrended Q-Q plot, and boxplot consistently showed that the data did not follow a bell-shaped distribution.

Because the assumption of normality was violated, the study proceeded with non-parametric analytical techniques. Accordingly, the Mann-Whitney U, Kruskal-Wallis H, and Spearman's rho correlation tests were selected in line with the research objectives data structure. This methodological decision reflects established statistical recommendations emphasizing the stability and robustness of non-parametric approaches when normal distribution assumptions are not satisfied (Field, 2013; Ghasemi & Zahediasl, 2012).

5.4 Overall Discussion and Limitations

This study undertook a comprehensive assessment of the psychometric soundness of the instrument designed to measure three central constructs of economic well-being among Malaysia's B40 households in the post-COVID-19 period: Financial Well-Being (FWB), Daily Spending Pattern (DSP), and Basic Government Effectiveness (BGE). The computed Cronbach's alpha values, 0.94 for FWB, 0.78 for DSP, and 0.83 for BGE, indicate a high to excellent degree of internal consistency, thereby supporting the reliability and stability of the instrument. These outcomes correspond with established methodological standards, which recognize alpha coefficients above 0.70 as satisfactory for research in the social sciences (DeVellis, 2016; Basu, 2021).

The assessment of normality was carried out using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Both analyses revealed that the household income variable did not satisfy the normality assumption ($p < 0.05$). Graphical evaluations through the histogram, Q-Q plot, detrended Q-Q plot, and boxplot reinforced this outcome. Therefore, the study adopted non-parametric analytical procedures, including the Mann-Whitney U, Kruskal-Wallis H, and Spearman's rho tests, which are widely recommended for datasets that deviate from normal distribution patterns (Field, 2013; Ghasemi & Zahediasl, 2012).

The results further show that the income distribution among B40 households is markedly skewed, with most respondents concentrated in the lower-income range. This observation is consistent with the principles of neoclassical economic theory, which explain how market disequilibrium contributes to disparities in income and cost-of-living burdens (Jevons, 1871; Menger, 1950; Walras, 1954). It also aligns with

structuralist perspectives, emphasizing that systemic inequalities directly influence household well-being, particularly among vulnerable groups such as the B40, who remain susceptible to economic constraints and limited policy impact (Prebisch, 1950; Furtado, 1964).

Moreover, insights into daily expenditure patterns and perceptions of government policy effectiveness obtained from this instrument provide a clearer understanding of the challenges faced by B40 households in the aftermath of the COVID-19 pandemic. These results offer valuable implications for policymakers, providing an evidence-based foundation for designing more targeted and comprehensive strategies to address living costs and enhance economic well-being among low-income communities.

Overall, the study establishes a robust foundation for subsequent large-scale research using this validated and reliable instrument. Nevertheless, several limitations should be acknowledged. The pilot test was conducted with a relatively small sample size and restricted geographical coverage (Klang Valley and Sik, Kedah). Future studies are therefore encouraged to expand the sampling frame across different regions of Malaysia and to include larger, more diverse populations to enhance the generalizability, reliability, and accuracy of the findings.

Although the pilot study was limited by a small sample size ($N = 42$) and restricted geographical coverage, its primary purpose was to conduct preliminary reliability and distributional assessments. These limitations are explicitly addressed in the subsequent main study, which involves a substantially larger sample ($N = 390$) drawn from more diverse socio-economic backgrounds. The expanded sample size enhances statistical power, improves population representativeness, and allows for more robust validation of the instrument. Consequently, findings from the main study are expected to offer stronger generalisability and empirical support for policy-relevant conclusions.

6 Conclusions

The study concludes that the developed instrument designed to assess the economic well-being of B40 households demonstrates both validity and reliability. These qualities were confirmed through expert evaluation and satisfactory reliability indices. The normality assessment revealed that the dataset deviated from the normal curve, thereby supporting the selection of non-parametric analytical procedures. Collectively, these results affirm the methodological soundness of the study, particularly in relation to construct validity, internal consistency, and the suitability of the statistical approach adopted. This work establishes a solid empirical foundation for future large-scale and policy-oriented investigations aimed at enhancing the economic well-being of low-income households. It is recommended that subsequent studies broaden the geographical scope and increase the sample size to improve generalisability. Furthermore, longitudinal approaches may yield deeper insights into changing financial behaviours and the long-term policy effects on the B40 population.

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Disclosure of Interests. The authors declare no competing interests.

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