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Effect of Financial Inclusion on the Human Capital Development of Women Entrepreneurs in North-Central Nigeria

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ABSTRACT

In both developed and developing economies, women-owned businesses play a crucial role, particularly within the small and medium-sized enterprises (SMEs) sector largely contributing to the growth of economy. Despite their contributions, women entrepreneurs in North-Central Nigeria face significant barriers, with limited financial inclusion being one of the most pervasive. This study examines the effect of financial inclusion on human capital development of women entrepreneurs in North-Central Nigeria. The study adopted a cross-sectional survey research design and the population was 37,690 registered women entrepreneurs and employing the Taro Yamane formula the sample size of the study became 396. Primary data was used to collect information from the respondents by using a structured questionnaire. The study used Ordinal Logistic Regression tool of analysis to regressed the data gotten from the respondents and the finding revealed that financial inclusion Affordable Credits (AFFC = 0.1635, $p < 0.00$); and Financial Advice (FINA = 0.0234, $p < 0.01$) has a positive and significant effect on human capital development (education and training) of women entrepreneurs in North-Central Nigeria. The study recommends that stakeholders, especially financial regulators and fintech companies continue to expand women-focused financial inclusion programs. This should involve designing simple mobile platforms that allow women to open accounts, access credit, and make payments. These platforms must be complemented by digital literacy programs delivered in local languages to ensure women can effectively navigate and utilize digital tools for business growth.

Keywords: Financial Inclusion, Affordable Credits, Financial Advice, Education and Training and Women Entrepreneurs

INTRODUCTION

Globally, women entrepreneurs are recognized as key drivers of economic development, contributing significantly to job creation and poverty alleviation. In both developed and developing economies, women-owned businesses play a crucial role, particularly within the small and medium-sized enterprises (SMEs) sector. The World Bank (2022) estimates that women-owned businesses account

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for 30% to 37% of SMEs in emerging markets, contributing over $3 trillion to the global economy. Despite their contributions, women entrepreneurs face significant barriers, with limited financial inclusion being one of the most pervasive. Access to financial services, including credit and loans, is essential for business growth, particularly in developing regions like Africa, where access to finance remains a constraint for women entrepreneurs.

A viable business plan is often a prerequisite for accessing financial resources from formal institutions. In many cases, financial institutions require entrepreneurs (in this case women entrepreneurs from North-Central) to present detailed business plans that outline strategic goals, market positioning, and financial projections before offering loans or credit. Women entrepreneurs in Africa face challenges in developing these business plans due to a lack of training and support. For example, a study in Nigeria by Adebayo & Oduwole (2022) found that women entrepreneurs with comprehensive business plans were 45% more likely to secure financial support than those without such plans. However, many women in North-Central Nigeria struggle to develop viable business plans, which hinder their ability to access formal financial services.

In addition to its role in enhancing human capital, a viable business plan is crucial for promoting innovation and wealth generation. Women entrepreneurs who develop well-structured business plans are better positioned to attract investment and secure loans, which can be reinvested into research and development activities. Globally, research shows that women entrepreneurs with business plans experience higher growth rates. In India, for example, Kumar & Srivastava (2021) reported that women entrepreneurs with business plans saw 38% higher revenue growth than those without formal business strategies. Similarly, in Nigeria, many women entrepreneurs are unable to secure the necessary financial backing to drive innovation due to the lack of viable business plans

Financial inclusion-the integration of women into the formal financial system-is a critical factor influencing the growth of women entrepreneurs. In Nigeria, efforts to promote financial inclusion have made progress, but significant gender disparities remain. The EFInA Survey (2020) revealed that only 44.1% of Nigerian women are financially included, compared to 55.9% of men. This lack of financial inclusion prevents many women from accessing the financial services they need to grow their businesses. In North-Central Nigeria, the challenge of financial inclusion is particularly acute, with many women entrepreneurs relying on informal financial sources, such as savings groups, which offer little in terms of long-term capital.

In addition to its impact on human capital development, financial inclusion is essential for fostering innovation and wealth generation. Women entrepreneurs who are financially included are more likely to access credit, manage their finances effectively, and invest in business expansion. Musa & Lawal (2023) found that women entrepreneurs in North-Central Nigeria who were financially included experienced 33% higher rates of innovation and 28% more wealth generation than those who were financially excluded.

Despite the fact that emphasis has been placed on financial inclusion and overall business performance, the impact of financial inclusion on specific outcomes, such as human capital development and innovation, remains underexplored, particularly in the context of women entrepreneurs in North-Central Nigeria. Existing research has primarily focused on broader metrics of financial inclusion without delving into how it influences key growth factors like human capital development and wealth generation (Islam et al., 2020; Gusman et al., 2021). This gap is significant, especially considering that women entrepreneurs face unique challenges related to education, training, and access to business networks, which are vital for enhancing business performance and fostering innovation (Muiruri et al., 2024; Oyedele et al., 2023; Hossain et al., 2023). Addressing this underexplored area is crucial, as overcoming these barriers could significantly contribute to the growth and sustainability of women-led businesses in Nigeria, fostering both economic empowerment and broader societal benefits.

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Discovering out how financial inclusion impacted the human capital development of women entrepreneurs in North-Central Nigeria was the main objective of this study. Additional related objectives include determining the impact of financial advice on education and training of women entrepreneurs in North-Central Nigeria and examine the impact of affordable credits on education and training of women entrepreneurs in North-Central Nigeria

LITERATURE REVIEW

Financial Inclusion

Financial inclusion is the process of ensuring that women entrepreneurs, particularly those in rural areas, have access to formal financial systems such as banking, savings, and insurance services. This concept is critical in overcoming the barriers women face in accessing financial services, thereby fostering their economic empowerment and business development (Adebayo & Oduwole, 2022).

Women entrepreneurs, especially those in informal and rural settings, face significant barriers to financial inclusion. These barriers include limited access to financial accounts, constrained credit, and normative roles that restrict their economic participation (Bin-Humam et al., 2022). Additionally, the lack of financial literacy, inadequate documentation, and societal biases further hinder their ability to access formal financial services (Chamani et al., 2023).

Several determinants influence the financial inclusion of women entrepreneurs. Education level, entrepreneurial experience, and resource capacity of the business are significant factors. For instance, studies have shown that young women entrepreneurs with higher education levels and less experience are more likely to be financially included (Chamani et al., 2023). The use of information and communication technology (ICT) also plays a crucial role in enhancing financial inclusion among women entrepreneurs (Chamani et al., 2023).

National Financial Inclusion Strategies can significantly enhance financial inclusion for women entrepreneurs. These strategies often include measures to promote women's financial inclusion, such as improving access to credit, enhancing legal autonomy, and increasing representation of women in policy-making (Bin-Humam et al., 2022). Despite these efforts, more needs to be done to develop indicators at both the policy and regulatory levels to support women's entrepreneurship effectively (Bin-Humam et al., 2022).

Human Capital Development

Human capital development refers to the process by which women entrepreneurs invest in acquiring the knowledge, skills, and competencies essential for fostering business growth. It is a crucial aspect of entrepreneurial success, as it directly influences the productivity, efficiency, and long-term sustainability of enterprises. Entrepreneurs who prioritize human capital development are more likely to enhance their strategic decision-making capabilities, improve operational efficiency, and foster innovation within their businesses (Klapper et al., 2021).

One of the key enablers of human capital development is access to financial resources. Adequate financial accessibility allows women entrepreneurs to invest in formal education, vocational training, and skills development programs tailored to their business needs. This investment not only boosts their entrepreneurial capabilities but also improves their adaptability to market dynamics and enhances competitiveness (Akhter & Alam, 2022). For example, in regions like North-Central Nigeria, where the entrepreneurial landscape is increasingly competitive, women who invest in training programs are more likely to navigate market challenges and sustain business growth (Oluwole & Agboola, 2022).

Women Entrepreneurs

The growth of women entrepreneurs refers to the enhancement of business performance and the expansion of business activities by women-owned enterprises. This growth is not only pivotal for the individual success of women entrepreneurs but also for broader economic development, job creation,

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poverty reduction, and social advancement. In recent years, the role of women entrepreneurs has gained increasing attention, particularly in developing economies, where they significantly contribute to employment, income generation, and innovation. Research shows that women's entrepreneurial growth positively impacts local economies by fostering innovation and creating jobs, particularly in regions where economic opportunities are scarce (Abdullahi et al., 2022). Women-owned businesses often reinvest their earnings into their communities, supporting social infrastructure, education, and healthcare, which further accelerates socio-economic development (Adebayo & Ogunleye, 2023). For example, studies in sub-Saharan Africa have revealed that women entrepreneurs reinvest 90% of their earnings into their families and communities, compared to men who reinvest only 40% (World Bank, 2022).

In terms of economic development, women's entrepreneurial activities are integral to reducing poverty and addressing inequality. In Nigeria, women entrepreneurs account for approximately 41% of micro, small, and medium-sized enterprises (MSMEs), contributing significantly to the economy's non-oil sector (Agunbiade & Lawal, 2021). These women-led businesses are key drivers of innovation and have been found to be more likely to introduce new products or services when provided with adequate financial resources (Musa & Olayinka, 2022). Innovation is essential for maintaining competitiveness and ensuring business survival in the face of market challenges, especially in regions where access to financial resources is limited.

Theoretical Framework

The Financial Inclusion Theory was best suited for the study as its theoretical frameworks. The theory provides a comprehensive framework for understanding the relationship between financial inclusion and the growth of women entrepreneurs. For instance, the theory focuses on the importance of providing equitable access to financial services for women entrepreneurs. This theory posits that financial inclusion is essential for promoting economic empowerment and business growth among women. By providing access to banking, savings, and insurance services, financial inclusion helps women entrepreneurs overcome barriers to accessing financial resources (Demirgüç-Kunt et al., 2021). As Longwe (1991), stated the theory emphasizes that financial inclusion can significantly impact the efficiency and performance of women-owned enterprises, as seen in studies where financial inclusion positively and significantly impacted the functioning of women-owned businesses.

Empirical Review

Amoah and Ntim (2021) investigated the relationship between financial inclusion and female entrepreneurship in Sub-Saharan Africa, with a particular focus on the moderating role of financial literacy. Drawing on data from the World Bank Enterprise Survey and applying hierarchical regression analysis, the authors found that financial inclusion positively influences entrepreneurial activity among women. However, the strength of this relationship was significantly enhanced when women possessed higher levels of financial literacy. This suggests that access alone is insufficient without the capability to understand and utilize financial tools effectively. While the study offers valuable policy implications, it does not fully capture informal financial systems, such as rotating savings and credit associations, which are common in many African economies and play a key role in women's financial behavior. Furthermore, the generalizability of the study is somewhat limited by its aggregate continental focus, as it does not disaggregate data to examine country-specific or regional variations in depth.

Mensah and Amoako (2021) conducted an empirical study on the relationship between access to finance and innovation in women-owned enterprises in Ghana. Using a sample of 210 women entrepreneurs and applying multiple regression analysis, they found a strong positive relationship between financial access and innovation outcomes, particularly in product development and service delivery. The study emphasized that access to credit enabled experimentation, investment in tools, and expansion into new markets. However, the research acknowledged that formal financial institutions often impose rigid conditions that restrict full participation by women. Additionally, the study did not explore how

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financial literacy or business planning mediates the relationship between finance and innovation, leaving room for a more integrated analysis of how various financial capabilities interact.

Sarma and Kodan (2020) explored the relationship between financial inclusion, innovation, and entrepreneurship in South Asia. Utilizing a blend of econometric analysis and policy review, the study revealed that financial inclusion - particularly digital financial services—positively influenced innovation among small business owners, including women. Access to mobile banking, digital loans, and micro-insurance allowed entrepreneurs to take more calculated risks and experiment with new business models. However, the study noted that digital financial tools are only effective when combined with appropriate training and infrastructure. It also highlighted the need for financial institutions to design inclusion strategies tailored specifically to women's needs. While comprehensive, the study's regional focus on South Asia means its conclusions must be cautiously applied in Sub-Saharan contexts, where infrastructural challenges and gender norms may differ substantially.

METHODOLOGY

This study employs a cross-sectional survey research design to investigate the effect of financial inclusion on the human capital development within the women entrepreneurs in North-Central Nigeria. This design enables the collection of empirical data to provide a comprehensive analysis of the influence of financial inclusion dynamics. The quantitative approach is centred on the administration of structured surveys aimed at identifying trends and patterns in human capital development particularly from the perspectives of women entrepreneurs. The target population focuses on women entrepreneurs operating in Micro, Small, and Medium Enterprises (MSMEs) across the six states of North-Central Nigeria-Benue, Nasarawa, Kogi, Kwara, Niger, and Plateau as well as the Federal Capital Territory (FCT) Abuja.

These women are involved in a range of sectors such as agriculture, retail, manufacturing, and services, which significantly contribute to both local and national economic development. The number of women-owned MSMEs in the North-Central region is 37,690. This subset is the primary population for the study, as it focuses on the effect of financial inclusion on the human capital development of women-entrepreneurs. A purposive sampling technique was adopted to select participants with a minimum of two years' experience. The study seeks to engage 396 respondents to ensure a diverse and representative sample across financial advice and affordable credits using a Taro Yamane formula in breaking down the population. Data collection was conducted through a structured online questionnaire distributed via email and professional platforms such as LinkedIn or google form.

The questionnaire is divided into sections covering demographic information, financial inclusion, and human capital development metrics. Respondents were required to indicate their level of agreement on a five-point Likert scale ranging from 5 (Strongly Disagree) to 1 (Strongly Agree). Quantitative data was analyzed using descriptive statistics and correlation analysis through SPSS software. Prior to the main survey, a pilot test involving 12 participants was conducted to assess the reliability and clarity of the instrument. Participation in the study is entirely voluntary. Informed consent was obtained from all participants, and strict confidentiality was maintained with all responses anonymized to protect the identities of respondents. Ethical clearance will be secured from an accredited institutional review board or ethics committee prior to the commencement of data collection. The population distribution and sample size for each state is broken down by total MSMEs and the proportion of women-owned MSMEs, as shown in Table 1:

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Table 1: Total MSMEs and Women-Owned MSMEs Distribution by State and Enterprise Size in North-Central Nigeria

State	Total MSMEs	Micro Enterprises	Small Enterprises	Medium Enterprises	Women-Owned MSMEs (19.6%)	Micro Enterprises (Women-Owned)	Small Enterprises (Women-Owned)	Medium Enterprises (Women-Owned)
Benue	24,330	9,479	13,271	1,580	4,769	1,858	2,601	310
Nasarawa	18,633	7,905	10,163	565	3,652	1,549	1,992	111
Kogi	20,203	7,686	12,078	439	3,960	1,506	2,367	86
Kwara	35,921	10,565	24,752	604	7,041	2,071	4,851	118
Niger	32,402	9,205	22,092	1,105	6,351	1,804	4,330	217
Plateau	29,116	7,764	19,087	2,265	5,707	1,522	3,741	444
FCT Abuja	32,956	10,095	18,408	4,453	6,459	1,979	3,608	873
Total	192,561	62,699	119,851	10,011	37,742	12,289	23,491	1,962

Source: SMEDAN, 2024

Sample Size and Sampling Technique

The sample size for this study was determined using Taro Yamane's formula, which is appropriate for finite populations and provides a simplified approach to calculating a representative sample size. This method is particularly useful when the population size is known, and a specific level of precision is desired. Taro Yamane's formula ensures that the selected sample accurately reflects the characteristics of the broader population - in this case, women entrepreneurs operating within MSMEs across North-Central Nigeria. Using a confidence level of 95% and a margin of error of 5%, the sample size was derived to balance statistical reliability with practical feasibility. The formula applied is:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n = required sample size

N = population size

e = margin of error (0.05)

Inputting into the formula, we have:

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$$n = \frac{37,742}{1+37,742(0.05)^2}$$

$$n = \frac{37,742}{1+37,742(0.0025)}$$

$$n = \frac{37,742}{1+94.355} = \frac{37,742}{95.355} = 396$$

$$n = 396$$

Model Specification

Tables and simple percentage was used as technique of analyzing the research questions. The study adopted Pearson Moment correlation analysis to determine the nature of impact while regression technique is used to test the hypotheses. Stated below is the functional regressions model for testing of the research hypotheses:

HCD = f(AFFC, FINA) (1)

The regression equation is linearized in the study objectives as:

$HCD = \beta_0 + \beta_1 AFFC + \beta_2 FINA + u_t$ (2)

Where;

HCD = Human Capital Development as a proxy for education and training (Dependent variable).

AFFC = Affordable Credits (Independent variable)

FINA = Financial Advice (Independent variable)

$_{ut}$ = the stochastic error term.

β_0 is a regression constant while $\beta_{1 \text{ and}}$ β_2 are the coefficients of the independent variables.

To test the significance of the individual explanatory variables and coefficients to determine whether there is an impact of the independent variables on the dependent variable, the p-value outputs from the regression analysis was employed. Explicitly, if the calculated p-value is less than the benchmark p-value of 0.05 at a scaled 5 percent level of significance, the independent variable is considered to have a significant impact on the dependent variable, and hence the null hypothesis is rejected.

Data Analysis and Results

Table 2: Responses on Financial Inclusion

Variables	Items	Agreement scale				
		SA Freq. (%)	**A Freq. (%)**	**N Freq. (%)**	**D Freq. (%)**	**SD Freq. (%)**
Financial Inclusion (FI)	I have access to formal banking services (e.g., credit, savings, insurance).	303 (66.0)	49 (10.7)	41 (8.9)	27 (5.9)	39 (8.5)
	Financial inclusion has improved my business operations.	306 (66.7)	49 (10.7)	40 (8.7)	24 (5.2)	40 (8.7)

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I face fewer barriers in accessing financial services compared to the past.	296 (64.5)	49 (10.7)	42 (9.2)	30 (6.5)	42 (9.2)
The financial inclusion services available to me meet my business needs.	300 (65.4)	52 (11.3)	44 (9.6)	25 (5.4)	38 (8.3)
Financial inclusion has improved my access to loans for business expansion.	142 (30.9)	49 (10.7)	176 (38.3)	13 (2.8)	79 (17.2)

Source: Researcher's Computation (Field Survey), 2025

A large majority of respondents, 303 (66.0%), strongly agreed that they have access to formal banking services, with an additional 49 (10.7%) agreeing. This suggests that most women entrepreneurs in the region are included within the formal financial system, which is a promising indicator of progress in bridging financial gaps that have historically limited women's participation in business. Nonetheless, 8.5% still strongly disagreed, indicating that a small but significant portion remains excluded, potentially due to geographical, technological, or socio-economic barriers.

Similarly, 306 respondents (66.7%) strongly agreed and 49 (10.7%) agreed that financial inclusion has improved their business operations. This underscores the positive impact that access to formal financial services has on the day-to-day functionality and efficiency of women-owned enterprises. Access to credit, savings, and other tools likely contributes to better capital management, planning, and risk mitigation.

On the issue of progress over time, 296 respondents (64.5%) strongly agreed and 49 (10.7%) agreed that they face fewer barriers in accessing financial services compared to the past. This trend reflects growing outreach by banks and microfinance institutions, increasing financial literacy, and the expansion of digital banking. However, 9.2% strongly disagreed, indicating that persistent barriers still exist for some, which may include documentation challenges, lack of collateral, or discriminatory practices.

Furthermore, 300 respondents (65.4%) strongly agreed and 52 (11.3%) agreed that the financial inclusion services available to them meet their business needs. This suggests that the types of financial products—such as savings accounts, microloans, financial advice and mobile banking—are relatively well-aligned with the operational demands of women entrepreneurs. Yet, 8.3% of respondents strongly disagreed, highlighting room for improvement in tailoring services to diverse business models and growth stages.

Remarkably, the final item reveals a more mixed perception. Only 142 respondents (30.9%) strongly agreed that financial inclusion has improved their access to loans for business expansion, while a substantial 176 (38.3%) were neutral, and 79 (17.2%) strongly disagreed. This indicates that although many women may be formally included in the financial system, the depth of that inclusion—particularly in terms of financial advice and access to growth capital remains limited. This gap points to the difference between having basic knowledge, an account or basic service access and actually receiving sufficient credit to scale operations.

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Table 3: Responses on Human Capital Development

Variables	Items	Agreement scale				
		SA Freq. (%)	**A Freq. (%)**	**N Freq. (%)**	**D Freq. (%)**	**SD Freq. (%)**
Human Capital Development (HCD)	I participate in training or workshops to improve my business skills.	272 (59.3)	94 (20.5)	45 (9.8)	25 (5.4)	23 (5.0)
	My business regularly introduces new or improved products or services.	266 (58.0)	101 (22.0)	43 (9.4)	25 (5.4)	24 (5.2)
	I prioritize learning new business techniques or technologies.	267 (58.2)	101 (22.0)	42 (9.2)	25 (5.4)	24 (5.2)
	I encourage knowledge sharing among my staff.	270 (58.8)	100 (21.8)	41 (8.9)	25 (5.4)	23 (5.0)
	I assess the skill gaps in my business and seek to address them.	278 (60.6)	90 (19.6)	41 (8.9)	26 (5.7)	24 (5.2)

Source: Researcher's Computation (Field Survey), 2025

The first item shows that a substantial number of respondents actively participate in training or workshops to enhance their business skills. Specifically, 272 women (59.3%) strongly agreed and 94 (20.5%) agreed, indicating that nearly 80% of the participants are committed to improving their entrepreneurial capabilities. This reflects a strong culture of continuous learning, which is crucial in adapting to changing market demands and leveraging financial resources effectively.

The second item reveals that 266 respondents (58.0%) strongly agreed and 101 (22.0%) agreed that their businesses regularly introduce new or improved products or services. This suggests a dynamic business environment where innovation is driven by a commitment to human capital development. The ability to develop and enhance offerings is often a function of both financial capacity and knowledge investment, reinforcing the connection between learning and innovation.

Similarly, 267 respondents (58.2%) strongly agreed and another 101 (22.0%) agreed that they prioritize learning new business techniques or technologies. This demonstrates that a majority of women entrepreneurs not only value knowledge acquisition but are also forward-thinking in embracing technological advancements and modern practices that can improve productivity and competitiveness.

The culture of internal learning is further highlighted in the fourth item, where 270 respondents (58.8%) strongly agreed and 100 (21.8%) agreed that they encourage knowledge sharing among staff. Promoting collaboration and continuous learning within the business environment supports employee development and strengthens organizational performance. Only a small percentage, 10.4% in total, disagreed or strongly disagreed, indicating widespread acceptance of internal knowledge exchange.

The final item assesses a strategic approach to human capital development, with 278 respondents (60.6%) strongly agreeing and 90 (19.6%) agreeing that they assess skill gaps in their business and take steps to address them. This shows that most respondents not only value training and learning but also adopt a proactive and structured approach to workforce development. By identifying areas of weakness and implementing targeted interventions, these entrepreneurs demonstrate strategic thinking and a commitment to long-term business growth.

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Table 4: Descriptive Statistics

	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob.	Obs.
HCD	3.950980	0.781398	-0.56555	3.001881	24.46815	0.000005	459
AFFC	4.162309	0.822205	2.271107	27.19646	11591.67	0.000000	459
FINA	3.963834	0.690167	-0.36327	2.569549	13.63894	0.001092	459

Source: Researcher's Computation (2025)

Human Capital Development (HCD) had a mean of 3.951, indicating a generally positive perception among respondents regarding the role of financial inclusion in skill acquisition, employee training, and workforce improvement. The standard deviation of 0.781 shows moderate variability in the responses. The negative skewness of -0.566 suggests that most respondents agreed or strongly agreed with the statements, consistent with earlier survey findings that highlighted active investment in personal and staff development. The kurtosis of 3.00 is almost perfectly aligned with a normal distribution, indicating a balanced spread of responses. However, the Jarque-Bera statistic of 24.47 and p-value of 0.000005 suggest a statistically significant, conforming non-normality of the data.

Affordable Credits (AFFC) recorded a high mean of 4.162, showing that many respondents perceive the financial resources given to them as sufficient for supporting business activities and growth. However, the standard deviation of 0.822 shows a relatively moderate dispersion in perceptions. What is particularly notable here is the positive skewness of 2.271, which indicates that while many respondents rated affordable credits positively, a smaller group may have rated it much higher than the average, contributing to a longer right tail. The kurtosis of 27.20 indicates a highly peaked distribution with heavy tails, suggesting that most responses were tightly clustered around the mean with a few extreme values. The Jarque-Bera statistic (11,591.67) and p-value (0.000000) indicate a significant deviation from normality, pointing to the varied experiences women entrepreneurs have with affordable credits, likely influenced by differences in enterprise size, sector, and access to institutional funding.

Financial Advice (FINA) recorded a mean of 3.964, suggesting generally positive experiences with access to financial advice. The standard deviation of 0.690 is relatively low compared to other constructs, indicating more consistent responses across the sample. The negative skewness of -0.363 suggests that the distribution leans slightly toward higher agreement, while the kurtosis value of 2.57 implies a flatter distribution than the normal curve, meaning responses were more evenly spread across the scale. The Jarque-Bera test statistic of 13.64 and p-value of 0.001092 confirm a statistically significant deviation from normality, although less extreme than in the affordable credits construct. This supports earlier findings that while most women are financially included, the depth and impact of this inclusion vary.

Correlation and Multicollinearity

Correlation analysis and multicollinearity diagnostics are essential components of regression modelling, especially when examining the relationships between multiple independent variables and a dependent variable. Correlation analysis helps determine the strength and direction of linear relationships between variables, while Variance Inflation Factor (VIF) is used to assess multicollinearity, the degree to which independent variables are linearly related to one another.

Pairwise correlation Result and Multicollinearity Results for the Model

In Table 5, the correlation results for Human Capital Development (HCD), one of the dependent variables in this study, are analysed in relation to the three independent variables: Viable Business Plan (VBP), Financial Adequacy (FA), and Financial Inclusion (FI). These results provide insight into how

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each dimension of financial accessibility influences the development of skills, knowledge, and workforce capacity among women entrepreneurs in North-Central Nigeria.

Table 5: Pairwise correlation Result and Multicollinearity Results for HCD

	HCD	FA	FI	
HCD	1 -----			**Centered VIF**
AFFC	0.5485 0.0000	1 -----		1.064452
FINA	0.5116 0.0000	0.1867 0.0910	1 -----	1.059418

Source: Researcher's Computation (2025)

Affordable Credits (AFFC) shows a strong, positive correlation with HCD, with a coefficient of 0.5485 and a p-value of 0.0000. This result indicates that women who perceive their financial resources as sufficient are more likely to improve their skills and invest in their education and training. This relationship highlights the central role of financial inclusion in enabling women business owners to develop themselves and their teams, contributing to improved productivity and business sustainability.

Financial Advice (FINA) displays a moderately strong correlation with HCD at 0.5116, also statistically significant at the 0.0000 level. This suggests that access to financial advices services—such as credit, savings, and insurance, positively influences the ability of women entrepreneurs in North-Central Nigeria to invest in human capital. This supports earlier interpretations that financial inclusion, beyond providing basic financial access, can play a transformative role when it enables training, skill development and employee empowerment.

Turning to the VIF results, all two independent variables show values well below the threshold of 10: FA (1.064), and FI (1.059). These low VIF scores confirm that multicollinearity is not a concern in this model, and the independent variables are not excessively correlated with one another. This means that each variable can independently explain its share of variance in the dependent variable, HCD, without inflating standard errors or compromising the stability of the regression coefficients.

TEST OF HYPOTHESES

Ordinal Logistic Regression Results

Ordinal logistic regression was employed to examine the relationship between financial inclusions on the human capital development of women entrepreneurs in North-Central Nigeria. This analytical technique is appropriate for the study because it captures the ordinal nature of the dependent variables, Human Capital Development (HCD) while assessing the influence of key financial inclusion indicators: Affordable Credits (AFFC), and Financial Advice (FINA).

As discussed earlier, HCD represents a key dimension of entrepreneurial development and includes components such as skill development, employee training, and knowledge sharing. This regression model assesses how the independent variables; Affordable Credits (AFFC) and Financial Advice (FINA)—predict the likelihood of women entrepreneurs experiencing higher levels of human capital development.

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Table 6: Ordinal Regression Parameter Estimate

Method: ML - Ordered Logit (Newton-Raphson / Marquardt steps)

Dependent Variable: HCD

Variable	Coefficient	Odd Ratios	Std. Error	z-Statistic	Prob.
AFFC	0.1635	1.1777	0.0532	3.0756	0.0021
FINA	0.0234	1.0236	0.0090	2.5974	0.0102
Reliability estimates					
Pseudo R-squared	0.5692				
LR statistic	72.0086				
Prob(LR statistic)	0.0000				

Source: Researcher's Computation (2025)

Beginning with Affordable Credits (AFFC), it shows a statistically significant effect on human capital development, with a coefficient of 0.1635, odds ratio of 1.1777, z-statistic of 3.0756, and a p-value of 0.0021. This indicates that a one-unit increase in affordable credits increases the odds of a woman entrepreneur achieving higher HCD (education and training) by 17.77%. These results underscore the importance of not just having access to finance but having sufficient and consistent financial resources to support the development of internal capabilities, including training staff, hiring skilled labour, and acquiring knowledge relevant to business sustainability.

Financial Advice (FINA), while having a relatively smaller effect, remains a statistically significant predictor of human capital development. With a coefficient of 0.0234, odds ratio of 1.0236, z-statistic of 2.5974, and a p-value of 0.0102, the results suggest that an increase in financial advice services increases the odds of experiencing higher HCD by 2.36%. Although the magnitude is smaller compared to AFFC, this finding is still meaningful, as it supports the argument that financial inclusion, through tools such as advice to credit, savings, and insurance—can indirectly promote human capital development by providing the financial flexibility needed to invest in people and knowledge-based resources.

The Pseudo R-squared value of 0.5692 indicates that approximately 56.9% of the variance in human capital development among women entrepreneurs in North-Central Nigeria is explained by the model. This suggests that financial inclusion variables play a substantial role in influencing the extent to which women entrepreneurs are able to invest in their business and employee skill development, training, and knowledge enhancement.

The Likelihood Ratio (LR) statistic of 72.0086 further supports the model's reliability. This statistic tests the null hypothesis that all the model's coefficients are equal to zero. In this case, the p-value associated with the LR statistic is 0.0000, indicating that the model is highly statistically significant. This means that the inclusion of the independent variables, AFFC, and FINA, significantly improves the model's ability to predict human capital development outcomes compared to a model without these predictors.

Discussion of Findings

The study revealed that Financial Inclusion (FI) has a positive and significant effect on Human Capital Development. The implication here is that access to formal financial services—such as savings, loans, mobile banking, and insurance, creates a financial environment in which women entrepreneurs in North-Central Nigeria are more empowered to make long-term investments in their businesses,

including the up skilling of themselves and their workforce. This shows that financial inclusion does not only ease access to capital but also fosters a sense of financial advice, security and stability, which encourages forward-looking decisions, such as human capital development. This finding corroborates the work of Demirgüç-Kunt *et al.* (2022), who concluded that financial inclusion positively correlates with small business growth through improved investment in human capital and digital tools, especially among women in lower-income countries. Likewise, Amoah and Ntim (2021), in their study on financial inclusion in Ghana, found that access to a broad range of financial services led to a significant increase in non-financial investments among women entrepreneurs, including in staff training and health coverage for employees. The outcome of this study also complements the broader perspective that inclusive financial systems are not just about access to funds but about empowering business owners to build enterprises with strong, capable, and well-supported human structures.

CONCLUSION AND RECOMMENDATIONS

Based on the findings and extensive analysis conducted in this study, it is evident that financial inclusion plays a fundamental role in shaping the human capital development of women entrepreneurs in North-Central Nigeria. In conclusion, the study showed that financial inclusion indeed has a significant effect of on HCD of women entrepreneurs in north central Nigeria; and therefore, enhancing financial inclusion for women entrepreneurs is not simply a matter of providing capital but involves fostering an ecosystem where planning, adequacy of resources, and inclusive finance intersect to support long-term development is necessary. For policies and interventions to be effective, they must address these dimensions holistically, promoting both the economic and social empowerment of women entrepreneurs.

To this extent, the study recommends that since it showed that financial inclusion contributes to human capital development, it is critical that stakeholders, especially financial regulators and fintech companies continue to expand women-focused financial inclusion programs. This should involve designing simple mobile platforms that allow women to open accounts, access credit, and make payments. These platforms must be complemented by digital literacy programs delivered in local languages to ensure women can effectively navigate and utilize digital tools for business growth.

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