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## ESG DISCLOSURE, CORPORATE GOVERNANCE, AND FIRM VALUE: EVIDENCE FROM LISTED COMPANIES

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**Abstract:** This study investigates the relationship between environmental, social, and governance (ESG) disclosure, corporate governance mechanisms, and firm value in listed companies. As capital markets increasingly integrate non-financial information into valuation processes, ESG disclosure and governance quality have become critical signals for investors. Using panel data from publicly listed firms and employing panel regression techniques, this research examines whether ESG disclosure and corporate governance enhance firm value, measured by Tobin's Q. The findings provide empirical evidence that ESG disclosure has a positive and significant effect on firm value. Furthermore, corporate governance mechanisms not only directly enhance firm value but also strengthen the valuation effect of ESG disclosure. These results support signaling theory and agency theory, suggesting that transparent ESG reporting and effective governance reduce information asymmetry and agency conflicts, thereby increasing market valuation. The study contributes to the corporate finance and sustainability literature by integrating ESG disclosure and governance perspectives in explaining firm value, with important implications for managers, investors, and policymakers.

**Keywords:** Environmental, Social, and Governance (ESG) Disclosure; Corporate Governance Mechanisms; Firm Value; Tobin's Q; Panel Data Analysis.



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# ESG信息披露、公司治理与企业价值：来自上市公司的证据

**摘要：**本研究探讨了环境、社会与治理（ESG）信息披露、公司治理机制与上市公司企业价值之间的关系。随着资本市场日益将非财务信息纳入估值过程，ESG信息披露与治理质量已成为投资者的重要信号。基于上市公司的面板数据，并采用面板回归方法，本文检验了ESG信息披露与公司治理是否能够提升以托宾Q（Tobin's

Q）衡量的企业价值。研究表明，ESG信息披露对企业价值具有显著的正向影响。此外，公司治理机制不仅直接提升企业价值，还强化了ESG信息披露对企业价值的估值效应。上述结果支持信号理论与代理理论，表明透明的ESG信息披露和有效的公司治理能够降低信息不对称和代理冲突，从而提升市场估值。本文通过整合ESG信息披露与公司治理视角来解释企业价值，丰富了公司金融与可持续发展领域的研究，并对管理者、投资者及政策制定者具有重要启示。

**关键词：**环境、社会与治理（ESG）信息披露；公司治理机制；企业价值；托宾Q；面板数据分析

## 1. Introduction

Firm value represents a central objective of corporate management and a key concern for investors in capital markets. Traditionally, firm value has been explained primarily by financial performance and risk, reflected in accounting indicators and stock price movements [1,2]. However, the growing complexity of business environments and rising awareness of sustainability issues have altered investor preferences, leading to greater attention to non-financial information in valuation decisions [3,4].

Environmental, social, and governance (ESG) disclosure has emerged as an important mechanism through which firms communicate their commitment to sustainable and responsible business practices. Prior studies suggest that ESG disclosure reduces information asymmetry and enhances transparency, enabling investors to better assess firm risk and long-term prospects [5,6]. From a signaling theory perspective, voluntary ESG disclosure serves as a positive signal of management quality and strategic orientation toward long-term value creation [7,8].

At the same time, corporate governance mechanisms play a critical role in ensuring that managerial actions align with shareholder interests and that disclosed information is credible. Agency theory argues that weak governance structures increase the likelihood of opportunistic managerial behavior, which may lead to inefficient investment decisions and lower firm value [9,10]. Empirical evidence indicates that effective governance, reflected in board independence, board diversity, and monitoring mechanisms, contributes positively to firm value and market valuation [11,12].

Despite the growing relevance of ESG disclosure

and corporate governance, empirical evidence on their combined effect on firm value remains mixed, particularly in emerging and developing capital markets. Some studies document a positive relationship between ESG disclosure and firm value [13,4], while others find insignificant or context-dependent effects, often attributed to differences in institutional quality, governance strength, and investor awareness [14]. Similarly, although corporate governance is generally associated with higher firm value, its interaction with ESG disclosure has received limited empirical attention.

This study aims to address this gap by examining the effect of ESG disclosure and corporate governance on firm value using evidence from listed companies. Specifically, this research investigates whether ESG disclosure directly enhances firm value, whether corporate governance mechanisms contribute to higher firm value, and whether governance strengthens the relationship between ESG disclosure and firm value. By integrating sustainability disclosure and governance perspectives within a corporate finance framework, this study contributes to the growing literature on ESG, governance, and market valuation.

This study offers several important contributions to the existing literature. First, unlike prior studies that examine ESG disclosure or corporate governance separately, this research integrates both variables within a unified empirical framework to explain firm value. This integrated approach provides a more comprehensive understanding of how sustainability disclosure and governance mechanisms jointly influence market valuation.

Second, this study contributes by focusing on listed companies in an emerging market context, where

institutional environments, regulatory enforcement, and investor awareness differ significantly from developed markets. This context allows the study to provide new empirical evidence on the role of ESG disclosure under varying governance quality and market conditions.

Third, the study extends prior research by explicitly examining the moderating role of corporate governance in the ESG–firm value relationship. While previous studies have documented direct effects, limited empirical evidence has explored how governance mechanisms strengthen or weaken the valuation relevance of ESG disclosure.

Finally, this research enhances methodological rigor by employing panel data techniques with robustness checks, allowing for more reliable estimation and control of unobserved firm heterogeneity.

**Problem Statement:** Despite the rapid growth of ESG reporting and increasing regulatory pressure on corporate governance practices, there is no clear consensus on how ESG disclosure and corporate governance jointly affect firm value, particularly in emerging capital markets. Prior empirical studies report mixed findings, suggesting that the valuation effects of ESG disclosure may depend on governance quality and institutional context. This inconsistency raises an important question regarding whether ESG disclosure alone is sufficient to enhance firm value, or whether strong corporate governance is required to ensure the credibility and effectiveness of ESG information.

**Significance:** This study is significant in several respects. From a theoretical perspective, it advances the literature by integrating ESG disclosure and corporate governance within a unified empirical framework, thereby addressing the limited attention given to their interaction effects in prior studies. From an empirical perspective, it provides new evidence from an emerging market setting, where the effectiveness of ESG disclosure may depend heavily on governance quality and institutional factors. From a practical perspective, the findings offer important insights for corporate managers on the need to align ESG reporting with strong governance mechanisms to enhance credibility and firm value. For investors, the study highlights the importance of jointly evaluating ESG disclosure and governance quality in valuation decisions. For policymakers, the results emphasize the role of governance structures in strengthening the effectiveness of ESG reporting in capital markets.

**Organization:** The remainder of this paper is organized as follows. Section 2 reviews the relevant literature and develops the hypotheses. Section 3 outlines the research methodology, including data sources, variable measurement, and model specification. Section 4 presents and discusses the empirical results. Section 5 concludes the paper and provides implications and directions for future research.

## 2. Literature Review and Hypotheses Development

### 2.1. Firm Value

Firm value reflects the market's assessment of a company's current performance and future growth prospects. Market-based measures, such as Tobin's Q, are widely used in empirical studies because they incorporate investor expectations and forward-looking information. According to financial theory, firm value is influenced by corporate policies, information quality, and risk perceptions.

### 2.2 ESG Disclosure

ESG disclosure refers to the reporting of environmental, social, and governance practices that extend beyond traditional financial statements. From a signaling theory perspective, ESG disclosure serves as a signal of management quality, ethical standards, and long-term orientation. Firms that provide transparent ESG information are perceived as more reliable and less risky, which can enhance investor confidence and firm value.

### 2.3 Corporate Governance

Corporate governance encompasses the structures and mechanisms that control and direct corporate activities. Board characteristics, such as board size, independence, and diversity, are commonly used indicators of governance quality. Agency theory suggests that effective governance reduces conflicts of interest between managers and shareholders, leading to more efficient decision-making and higher firm value.

### 2.4 ESG Disclosure, Corporate Governance, and Firm Value

ESG disclosure and corporate governance are complementary mechanisms. While ESG disclosure enhances transparency, corporate governance ensures the credibility and reliability of disclosed information. Strong governance structures can therefore amplify the positive valuation effect of ESG disclosure by reducing skepticism among investors.

### 2.5 Hypothesis

Based on the above discussion, the following hypotheses are proposed:

- H1:** ESG disclosure has a positive effect on firm value.
- H2:** Corporate governance has a positive effect on firm value.
- H3:** Corporate governance strengthens the positive relationship between ESG disclosure and firm value.

## 3. Research Methodology

### 3.1 Research Design

This study adopts a quantitative research design to empirically examine the relationship between ESG

disclosure, corporate governance, and firm value in listed companies. A quantitative approach is appropriate because the objective of the study is to test theoretically grounded hypotheses using numerical data and statistical techniques, consistent with prior empirical research in corporate finance and sustainability. The analysis employs panel data methodology, allowing the study to capture both cross-sectional and time-series variations while controlling for unobserved firm-specific heterogeneity.

### 3.2 Population and Sample

The population of this study consists of all non-financial companies listed on the stock exchange during the observation period. Financial institutions are excluded because they operate under distinct regulatory frameworks and financial reporting standards, which may affect ESG disclosure practices and firm valuation. The sample is selected using a purposive sampling technique based on the following criteria: (1) the firm must be continuously listed during the observation period; (2) the firm must publish complete annual reports and financial statements; (3) the firm must disclose sufficient ESG-related information; and (4) the firm must have complete data for all variables used in the analysis. Firms that do not meet these criteria are excluded from the final sample.

### 3.3 Data Sources

This study relies on secondary data obtained from publicly available sources. Financial data are collected from firms' annual reports and audited financial statements, while ESG disclosure data are obtained from sustainability reports, annual reports, and official corporate disclosures. Corporate governance data are derived from company reports and publicly accessible governance information. The use of secondary data ensures objectivity and replicability of the research.

### 3.4 Variable Measurement

Firm value is measured using Tobin's Q, a market-based indicator widely used in empirical studies to capture investors' valuation of a firm's growth opportunities. ESG disclosure is measured using a disclosure index constructed based on the content analysis of firms' annual reports and sustainability reports. The index is developed by adopting established ESG reporting frameworks, including the Global Reporting Initiative (GRI) standards and prior empirical studies. The ESG disclosure index consists of three main dimensions: environmental, social, and governance. The environmental dimension includes indicators such as energy consumption, emissions, waste management, and environmental policies. The social dimension covers aspects such as employee welfare, health and safety, diversity, and community engagement. The governance dimension includes disclosures related to board structure, ownership, audit practices, and ethical standards.

Each disclosure item is scored using a binary approach, where a value of 1 is assigned if the firm discloses the item, and 0 otherwise. The ESG disclosure score for each firm is calculated as the ratio of the total disclosed items to the maximum possible disclosure items:

$$\text{ESG Index} = (\text{Total Disclosed Items} / \text{Total Applicable Items})$$

This approach ensures consistency with prior ESG disclosure studies and allows for comparability across firms. Corporate governance is proxied by key board characteristics that reflect the effectiveness of internal monitoring mechanisms. Specifically, this study uses board size, board independence, and board diversity as governance indicators. Board size is measured by the total number of directors on the board, reflecting the capacity of the board to provide expertise and oversight. Board independence is measured as the proportion of independent directors to total board members, indicating the ability of the board to monitor management objectively. Board diversity is measured based on the presence of gender diversity within the board, capturing heterogeneity in perspectives and decision-making quality.

These governance variables are widely used in prior studies and are grounded in agency theory, which suggests that effective board structures reduce agency conflicts and improve firm performance and value. Control variables include firm size, leverage, and profitability, which are commonly used in firm value studies.

### 3.5 Model Specification

To test the proposed hypotheses, this study employs panel data regression analysis. The empirical model is specified as follows:

$$\text{Firm Value}_{it} = \alpha + \beta_1 \text{ESG}_{it} + \beta_2 \text{CG}_{it} + \beta_3 \text{ESG}_{it} \times \text{CG}_{it} + \beta_4 \text{Controls}_{it} + \varepsilon_{it}$$

where Firm Value<sub>it</sub> represents Tobin's Q of firm *i* in year *t*; ESG<sub>it</sub> denotes the ESG disclosure index; CG<sub>it</sub> represents corporate governance variables; ESG<sub>it</sub> × CG<sub>it</sub> is the interaction term capturing the moderating effect of governance; Controls<sub>it</sub> refers to control variables;  $\alpha$  is the constant term;  $\beta$  denotes regression coefficients; and  $\varepsilon_{it}$  is the error term.

### 3.6 Data Analysis Technique

The analysis begins with descriptive statistics to summarize the characteristics of the sample. Panel regression analysis is then conducted using fixed effects or random effects models. Model selection is based on the Chow test and Hausman test. To address potential econometric issues, diagnostic tests for multicollinearity, heteroskedasticity, and autocorrelation are performed. Robust standard errors

clustered at the firm level are applied to ensure the reliability of the estimated coefficients.

In addition, this study considers potential endogeneity issues that may arise in the relationship between ESG disclosure and firm value. One possible concern is reverse causality, where firms with higher market valuation may have greater incentives and resources to engage in ESG disclosure. To mitigate this issue, the study employs panel data techniques with fixed effects, which help control for time-invariant unobserved heterogeneity across firms.

Furthermore, the use of control variables such as firm size, leverage, and profitability reduces omitted variable bias. Robust standard errors clustered at the firm level are also applied to address potential heteroskedasticity and serial correlation, ensuring the reliability of the estimated coefficients.

Although these approaches do not fully eliminate endogeneity concerns, they are consistent with prior empirical studies and provide a reasonable strategy to improve the robustness and validity of the results.

### 3.7 Ethical Considerations

This study uses secondary data obtained from publicly available sources. Therefore, no ethical issues related to confidentiality or personal data arise in the research process.

## 4. Analysis and Discussion

### 4.1 ESG Disclosure, Corporate Governance, and Firm Value

**Table 1 Descriptive Statistics**

Variable	Mean	Std. Dev.	Min	Max
Firm Value (Tobin's Q)	1.45	0.62	0.58	3.90
ESG Disclosure	0.47	0.18	0.12	0.85
Board Size	6.8	1.9	3	12
Board Independence	0.41	0.15	0.20	0.75
Firm Size	28.9	1.6	25.3	32.4
Leverage	0.46	0.21	0.08	0.81

Source : Authors' calculations based on firms' annual reports, ESG disclosures, and market data from the stock exchange.

The descriptive statistics are reported in Table 1. The statistics indicate substantial variation in firm value among listed companies, reflecting heterogeneous market valuation and growth expectations. The dispersion in ESG disclosure scores suggests significant differences in sustainability transparency across firms, consistent with prior evidence on uneven ESG adoption [6,3]. The empirical

results indicate that ESG disclosure has a positive and statistically significant effect on firm value. This finding suggests that firms providing more extensive ESG information tend to receive higher market valuation. From the perspective of signaling theory, ESG disclosure serves as a signal of management quality and long-term strategic orientation, which investors interpret as a positive indicator when forming valuation judgments [7,8].

The positive valuation effect of ESG disclosure also reflects the growing importance of sustainability considerations in capital markets. Investors increasingly incorporate environmental and social risks into their assessment of future cash flows and firm risk profiles. As a result, transparent ESG disclosure reduces uncertainty and information asymmetry, thereby enhancing firm value [5,6]. Corporate governance variables are also found to be positively associated with firm value.

**Table 2. Correlation Matrix**

Variable	FV	ESG	BS	BI
Firm Value (FV)	1.00			
ESG Disclosure (ESG)	0.32	1.00		
Board Size (BS)	0.21	0.18	1.00	
Board Independence (BI)	0.27	0.25	0.14	1.00

Authors' calculations based on the variables defined in this study.

The correlation analysis is summarized in Table 2. The results show that ESG disclosure and corporate governance variables are positively correlated with firm value, providing preliminary support for the hypothesized relationships. The magnitude of the correlation coefficients remains below conventional thresholds, indicating that multicollinearity is unlikely to bias the regression estimates [15]. Firms with stronger governance structures, such as more independent and diverse boards, exhibit higher market valuation. This result is consistent with agency theory, which argues that effective governance mechanisms reduce managerial opportunism and improve decision-making efficiency, leading to higher firm value [9,11].

Importantly, the interaction between ESG disclosure and corporate governance shows a positive and significant effect on firm value. This indicates that the valuation relevance of ESG disclosure is stronger when firms are supported by effective governance mechanisms.

This interaction effect has important economic implications. It suggests that ESG disclosure alone may not be sufficient to enhance firm value unless it is supported by strong corporate governance mechanisms. In firms with weak governance structures, ESG

disclosure may be perceived by investors as symbolic or driven by compliance motives, thereby limiting its impact on market valuation.

In contrast, firms with strong governance structures provide greater credibility to ESG disclosures. Effective monitoring by independent and diverse boards ensures that ESG reporting reflects actual corporate practices rather than opportunistic behavior. As a result, investors are more likely to interpret ESG disclosure as a reliable signal of long-term value creation.

This finding highlights the complementary role of ESG disclosure and corporate governance, indicating that governance quality acts as a reinforcing mechanism that strengthens the positive valuation effect of sustainability disclosure, particularly in emerging market contexts [14].

These findings can be further interpreted through the lens of signaling theory and agency theory. From a signaling perspective, ESG disclosure functions as a credible signal of a firm's commitment to sustainability and long-term value creation. Firms that voluntarily disclose ESG information reduce information asymmetry and provide investors with additional non-financial insights, which enhances market confidence and valuation.

From an agency theory perspective, corporate governance plays a critical role in ensuring that ESG disclosures are reliable and not merely symbolic. Effective governance mechanisms, particularly independent and diverse boards, strengthen monitoring and reduce managerial opportunism. This reduces agency conflicts and ensures that ESG practices are aligned with shareholder interests.

The interaction between ESG disclosure and corporate governance therefore reflects the joint effect of signaling and monitoring mechanisms. While ESG disclosure provides the signal, corporate governance ensures its credibility. This complementary relationship explains why the valuation effect of ESG disclosure is significantly stronger in firms with higher governance quality.

This integration of signaling and agency perspectives provides a more comprehensive explanation of how ESG disclosure and governance mechanisms jointly influence firm value in emerging market contexts.

Overall, these findings demonstrate that ESG disclosure and corporate governance operate as complementary mechanisms in value creation. Firms that simultaneously improve ESG transparency and governance quality are more likely to enhance investor confidence and achieve higher market valuation. This result aligns with recent empirical studies emphasizing the joint role of sustainability disclosure and governance in determining firm value [13,4].

## 4.2 Robustness and Interpretation of Findings

**Table 3. Panel Regression Results**

Variable	Coefficient	t-Statistic	p-value
ESG Disclosure	0.284	3.41	0.001
Corporate Governance	0.196	2.87	0.004
ESG × Governance	0.133	2.12	0.034
Firm Size	0.102	2.56	0.011
Leverage	-0.174	-2.91	0.004
Constant	0.883	6.78	0.000

Source: Authors' calculations.

**Note:**

*The regression is estimated using a fixed-effects model with firm-level clustered robust standard errors.*

The panel regression results are reported in Table 3. The findings indicate that ESG disclosure has a positive and statistically significant effect on firm value, supporting Hypothesis 1. Corporate governance also shows a significant positive association with firm value, consistent with agency theory predictions [9]. The interaction term between ESG disclosure and corporate governance is positive and significant, suggesting that governance mechanisms strengthen the valuation relevance of ESG information.

**Table 4. Model Diagnostics and Robustness Tests**

Test	Result	Conclusion
Chow Test	p < 0.01	Fixed effects preferred
Hausman Test	p = 0.02	Fixed effects consistent
Mean VIF	1.42	No multicollinearity
Heteroskedasticity Test	p < 0.01	Present
Autocorrelation Test	p = 0.03	Present

Source: Authors' calculations.

**Note (optional):**

Chow and Hausman tests are used for model selection. Robust standard errors are applied to address heteroskedasticity and autocorrelation.

Model diagnostics and robustness tests are presented in Table 4. The fixed-effects model is selected as the most appropriate specification. Although heteroskedasticity and autocorrelation are detected, the use of firm-level clustered robust standard errors ensures the reliability of the estimated

coefficients [16,17]. To ensure the reliability of the empirical results, several robustness checks are conducted. The analysis accounts for potential econometric issues commonly encountered in panel data, including heteroskedasticity and autocorrelation. After applying robust standard errors clustered at the firm level, the main findings remain stable in terms of coefficient signs and statistical significance, confirming the robustness of the results [16,17].

The robustness of the ESG disclosure coefficient suggests that the positive relationship between ESG transparency and firm value is not sensitive to model specification. This stability indicates that ESG disclosure provides economically meaningful information to investors across different firm contexts. Such findings support prior studies documenting consistent valuation effects of ESG disclosure in various markets [3,4].

Similarly, the robustness of corporate governance variables underscores the importance of governance quality in shaping market valuation. Effective governance mechanisms appear to play a persistent role in mitigating agency conflicts and enhancing firm value, even after controlling for firm-specific characteristics and potential econometric biases [18,12].

The significant interaction effect between ESG disclosure and corporate governance remains robust, reinforcing the interpretation that governance quality strengthens the credibility and valuation relevance of ESG information. This result highlights the importance of viewing ESG disclosure within a broader governance framework rather than as an isolated reporting practice [5].

Taken together, the robustness analysis confirms that the main conclusions of this study are not driven by methodological artifacts. Instead, they reflect a stable and theoretically consistent relationship between ESG disclosure, corporate governance, and firm value, providing confidence in the empirical findings and their interpretation.

## 5. Conclusion

This study examines the relationship between ESG disclosure, corporate governance, and firm value using evidence from listed companies. Drawing on signaling theory and agency theory, the study investigates whether sustainability disclosure and governance mechanisms contribute to market valuation. The empirical findings indicate that ESG disclosure has a positive and significant effect on firm value, suggesting that investors increasingly value transparent non-financial information when assessing firms' long-term prospects.

The results also demonstrate that corporate governance plays a crucial role in enhancing firm value. Firms with stronger governance structures

benefit from improved monitoring and reduced agency conflicts, which are reflected in higher market valuation. More importantly, the interaction between ESG disclosure and corporate governance reveals that governance quality strengthens the valuation relevance of ESG information. This finding highlights that ESG disclosure is most effective when supported by credible and effective governance mechanisms.

From a theoretical perspective, this study contributes to the literature by integrating ESG disclosure and corporate governance within a unified framework to explain firm value. The findings provide empirical support for signaling theory by showing that ESG disclosure conveys valuable information to investors, and for agency theory by emphasizing the role of governance in aligning managerial actions with shareholder interests.

From a practical perspective, the results offer important implications for corporate managers, investors, and policymakers. Managers are encouraged to enhance ESG transparency and strengthen governance structures as part of a comprehensive value creation strategy. Investors may incorporate ESG disclosure and governance quality into firm valuation and portfolio selection decisions. Policymakers and regulators are advised to promote ESG reporting standards and governance reforms to improve market efficiency and investor protection.

Despite its contributions, this study has several limitations. The analysis relies on secondary data and focuses on listed companies, which may limit the generalizability of the findings.

Future research may employ instrumental variable approaches or dynamic panel models to further address endogeneity concerns.

## 6. Future Research Directions

Future research may extend the findings of this study in several important ways. First, subsequent studies could employ alternative measures of firm value, such as market-adjusted returns or economic value added, to examine whether the valuation effects of ESG disclosure and corporate governance are consistent across different valuation proxies. This approach would enhance the robustness and generalizability of the results.

Second, future research could explore sector-specific or industry-level differences in the ESG-firm value relationship. The relevance of ESG disclosure and governance mechanisms may vary across industries with different environmental exposure, regulatory intensity, and stakeholder pressure. An industry-based analysis could provide more nuanced insights into how ESG and governance contribute to firm value in different economic contexts.

Third, longitudinal and dynamic research designs

could be employed to investigate the long-term effects of ESG disclosure and corporate governance on firm value. Examining how changes in ESG practices and governance structures over time affect market valuation would offer a deeper understanding of causal relationships and sustainability-driven value creation.

Finally, future studies may incorporate institutional and country-level factors, such as legal systems, investor protection, and cultural dimensions, to assess how external governance environments moderate the impact of ESG disclosure on firm value. Such cross-country analyses would contribute to a more comprehensive and globally relevant understanding of ESG, governance, and firm valuation.

## General Guidelines for the Preparation of Your Text

Avoid hyphenation at the end of a line. Symbols denoting vectors and matrices should be indicated in bold type. Scalar variable names should normally be expressed using italics. Weights and measures should be expressed in SI units.

## Footnotes

Footnotes should be avoided if possible. Necessary footnotes should be denoted in the text by consecutive superscript letters. The footnotes should be typed single spaced, and in smaller type size (8pt), at the foot of the page in which they are mentioned, and separated from the main text by a short line extending at the foot of the column.

## Declarations

### *Author Contributions*

Corresponding author, M.A ; Conceptualization, M.A and L.B; Supervision, L.B; Investigation, M.A; Methodology, M.A and L.B; Formal analysis, M.A and L.B ; Writing original draft, M.A and L.B ; Writing review and editing, M.A and L.B.

### *Data Availability Statement*

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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during the development of this manuscript. Any remaining errors are the sole responsibility of the author.

### *Institutional Review Board Statement*

#### **Human subjects with IRB approval**

All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional research committee and with the principles of the Declaration of Helsinki. Prior to data collection, informed consent was obtained from all participants, and participation was entirely voluntary. Respondent anonymity and data confidentiality were strictly maintained throughout the research process

### *Conflicts of Interest*

The authors declare that there is no conflict of interest regarding the publication of this manuscript. The authors also confirm that all ethical standards have been fully observed, including the avoidance of plagiarism, data fabrication and/or falsification, misconduct, redundant or duplicate publication, and other unethical practices.

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