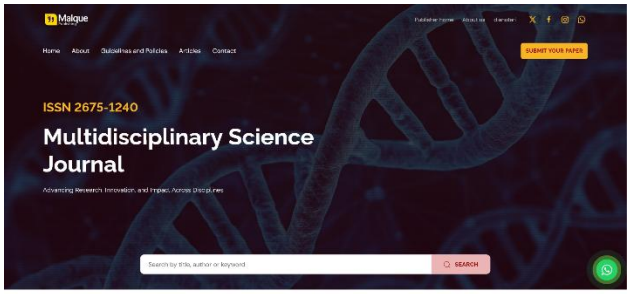
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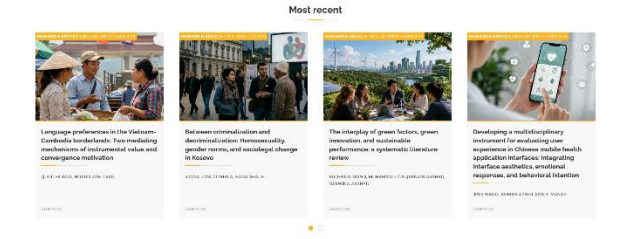


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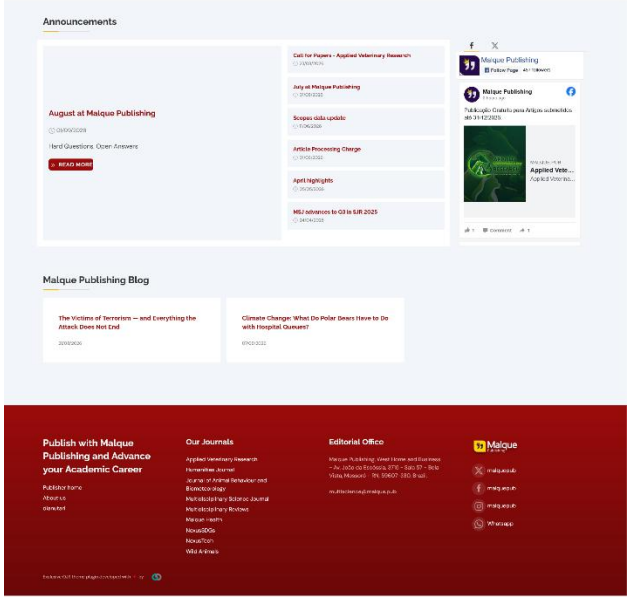




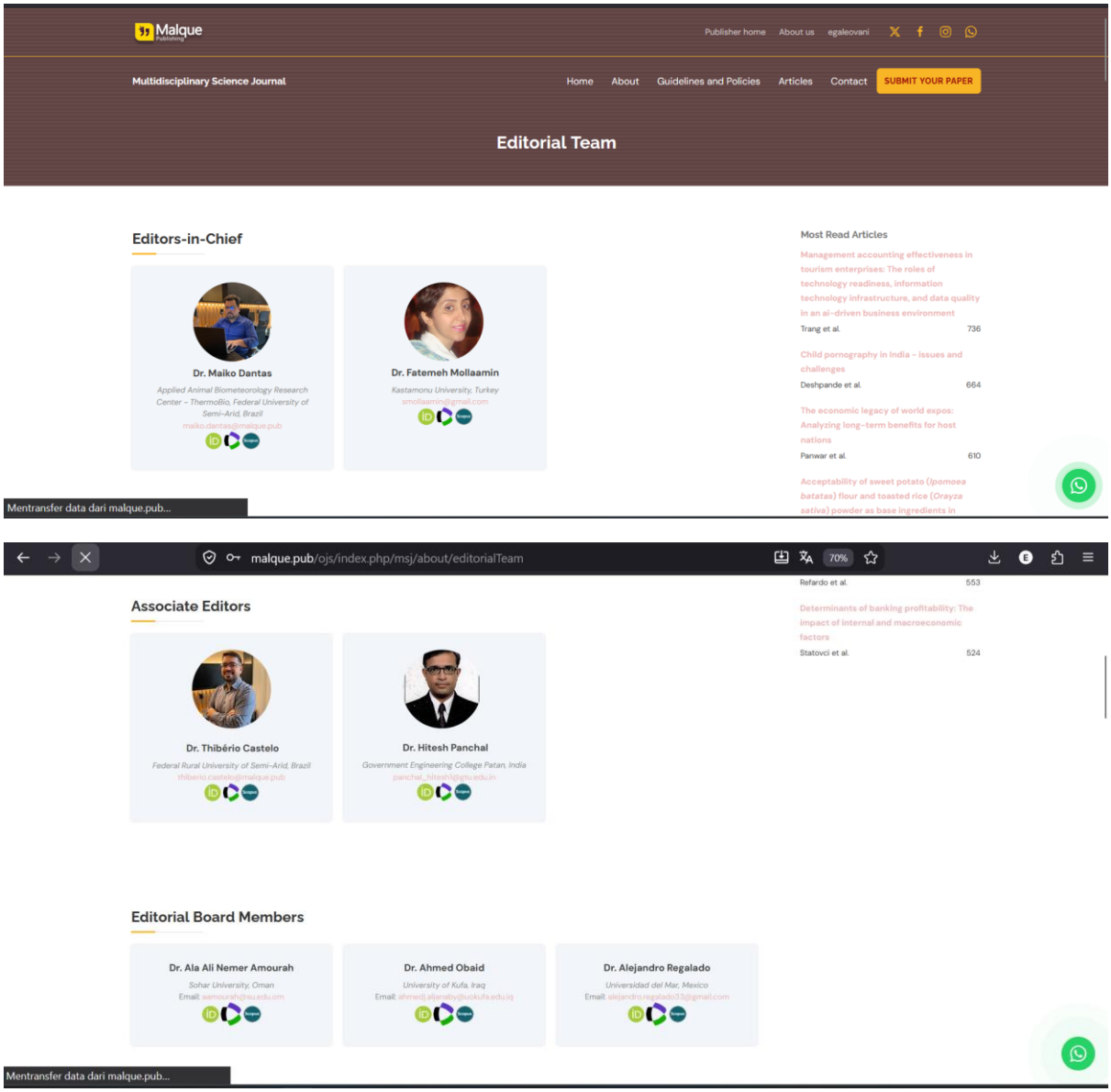


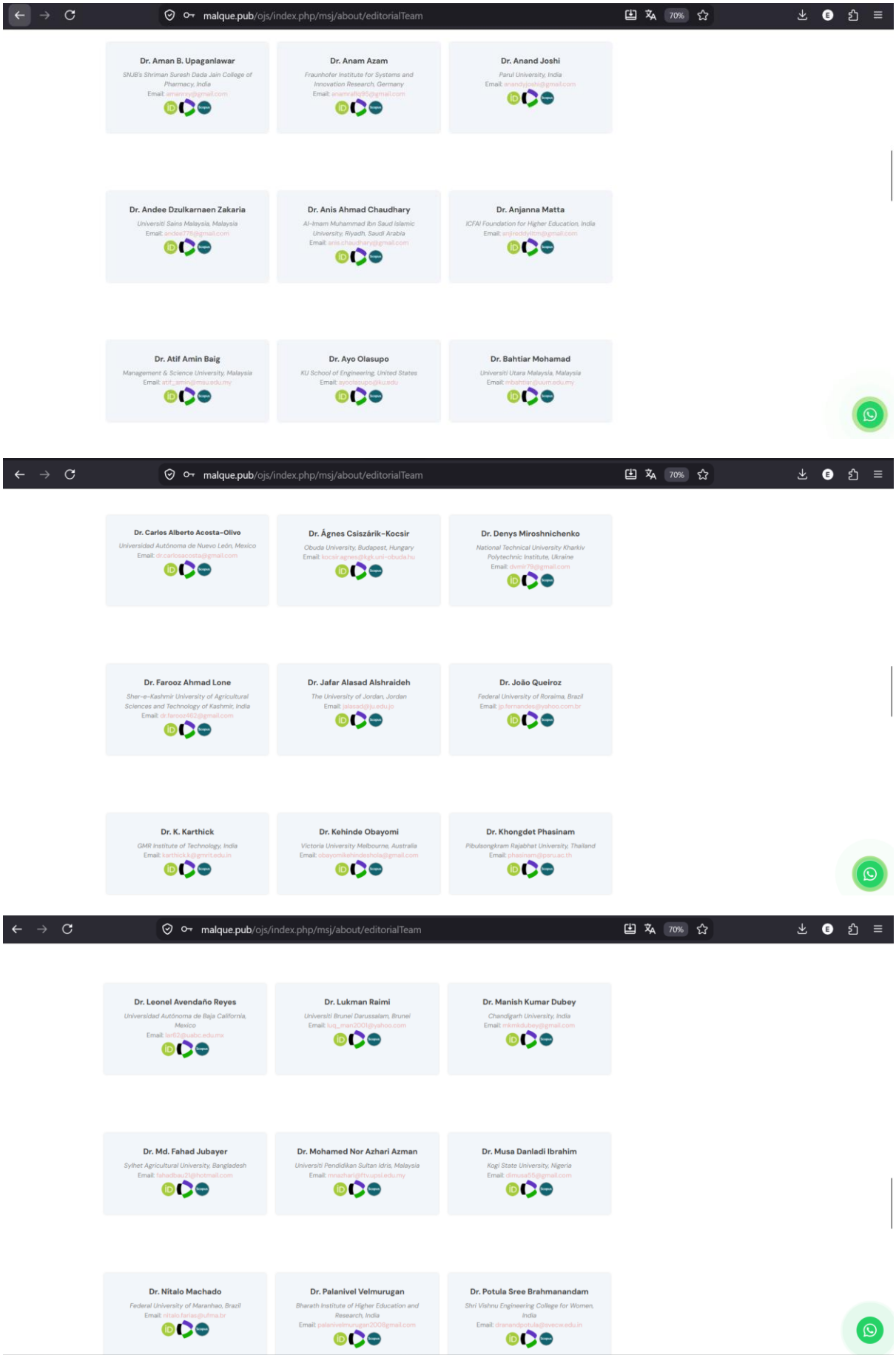


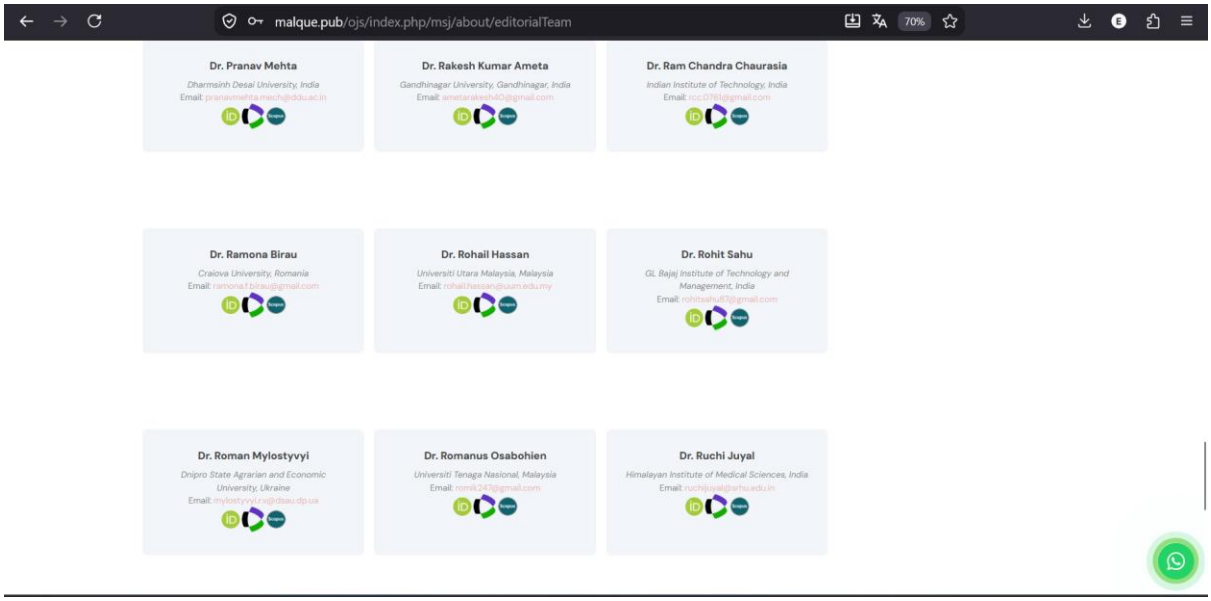


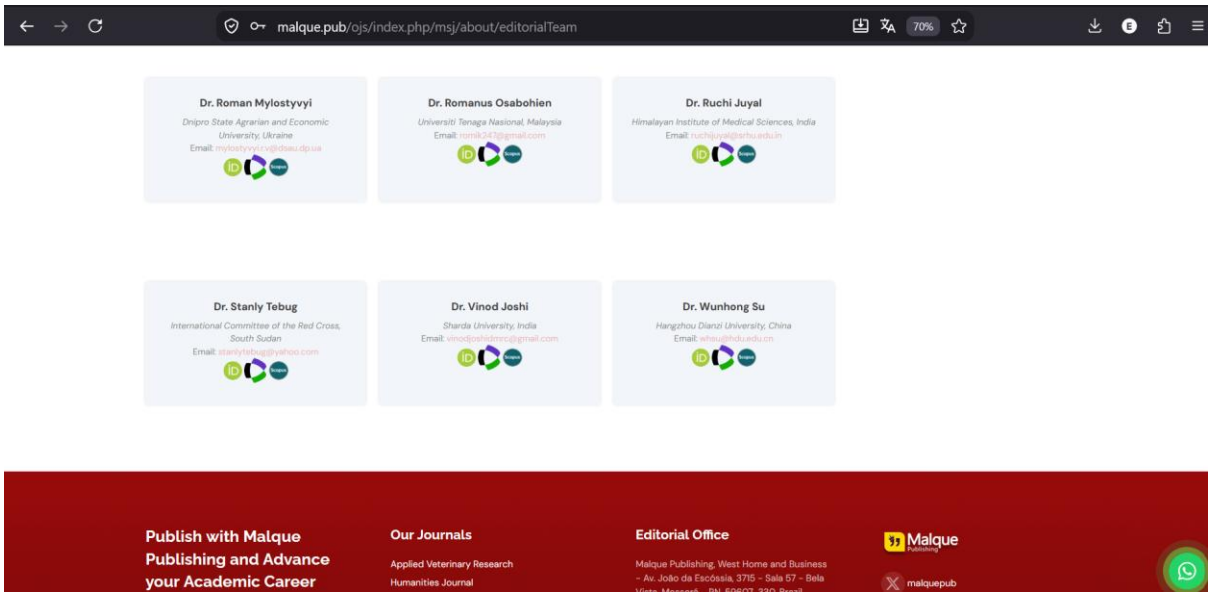


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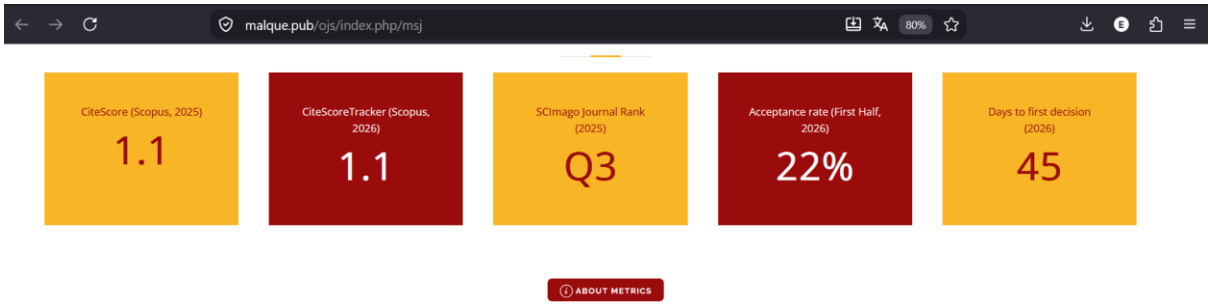



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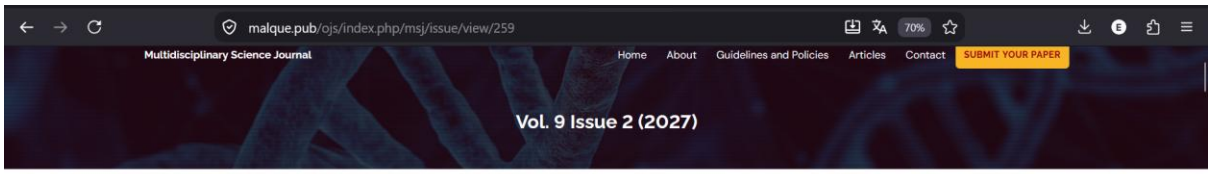

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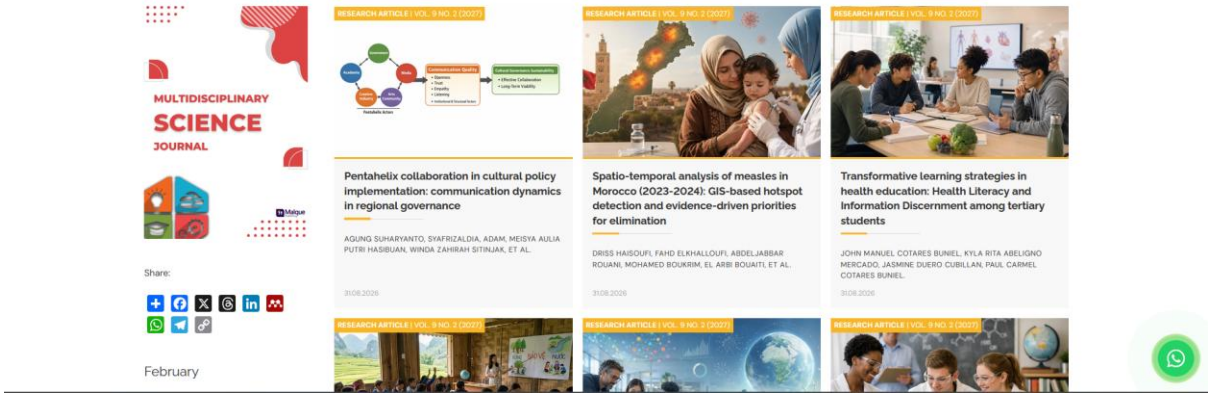

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Developing instrument to measure the glass ceiling phenomenon among female academics in Indonesia

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Abstract The persistence of the glass ceiling phenomenon in academia indicates the necessity of developing a contextually valid and reliable measurement instrument, particularly within Indonesian higher education institutions. Instruments developed in different cultural settings are often unable to fully capture the structural and sociocultural dynamics influencing female academics' career advancement in Indonesia. This study aims to develop and validate a comprehensive measurement instrument that reflects these contextual specificities and improves measurement accuracy in assessing career advancement barriers. A quantitative research design was employed using a survey approach. Instrument development was conducted through the integration of two established questionnaires originating from India and Europe, followed by contextual adaptation. Data were collected from female lecturers employed at Catholic universities in Indonesia. The two preliminary questionnaires were administered to the same initial group of female academics. For the final validation, the integrated instrument was administered to the initial respondents together with additional participants, resulting in a larger validation sample. The measurement model was evaluated using confirmatory factor analysis (CFA) with SmartPLS. Reliability and validity were assessed through composite reliability, Cronbach's alpha, average variance extracted, and discriminant validity criteria. The findings indicate that the newly developed instrument demonstrates strong reliability and validity across all dimensions, with acceptable thresholds achieved for composite reliability and convergent validity. Compared to the adapted international instruments, the final instrument exhibits higher cultural relevance and improved measurement precision. Several dimensions were more accurately captured, particularly those related to organizational culture, informal networks, and discriminatory promotion practices, indicating a stronger alignment with the Indonesian academic environment. The study contributes to the refinement of measurement approaches in gender-related research by providing a robust and context-sensitive instrument. The instrument is expected to support future empirical studies and institutional policy evaluations aimed at reducing gender disparities in academic career advancement and leadership positions in Indonesia, while also enabling more accurate diagnosis of structural and cultural barriers.

Keywords: gender inequality, female academics, Indonesia, career advancement

1. Introduction

The *glass ceiling* phenomenon refers to invisible yet pervasive barriers that prevent women from reaching managerial or leadership positions across various professional sectors (Tyrowicz et al., 2020). Despite the introduction and implementation of gender equality policies in many organizations, women continue to experience discrimination that limits their career advancement (Radcliffe et al., 2023). One of the most compelling indicators of this phenomenon is the underrepresentation of women in decision-making positions, particularly at the executive and managerial levels, despite the significant increase women's participation in the workforce (Saitova & Di Mauro, 2021). This highlights the need for more focused and in-depth strategies to understand the factors that constrain women's career progression, especially in the higher education sector (Cruz-Castro & Sanz-Menendez, 2021).

In academia, female faculty members face similar challenges. A growing body of literature has documented the persistent gender gap in academia, where women remain underrepresented in senior faculty and leadership positions (Okpara et al., 2005). According to Cruz-Castro and Sanz-Menendez (2021); Ferri et al. (2022), while women's participation in higher education as students and junior faculty members has increased over the decades, their advancement to senior leadership roles remains disproportionately low, particularly in research-intensive universities (Okpara et al., 2005). This "leaky pipeline" phenomenon is attributed to various factors, including discriminatory practices in promotions, lack of mentorship, and exclusion from key decision-making networks (Gasser & Shaffer, 2014; Ysseldyk et al., 2019).

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Studies by Joseph (2021) in the banking sector have demonstrated that women continue to face difficulties in gaining equal recognition with men in managerial positions, even in heavily regulated industries such as banking. Their research underscores that even with policies in place, women often need to work harder to achieve the same level of recognition as their male counterparts do. Similarly, Babic and Hansez (2021) reported that the *glass ceiling* has a significant effect on the work-life balance of women in Europe, with women often carrying a heavier double burden than men due because of family responsibilities and workplace expectations.

In the Indonesian context, particularly within Catholic higher education institutions affiliated with the Association of Catholic Higher Education Institutions (APTIK), female academics operate within a unique environment shaped by the interaction of institutional values, organizational governance, and sociocultural expectations. According to the APTIK Guidelines on Identity and Mission, Catholic higher education institutions are expected to promote human dignity, holistic human development, solidarity, social responsibility, and non-discriminatory institutional practices (APTIK, 2023). These principles are consistent with the mission of Catholic universities articulated in *Ex Corde Ecclesiae*, which emphasizes respect for human dignity, service to society, and the integration of faith and reason within academic life (Pope John Paul II, 1990). At the same time, women's career development in Indonesia continues to be influenced by traditional gender norms. One of the most prominent concepts is *kodrat perempuan*, which reflects socially embedded expectations regarding women's roles as wives, mothers, and primary caregivers. The construction of *kodrat perempuan* is influenced by the interaction of religious teachings, cultural traditions, social institutions, and broader societal values (Kusmana, 2014). Consequently, female academics may experience career advancement challenges arising not only from organizational structures but also from the intersection of religious institutional values, traditional gender expectations, and academic governance systems. Such conditions may produce manifestations of the glass ceiling that differ from those reported in Western higher education settings and therefore require contextually appropriate measurement instruments.

The concept of the *glass ceiling* was first popularized in the 1980s to describe the unseen barriers that prevent women from ascending to top-level positions in corporate and professional settings (Hymowitz & Schellhardt, 1986). Over the years, this concept has evolved to encompass not only overt discrimination but also subtle forms of gender bias embedded within organizational cultures and policies. According to Eagly and Karau (2002), compared with men, women often face a labyrinth of obstacles, including prejudiced evaluations of their leadership abilities and fewer opportunities for advancement. This is compounded by the intersection of personal and professional responsibilities, particularly for women in academia, who often balance teaching, research, and administrative duties alongside family care (Eagly & Karau, 2002).

In higher education, the literature identifies several key barriers that contribute to the *glass ceiling* effect. For instance, lack of access to leadership training, exclusion from informal networks, and an unequal distribution of resources are recurring themes (Heymann et al., 2023). Gendered organizational cultures and stereotypes about women's leadership capabilities also play significant roles in limiting women's advancement to higher academic positions (Barry et al., 2020). These factors indicate the necessity of not only addressing institutional policies but also reshaping cultural attitudes within academic environments (Kholis, 2017). Despite the proliferation of research in Western contexts, few studies have focused on the challenges faced by women in higher education in Indonesia (Kholis, 2017). The scarcity of contextually relevant research tools hinders the understanding of how *glass ceiling* dynamics operate in Indonesian academic institutions, particularly those with religious affiliations. This research addresses this gap by developing and validating two instruments specifically designed to measure the *glass ceiling* phenomenon among female academics in Indonesia.

This study fills a significant gap in the literature by developing tools that assess the specific challenges faced by women in academic leadership within Indonesia's unique cultural and organizational context. While numerous studies have investigated the *glass ceiling* in Western academia, research focusing on Indonesian universities, particularly within religiously affiliated institutions, where cultural norms and gender expectations can further hinder women's career progression is lacking.

The urgency of this research lies in the need to develop valid and reliable measurement tools that can capture both internal and external factors contributing to the *glass ceiling*. Internal factors include self-confidence, educational qualifications, and perceived promotion opportunities, whereas external factors include organizational gender culture, access to informal networks, and discrimination in promotion processes. The comprehensive approach taken in developing these instruments ensures that they are attuned to the specific dynamics of Indonesian academia, where societal and cultural norms significantly influence women's career trajectories. By rigorously testing these two instruments, the final tool that is both valid and reliable, capable of measuring the *glass ceiling* phenomenon among female lecturers in Indonesia is developed. This new instrument provides a holistic approach to understanding the structural and cultural barriers faced by women in academia, enabling more effective policy-making to address gender inequalities.

The instruments developed through this research are expected to make significant contributions to higher education policy. By providing reliable data on the challenges women face in reaching leadership positions, this research can guide universities in identifying areas where interventions are needed. Institutions can use these findings to design more inclusive policies related to promotion, mentorship, and professional development. Additionally, the instrument will serve as a valuable tool for tracking gender equality progress across various educational sectors in Indonesia, and potentially other countries with similar sociocultural dynamics.

2. Materials and Methods

A quantitative research design was employed and a survey method was used to develop, validate, and assess the reliability of measurement instruments for the glass ceiling phenomenon among female lecturers in Indonesia. The primary objective was to construct an instrument capable of capturing multidimensional barriers to academic career progression. The research was conducted in three sequential phases, with each phase refining the instrument based on empirical evaluation. Indicators retained for the integrated instrument were selected based on psychometric performance, theoretical relevance, and expert evaluation. Therefore, indicator selection was not determined solely by the results of a single preliminary assessment.

2.1. Participants and Sampling

Participants were female academics employed at Catholic universities affiliated with the Association of Catholic Higher Education Institutions (APTIK) in Indonesia. During the preliminary instrument development stage, a sample of 102 female academics was recruited to evaluate two alternative questionnaires derived from different theoretical sources. The same respondents completed both questionnaire A and questionnaire B, allowing direct comparison of indicator performance within a common sample. The purpose of this stage was instrument refinement and indicator screening rather than theory testing. Subsequently, an integrated instrument was developed using indicators that demonstrated satisfactory psychometric performance and theoretical relevance. The integrated instrument was then administered to an independent validation sample consisting of 371 female academics to confirm its reliability and validity. The larger validation sample was intended to provide stronger evidence regarding the psychometric properties of the final instrument and exceeded commonly recommended sample sizes for confirmatory measurement validation (Hair et al., 2019; Kline, 2023).

2.2. Instrument Development

Instrument development was conducted through three stages. The first stage involved the preliminary assessment of questionnaire A, adapted from Joseph (2021). This questionnaire measured various dimensions associated with women's career advancement, including family responsibilities, discriminatory promotion practices, employee relations, personal characteristics, lack of organizational support, gender stereotypes, and training opportunities. The second stage involved the preliminary assessment of questionnaire B, adapted from Babic & Hansez (2021). This questionnaire assessed additional dimensions of the glass ceiling phenomenon, including interpersonal issues, situational issues, differential treatment, and organizational gender culture.

Prior to data collection, both questionnaires were translated from English into Bahasa Indonesia using a forward backward translation procedure. The translated versions were reviewed by bilingual academics to ensure conceptual equivalence, linguistic clarity, and cultural appropriateness. An independent translator subsequently conducted a back-translation, and any discrepancies were resolved through discussion among the research team before administration.

Questionnaire A and questionnaire B were administered to the same sample of 102 female academics employed at Catholic universities affiliated with the Association of Catholic Higher Education Institutions (APTIK). The purpose of this stage was to evaluate the psychometric properties of the indicators derived from two different theoretical sources. Validity was assessed using outer loadings, while reliability was evaluated using Cronbach's Alpha and Composite Reliability. Indicators that met the established validity and reliability criteria were retained for further analysis.

In the third stage, indicators retained from questionnaire A and questionnaire B were integrated into a single instrument. The resulting integrated instrument was subsequently administered to a broader and independent sample of female academics, yielding 371 valid responses. Confirmatory factor analysis (CFA) was conducted using SmartPLS to re-evaluate the validity and reliability of the final instrument. The measurement model was assessed using outer loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE).

2.3. Data Analysis

Data analysis was conducted using SmartPLS through confirmatory factor analysis (CFA). Item validity was assessed using outer loadings, with a minimum threshold of 0.60 (Hair et al., 2019). Reliability was evaluated using composite reliability (CR) and Cronbach's alpha, with values exceeding 0.70 indicating acceptable reliability. Convergent validity was assessed through average variance extracted (AVE), with a threshold of 0.50 (Hair et al., 2019).

2.4. Data Collection Procedure

Data collection was conducted electronically via institutional email distribution lists and faculty networks. A five-point Likert scale was utilized, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) was used. Anonymity and confidentiality were ensured to minimize response bias and enhance data integrity.

2.5. Ethical Considerations

Ethical approval was obtained from the Health Research Ethics Committee (Komisi Etik Penelitian Kesehatan/KEPK) of Universitas Prima Indonesia under reference number 033/KEPK/UNPRI/XI/2024 prior to data collection. All procedures involving human participants were conducted in accordance with institutional ethical standards and the principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants prior to their participation, and confidentiality and anonymity were strictly maintained throughout the research process.

3. Results

This section presents the results of the validity and reliability tests for the two initial questionnaires and the final synthesized questionnaire. The data were analyzed using SmartPLS to assess the outer loadings, composite reliability (CR), and average variance extracted (AVE) for each dimension. The discussion that follows interprets these findings in the context of the glass ceiling phenomenon among female lecturers in Indonesian academia.

Questionnaire A, adapted from Joseph (2021), assessed several dimensions related to women's career advancement. The validity and reliability of the instrument were evaluated using confirmatory factor analysis (CFA) in SmartPLS. The results are presented in Table 1.

Table 1 Preliminary Assessment of Questionnaire A (Joseph, 2021).

Construct	Item	Loading	Status	Cronbach's Alpha	CR	AVE
Discriminatory Promotion Practices	DPP1	0.904	Retained	0.873	0.912	0.723
	DPP2	0.871	Retained			
	DPP3	0.694	Removed			
	DPP4	0.914	Retained			
Employee Relations	ER1	0.519	Removed	0.759	0.817	0.543
	ER2	0.553	Removed			
	ER3	0.901	Retained			
	ER4	0.885	Retained			
Family Responsibilities	FR1	0.889	Retained	0.867	0.908	0.662
	FR2	0.905	Retained			
	FR3	0.033	Removed			
	FR4	0.878	Retained			
	FR5	0.883	Retained			
	FR6	0.900	Retained			
Gender Stereotypes	GS1	0.908	Retained	0.805	0.887	0.726
	GS2	0.699	Removed			
	GS3	0.931	Retained			
Lack of Organizational Support	LOS1	0.933	Retained	0.863	0.910	0.723
	LOS2	0.566	Removed			
	LOS3	0.916	Retained			
	LOS4	0.927	Retained			
Lack of Training Opportunities	LT1	0.940	Retained	0.752	0.853	0.675
	LT2	0.493	Removed			
	LT3	0.947	Retained			
Personal Characteristics	PT1	0.914	Retained	0.857	0.903	0.707
	PT2	0.570	Removed			
	PT3	0.931	Retained			
	PT4	0.896	Retained			

The results presented in Table 1 indicate that most indicators in questionnaire A demonstrated satisfactory psychometric properties. Several indicators (DPP3, ER1, ER2, FR3, GS2, LOS2, LT2, and PT2) did not meet the retention criterion and were excluded from further analysis. The remaining indicators exhibited acceptable convergent validity, with AVE values ranging from 0.543 to 0.723. Reliability was also supported, as Cronbach's alpha values ranged from 0.752 to 0.873 and composite reliability values ranged from 0.817 to 0.912, exceeding the recommended threshold of 0.70. These results indicate that the retained constructs demonstrated satisfactory validity and reliability and were therefore considered suitable for inclusion in the integrated instrument.

Following the preliminary assessment of questionnaire A, a second evaluation was conducted using questionnaire B to examine additional dimensions of the glass ceiling phenomenon that were not fully represented in the first instrument. Questionnaire B adapted from Babic and Hansez (2021) assessed additional dimensions of the glass ceiling phenomenon. The validity and reliability of the instrument were evaluated using confirmatory factor analysis (CFA) in SmartPLS. The results are presented in Table 2.

Table 2 Preliminary Assessment of Questionnaire B (Babic & Hansez, 2021).

Construct	Item	Loading	Status	Cronbach's Alpha	CR	AVE
Differential Treatment	PB1	0.765	Retained	0.911	0.932	0.667
	PB2	0.605	Removed			
	PB3	0.944	Retained			
	PB4	0.907	Retained			
	PB5	0.614	Removed			
	PB6	0.907	Retained			
	PB7	0.899	Retained			
Interpersonal Factors	IN1	0.890	Retained	0.932	0.945	0.687
	IN2	0.836	Retained			
	IN3	0.655	Removed			
	IN4	0.910	Retained			
	IN5	0.855	Retained			
	IN6	0.668	Removed			
	IN7	0.872	Retained			
	IN8	0.898	Retained			
Organizational Gender Culture	GO1	0.818	Retained	0.809	0.876	0.647
	GO2	0.899	Retained			
	GO3	0.520	Removed			
	GO4	0.917	Retained			
Situational Factors	ST1	0.929	Retained	0.937	0.952	0.771
	ST2	0.617	Removed			
	ST3	0.893	Retained			
	ST4	0.947	Retained			
	ST5	0.905	Retained			
	ST6	0.933	Retained			

The results presented in Table 2 indicate that most indicators in questionnaire B demonstrated satisfactory psychometric properties. Several indicators (PB2, PB5, IN3, IN6, GO3, and ST2) did not meet the retention criterion and were excluded from further analysis. The retained constructs demonstrated acceptable reliability and convergent validity, with Cronbach's alpha values ranging from 0.809 to 0.937, Composite Reliability values ranging from 0.876 to 0.952, and AVE values ranging from 0.647 to 0.771. These findings indicate that the retained indicators were suitable for inclusion in the integrated instrument.

Indicators retained from questionnaire A and questionnaire B were combined to form an integrated instrument. The resulting instrument was subsequently validated using an independent sample of 371 female academics to confirm its validity and reliability. The results of the final validation are presented in Table 3.

The results presented in Table 3 indicate that most constructs demonstrated satisfactory validity and reliability. Cronbach's alpha values ranged from 0.627 to 0.940, composite reliability values ranged from 0.702 to 0.954, and most AVE values exceeded the recommended threshold of 0.50. Although the AVE value for organizational gender culture (0.461) was slightly below the recommended threshold, the construct was retained because its composite reliability exceeded 0.60. According to Fornell and Larcker (1981), convergent validity may still be considered adequate when AVE is below 0.50 provided that composite reliability exceeds 0.60. Therefore, the construct was considered acceptable and retained in the final instrument.

The results of the present study offer significant contributions to the ongoing discourse on the *glass ceiling* phenomenon, particularly within the context of Indonesian academia. The validated dimensions, such as discriminatory promotion practices and family responsibilities, align well with global research findings on gender barriers, underscoring that systemic issues like promotion discrimination are not confined to any one cultural or organizational context. However, the unique cultural factors present in Indonesian catholic universities may amplify certain dimensions, such as gender stereotypes and organizational gender culture (Babic & Hansez, 2021; Joseph, 2021).

4. Discussion

These findings contribute to the broader theoretical understanding of the *glass ceiling* by illustrating how cultural and organizational factors intersect to shape women's career advancement opportunities. The prominence of family responsibilities as a key dimension in the indonesian context supports the literature suggesting that gendered expectations regarding caregiving significantly impact women's professional lives (Babic & Hansez, 2021). Furthermore, the high outer loadings for discriminatory promotion practices echo the findings of Joseph (2021), indicating that formal policies alone may be insufficient to address gender inequities in promotion, as informal biases persist in academic institutions.

Table 3 Validation of the Integrated Instrument (n = 371).

Construct	Item	Loading	Status	Cronbach's Alpha	CR	AVE
Differential Treatment	PB1	0.561	Removed	0.885	0.915	0.652
	PB2	0.580	Removed			
	PB3	0.895	Retained			
	PB4	0.903	Retained			
	PB6	0.908	Retained			
	PB7	0.904	Retained			
Discriminatory Promotion Practices	DPP1	0.903	Retained	0.696	0.817	0.614
	DPP2	0.468	Removed			
	DPP4	0.899	Retained			
Employee Relations	ER3	0.858	Retained	0.742	0.884	0.792
	ER4	0.921	Retained			
Family Responsibilities	FR1	0.531	Removed	0.851	0.896	0.641
	FR2	0.762	Retained			
	FR4	0.879	Retained			
	FR5	0.878	Retained			
	FR6	0.893	Retained			
Gender Stereotypes	GS1	0.892	Retained	0.715	0.875	0.778
	GS3	0.872	Retained			
Interpersonal Issues	IN1	0.849	Retained	0.887	0.918	0.661
	IN2	0.870	Retained			
	IN4	0.892	Retained			
	IN5	0.398	Removed			
	IN7	0.890	Retained			
	IN8	0.862	Retained			
Lack of Organizational Support	LOS1	0.931	Retained	0.905	0.940	0.840
	LOS3	0.891	Retained			
	LOS4	0.927	Retained			
Lack of Training Opportunities	LT1	0.937	Retained	0.807	0.911	0.836
	LT3	0.892	Retained			
Organizational Gender Culture	GO1	0.508	Removed	0.627	0.702	0.461
	GO2	0.514	Removed			
	GO4	0.928	Retained			
Personal Characteristics	PT1	0.872	Retained	0.798	0.879	0.709
	PT2	0.735	Retained			
	PT3	0.908	Retained			
Situational Issues	ST1	0.889	Retained	0.940	0.954	0.806
	ST3	0.896	Retained			
	ST4	0.913	Retained			
	ST5	0.894	Retained			
	ST6	0.898	Retained			

The results also extend the understanding of the role of organizational culture in perpetuating gender biases, as reflected in the organizational gender culture dimension. Similar findings in previous research indicate that academic institutions, despite formal gender equality policies, may continue to reinforce male-dominated leadership paradigms (Eagly & Karau, 2002; Saitova & Di Mauro, 2021). The practical implications of these findings are highly relevant for academic institutions in Indonesia, especially those seeking to foster a more inclusive environment for female academics. The validated instrument developed through this research provides a robust tool that universities can use to assess and monitor the *glass ceiling* within their own organizations. By identifying key barriers, such as discriminatory promotion practices and lack of organizational support, universities can implement targeted interventions. For instance, institutions might develop training programs that address implicit biases in promotion decisions, or provide more support for female lecturers to balance family responsibilities with professional obligations (Babic & Hansez, 2021).

Additionally, the inclusion of gender stereotypes as a valid dimension highlights the need for cultural change within organizations. Academic leaders could use these insights to design mentorship and leadership development programs specifically aimed at challenging stereotypes and increasing women's participation in leadership roles (Bellaire et al., 2023; Maheshwari & Lenka, 2022). The use of this instrument allows universities to track the effectiveness of such initiatives over time, ensuring that gender equity goals are met.

While the study provides valuable insights, several limitations must be acknowledged. First, the sample was drawn exclusively from Catholic universities within Indonesia, which may limit the generalizability of the findings to other academic

contexts, particularly secular or other religious institutions. The cultural and organizational dynamics of Catholic universities may have uniquely influenced certain dimensions, such as Organizational Gender Culture, which could manifest differently Utoft (2020) in nonreligious institutions. Second, the data were collected cross-sectionally, meaning that the findings reflect a snapshot in time. While the study successfully identifies barriers to career progression, it does not capture how these barriers might evolve as organizational policies or cultural attitudes shift over time. A longitudinal study would provide deeper insights into how interventions or policy changes affect the *glass ceiling* phenomenon (Saleem et al., 2017). Another limitation is the self-reported nature of the data, which may introduce biases such as social desirability bias, where respondents might underreport their experiences with gender discrimination to avoid stigma. This could have affected the validity of certain items, particularly those related to interpersonal issues, which did not consistently meet validity thresholds.

Future research could address these limitations by expanding the scope of the study to include a more diverse range of academic institutions, such as secular universities or institutions from other cultural regions within Indonesia. This would help determine whether the findings are generalizable across different organizational settings or whether the *glass ceiling* barriers Dashper (2020) identified in this study are specific to the Catholic academic environment. Longitudinal studies would also be valuable in assessing how the dimensions identified in this research evolve over time, particularly in response to gender equality interventions. For instance, tracking the effectiveness of mentorship programs or promotion policy changes over a five-year period could provide critical insights into whether institutions are successfully reducing barriers like discriminatory promotion practices (London et al., 2019).

Furthermore, future studies might explore the intersectionality of gender with other factors such as ethnicity, age, or socioeconomic status to understand how different groups of women experience the *glass ceiling* in academia (Filandri et al., 2023). Intersectional research would provide a more nuanced understanding of the diverse challenges that women face and help institutions design more tailored interventions. Finally, the validated instrument developed through this research could be adapted for use in other sectors outside of academia, such as government or corporate environments. By testing the instrument in different industries, researchers could assess whether the dimensions identified are relevant across professions or whether unique barriers exist in each sector.

Cultural change within academic organizations is another critical area of focus. Gender stereotypes and ingrained cultural expectations about leadership roles need to be challenged through awareness campaigns and diversity training programs. Universities should implement initiatives that promote gender equality, aiming to create an inclusive academic environment where female lecturers are empowered to pursue leadership roles. Furthermore, institutions could establish gender-equity committees responsible for monitoring the progress of these initiatives and ensuring that gender biases are actively addressed within the organizational culture.

In terms of practical implementation, universities should also focus on data-driven decision-making. The instrument developed in this study provides a reliable tool that academic institutions can use to periodically assess and track gender equality within their organizations. By regularly monitoring metrics such as promotion rates, salary equality, and the representation of women in leadership positions, universities can identify areas where progress is being made and where further improvements are needed.

Future research can expand upon the findings of this study by examining a more diverse range of academic institutions, including secular universities and those in different cultural regions of Indonesia. This would help determine whether the barriers identified in this research are specific to Catholic academic environments or whether they are prevalent across all types of institutions. Additionally, future studies could explore how intersectional factors, such as race, class, or ethnicity, intersect with gender to influence the career progression of female academics. By considering these factors, researchers can gain a more nuanced understanding of the various challenges women face in higher education.

Longitudinal studies could also provide valuable insights into how gender barriers evolve over time and how effective interventions, such as policy reforms or mentorship programs, are in reducing these barriers. Tracking the long-term impact of these initiatives would allow universities to adapt their strategies and ensure that their efforts to promote gender equality have lasting effects. By continuing to study the *glass ceiling* phenomenon and implementing targeted reforms, both researchers and institutions can contribute to a more equitable academic environment for future generations of female scholars.

5. Conclusions

The findings of this study have significant theoretical and practical implications for understanding and addressing the *glass ceiling* phenomenon in Indonesian academia. The validated dimensions, such as discriminatory promotion practices and family responsibilities, highlight the systemic and cultural barriers that continue to limit female academics' career advancement. The development of a reliable and valid instrument provides academic institutions with a valuable tool for diagnosing and addressing these barriers.

By implementing targeted policies and programs informed by these findings, universities in Indonesia can begin to dismantle the structural and cultural obstacles that prevent women from reaching leadership positions. However, future research is needed to expand the generalizability of these findings and explore how different intersectional identities may influence women's experiences with the *glass ceiling* in various academic and professional contexts.

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6. Declarations

6.1. Ethical considerations

Ethical approval was obtained from the Health Research Ethics Committee (Komisi Etik Penelitian Kesehatan/KEPK) of Universitas Prima Indonesia, which is registered and accredited under the National Health Research Ethics Commission (KEPPKN). The study was approved under reference number 033/KEPK/UNPRI/XI/2024. The ethical clearance confirmed that the research protocol met the seven WHO 2011 ethical standards, including social value, scientific validity, fair subject selection, favorable risk–benefit ratio, independent review, informed consent, and respect for participants, in accordance with the CIOMS 2016 guidelines. The approval is valid for the period from November 11, 2024 to November 11, 2025. Data collection was conducted between January and June 2025, which is within the approved ethical clearance period. All procedures involving human participants were carried out in accordance with institutional ethical standards and the principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants prior to their participation. Confidentiality and anonymity were strictly maintained throughout the research process.

6.2. Use of artificial intelligence (AI)

The authors declare that the generative artificial intelligence (AI) tool ChatGPT was used exclusively for language editing and grammatical refinement during the manuscript preparation process. The use of AI did not influence the scientific content, study design, data analysis, data interpretation, results, or conclusions of the manuscript. Full responsibility for the content remains with the authors.

6.3. Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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