

Exploring the impact of socioeconomic factors on the use of digital communication tools for poultry farming in South-West Nigeria

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Abstract

The study examined how socioeconomic factors shape the use of Digital Communication Tools (DCTs) among poultry farmers in South-West Nigeria. The research aimed to describe the farmers' socioeconomic profiles, gauge their awareness of DCTs and assess the extent to which these tools are used in poultry production. A multistage sampling technique was adopted to select 322 poultry farmers. Data were collected through structured questionnaires and analysed using descriptive statistics and Ordinary Least Squares regression (OLS). Findings showed that the majority of respondents were male (76.2%) with an average age of 45 ± 8.42 years, indicating a relatively mature and active farming population. While there was near-universal awareness of platforms like WhatsApp, Facebook, Google and YouTube, fewer respondents (55.8%) were familiar with more specialised tools such as poultry management software. Notably, only 47.3% reported frequent use of DCTs, pointing to gaps between awareness and actual adoption. The OLS regression results identified age ($\beta = -0.438$), marital status ($\beta = 0.190$), income ($\beta = 0.313$) and stock size ($\beta = 0.128$) as significant factors influencing DCTs usage. Younger farmers with higher incomes and larger flock sizes were more inclined to adopt these tools. The study concludes that socioeconomic characteristics play a crucial role in DCTs adoption. Bridging the awareness-utilisation gap through targeted interventions may help drive wider adoption and enhance productivity in poultry farming.

Keywords: awareness gap, behavioural determinants, information access, technology utilisation

1 Introduction

In today's rapidly evolving agricultural sector, Digital Communication Tools (DCTs) are playing an increasingly critical role in enhancing farm productivity and efficiency (Sonka *et al.*, 2024). Poultry farming, a vital component of Nigeria's agricultural economy, contributes significantly to food security, employment and economic growth (Birhanu *et al.*, 2022). As one of Africa's leading poultry producers, Nigeria depends heavily on this sub-sector not only for local consumption but also for export revenue. The adoption of DCTs presents a major opportunity to transform poultry production through improved communication, information access, and real-time decision-making (FAO, 2019).

DCTs encompass a wide range of technologies, from mobile applications and online platforms to sensor devices and data analytics systems (Alahi *et al.*, 2023). These innovations support smart farming by enabling precision monitoring and informed decision-making (Abiri *et al.*, 2023). However, access and utilisation among poultry farmers vary due to factors such as cost, infrastructure, and local farming challenges (Olanrewaju *et al.*, 2021).

Existing studies, particularly from developed countries, have shown that digital tool adoption is shaped by factors such as education, profession, openness to innovation and technological orientation (Maina *et al.*, 2023; Rico *et al.*, 2023;). Recent research has also explored how socioeconomic status and crisis-related pressures influence farmers' technology use (Akudugu, 2023; Kopler *et al.*, 2023). Des-

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pite growing interest in this area, limited attention has been given to how these factors specifically affect poultry farmers in Nigeria.

This study seeks to fill that gap by exploring the adoption patterns of DCTs and the socioeconomic drivers influencing their use in poultry production across Southwestern Nigeria. The study specifically aimed to: examine the socioeconomic characteristics of poultry farmers in the study area, assess their level of awareness of DCTs, identify their reasons for using DCTs in poultry farming, determine the extent of DCTs utilisation in poultry farming and assess the socioeconomic factors influencing the use of DCTs among poultry farmers.

2 Materials and methods

2.1 Study area

The study was conducted in South-West Nigeria, encompassing Lagos, Ogun, Oyo, Osun, Ondo and Ekiti states (Fig. 1). Geographically, the region lies between latitudes 58° N and 910° N, and longitudes 231° E and 600° E, spanning approximately 76,283 km², which is roughly 12 % of Nigeria's landmass. It is predominantly inhabited by the Yoruba ethnic group, with an estimated population of 27.5 million. Agriculture remains a major economic activity, complemented by commerce, manufacturing, and service sectors (Ogundare, 2016). Johnson *et al.* (2020), in their quantile regression study of poultry production in South-West Nigeria, identified Lagos, Ogun and Oyo as among the leading poultry-producing states in the region. The area also has a high literacy rate, averaging around 70 % across the six states (Sasu, 2022), along with relatively better digital infrastructure and a concentration of commercial poultry clusters (Adeniyi & Adeeko, 2024). A report by the Nigeria Communications Commission (NCC, 2022) also shows that internet penetration in the region exceeds 60 %, making it more digitally connected compared to other regions.

South-West Nigeria was purposively selected due to its high concentration of commercial poultry farms, strong access to digital tools and services and the presence of several agricultural research institutions, extension services and ICT-focused enterprises. These socio-economic conditions make the region an ideal context for investigating the adoption and usage patterns of digital communication tools among poultry producers.

2.2 Target population and sample size

The target population for the study consisted of registered commercial poultry farmers operating in the selected zones

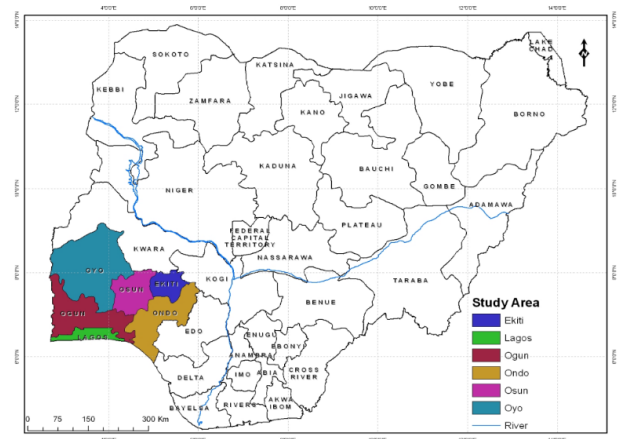


Fig. 1: Map of Nigeria showing the selected states in the southwestern region.

of South-West Nigeria. These were defined as farmers managing at least 500 birds, based on information obtained from the Poultry Association of Nigeria (PAN). The final sample comprised 322 respondents, selected across nine PAN zones from Lagos, Ogun and Oyo states.

2.3 Research design and sampling technique

This study employed a quantitative cross-sectional survey design, appropriate for capturing the current level of Digital Communication Tool (DCT) usage among poultry farmers at a specific point in time. This design supports the collection of standardised data across a wide geographic area, allowing statistical analysis of patterns and relationships between socioeconomic variables and DCTs adoption.

A multistage sampling approach was used. In the first stage, Lagos, Ogun and Oyo states were purposively selected based on their dominance in poultry production (Adeyonu *et al.*, 2016; Omodele & Okere, 2014). Using the PAN as a sampling frame, the second stage involved randomly selecting 60 % of PAN zones in each state, three zones in Oyo and four zones each in Ogun and Lagos. A list of poultry farmers in the selected zones was obtained and commercial farmers owning at least 500 birds were identified. In the final stage, 25 % of registered commercial poultry farmers were randomly selected from each zone, resulting in a total sample size of 322 respondents.

2.4 Methods of data collection

Data were collected using a structured, pretested questionnaire divided into four sections: Section A: Socioeconomic characteristics of the respondents; Section B: Awareness of various digital communication tools (DCTs); Section C: Reasons for using DCTs; and Section D: Extent

of DCT use in poultry farming. The questionnaire was reviewed by agricultural extension experts to ensure face and content validity, and it was pretested with 30 poultry farmers in a non-sampled PAN zone to refine question clarity and response reliability.

Three trained enumerators conducted face-to-face interviews with the selected farmers in their respective zones to ensure clarity in understanding the questions and to minimise non-response. Enumerators used both paper-based and digital forms (via Kobo Toolbox) to capture data. In addition, two trained coders handled data entry and a briefing session was held to standardise the coding process and prevent inconsistencies.

Awareness of DCTs was measured on a binary scale: 'aware' (1) or 'not aware' (0), and mean scores were used to classify respondents into high or low awareness groups. Reasons for using DCTs were assessed using a 4-point Likert-type scale: 'not a reason' (0), 'minor reason' (1), 'moderate reason' (2), and 'major reason' (3). Similarly, the extent of DCT usage was rated on a 4-point scale ranging from 'not at all' (0), 'rarely' (1), 'to a lesser extent' (2), to 'to a large extent' (3), with mean values used to categorise utilisation as high or low.

2.5 Data analysis

The data obtained were cleaned and entered into the International Business Machines Corporation Statistical Package for Social Sciences (IBM SPSS) Statistics version 20 for analysis. The data were subjected to both descriptive and inferential statistics. Descriptive statistics included frequency, percentages, mean, ranking and standard deviation, while the inferential statistics employed was OLS regression.

Ordinary Least Square regression was used to investigate the socioeconomic factors influencing DCTs usage for poultry farming the model is specified as:

$$Y = \beta_0 + \beta_1A + \beta_2S + \beta_3Ms + \beta_4Edu + \beta_5Hs + \beta_6In + \beta_7SS + \beta_8YP + \varepsilon$$

Where:

Y = Extent of DCTs use, A = Age (years), S = Sex (1 = Male, 0 = Female), Ms = Marital status (1 = Married, 0 = Otherwise), Edu = Years of formal education (years), Hs = Household size (number of people), In = Monthly income (₦), SS = Stock size (number of birds), YP = Years spent in poultry production (years), β_0 = Intercept, β_{1-8} = Coefficients for each independent variable, ε = Error term.

Table 1: Distribution of the socioeconomic characteristics of poultry producers in South-West Nigeria ($n = 322$).

Variables	Categories	%	Mean
Age (years)	≤ 30	15.3	45 ± 8.4
	31–40	24.2	
	41–50	32.9	
	51–60	19.9	
	>60	7.6	
Gender	Male	76.2	
	Female	23.8	
Marital status	Single	4.1	
	Married	81.6	
	Divorced	10.5	
Years of formal education	Widowed	3.9	10 ± 3.6
	1–6	15.9	
	7–12	51.2	
Religion	>12	32.9	
	Christianity	49.1	
	Islam	44.9	
Household size	Tradition	6.0	5 ± 1.7
	1–4	22.9	
	5–8	69.8	
Primary occupation	>8	6.9	
	Farming	60.5	
	Trading	34.3	
	Artisans	0.2	
Monthly income (₦)	Civil service	5.0	106,440 ± 48,769 (≈65.47 USD*)
	≤50,000	17.4	
	51,000–100,000	43.0	
	101,000–150,000	22.1	
	151,000–200,000	13.9	
Years of experience in poultry production	>200,000	2.9	13 ± 4.0
	1–10	26.7	
	11–20	66.1	
	21–30	7.2	
Scale of production (stock size)	>30	7.9	
	500–2000 birds (SS)	43.2	
	2001–5000 birds (MS)	50.4	
Type of poultry enterprise	>5000 birds (LS)	6.4	2204 ± 1522.7
	Egg	40.7	
	Meat	10.5	
	Meat and egg	48.8	

*50,000 ₦ = 30.25 USD at the time of the study; SS=small-scale; MS=medium-scale; LS=large-scale.

3 Results

3.1 Socioeconomic characteristics of poultry producers

As shown in Table 1, most respondents were within their productive age group, with the majority between 31 and 50 years. This suggested that poultry farming in the area was largely managed by middle-aged individuals who were active and experienced. Males dominated the enterprise, suggesting that poultry production remained a male-driven ac-

tivity in the region. The fact that most respondents were married implied the possibility of family labour support in farm operations.

The results further showed that the farmers were moderately educated, as many had at least seven years of formal education. Such literacy levels are expected to enhance their capacity to adopt innovations and effectively utilise DCTs in poultry management and marketing. The distribution by religion reflected the common faith patterns in the region, while the average household size of about five persons suggested access to a moderate labour force. Farming was the major occupation among respondents, with poultry serving as a major income source. The mean monthly income of ₦106,440.60 (≈65.47 USD) indicated that most producers operated at a modest commercial scale. The majority had over ten years of poultry farming experience, showing stability and accumulated technical knowledge in the enterprise. Medium-scale operations were predominant, and nearly half of the farmers were involved in both meat and egg production, reflecting enterprise diversification for better income security.

3.2 Awareness of digital communication tools

The data in Table 2 indicate that awareness of common digital communication tools such as Facebook, WhatsApp, YouTube and security cameras was universal among poultry producers. Awareness of video-conferencing and general social media platforms was also very high. In contrast, knowledge of more specialised DCTs such as poultry management software, sensor technologies and project-management applications was relatively low. Overall, slightly more than half of the respondents demonstrated a high level of awareness of DCTs, indicating that while farmers are well exposed to general communication technologies, their familiarity with tools specifically designed for poultry production remains limited.

3.3 Reasons for using digital communication tools

The results from Table 3 show that poultry producers primarily used DCTs to interact and exchange information with fellow farmers, source poultry inputs, and access market prices. They also relied on these tools to connect with customers, suppliers and experts, as well as to market their products and participate in online training programmes. Moderate levels of use were observed for learning poultry management skills, reducing extension costs and time, and obtaining weather and production information. Overall, the results suggest that poultry producers mainly applied DCTs for information exchange and market-related activities rather than for technical or record-keeping functions.

Table 2: Distribution of the awareness of digital communication tools (DCTs) among poultry producers in South-West Nigeria (n = 322).

Type of DCTs	%
Skype	98.8
Zoom	99.6
Google	100.0
Websites	80.8
Facebook	100.0
WhatsApp	100.0
YouTube	100.0
Instagram	95.0
Poultry management software	55.8
Trello	23.4
Sensors	68.4
Security cameras	100.0
Level of awareness	
High	54.2
Low	45.8

Table 3: Distribution of the reasons for using digital communication tools (DCTs) among poultry producers in South-West Nigeria.

Reasons for using DCTs in poultry farming	Mean score		Decision level
	(\bar{x})	SD	
Communicate & interact with other farmers	2.80	0.45	High
Source poultry inputs online	2.75	0.51	High
Access market prices	2.73	0.52	High
Link with customers, suppliers & experts	2.70	0.55	High
Market or advertise poultry products	2.60	0.62	High
Participate in online training	2.55	0.60	High
Learn poultry management skills	2.45	0.65	Moderate
Reduce cost & time in extension services	2.40	0.68	Moderate
Receive weather updates & alerts	2.35	0.70	Moderate
Access modern poultry production techniques	2.30	0.75	Moderate
Record & keep farm data & inventory	2.25	0.80	Moderate
Monitor farm performance via apps	2.20	0.82	Moderate

3.4 Extent of digital communication tool use

Table 4 shows that social media platforms, particularly Facebook and WhatsApp, were the most frequently used DCTs among poultry producers in South-West Nigeria. Moderate use was recorded for platforms such as Instagram and sensor-based technologies, while tools like Skype, Zoom and websites were used less often. The least utilised tools

were poultry management software and project-management applications, indicating limited adoption of advanced or specialised digital solutions for poultry operations.

Table 4: Distribution of the extent of digital communication tool (DCT) use among poultry producers in South-West Nigeria.

Type of DCTs	Mean score ± SD	Rank	Decision level*
Skype	0.67 ± 0.13	9th	Low
Zoom	1.17 ± 0.23	4th	Moderate
Google	2.06 ± 0.41	3rd	High
Websites and blogs	0.79 ± 0.16	8th	Low
Facebook	2.75 ± 0.55	1st	High
WhatsApp	2.74 ± 0.55	2nd	High
YouTube	0.89 ± 0.18	6th	Low
Instagram	1.12 ± 0.22	5th	Moderate
Poultry management software	0.24 ± 0.05	10th	Low
Trello	0.09 ± 0.02	11th	Low
Sensors	0.84 ± 0.17	7th	Low

*High = 2.00 – 3.00; Moderate = 1.00 – 1.99; Low = 0.00 – 0.99.

3.5 Socioeconomic factors influencing digital communication tool use

Several socioeconomic characteristics were found to significantly influence the use of DCTs among poultry farmers (Table 5). Age, marital status, education level, income and stock size emerged as important predictors of adoption, indicating that younger, better-educated and higher-income farmers with larger flock sizes were more likely to use DCTs in their operations. In contrast, sex, household size and years of poultry-farming experience did not significantly affect digital tool usage, suggesting that these characteristics play a limited role in determining technology adoption in the poultry sector.

4 Discussion

4.1 Socioeconomic profile and determinants of digital communication tool use

The socioeconomic characteristics of poultry producers in South-West Nigeria provided important insights into factors influencing the adoption of DCTs. Most respondents were aged between 31 and 50 years, representing an active and productive group that is open to innovation (Akintunde *et al.*, 2020). However, a negative association between age and DCTs use indicated that younger farmers were more likely to

Table 5: Socioeconomic factors influencing digital communication tool use among poultry producers in South-West Nigeria.

Variable	B	SE	Beta	t-value	Sig.
(Constant)	1.414	0.168		8.420	0.000
Age	-0.021	0.003	-0.438	-7.062	0.000
Sex	0.022	0.048	0.019	0.463	0.644
Marital status	0.140	0.033	0.190	4.253	0.000
Years of formal education	0.019	0.009	0.137	2.133	0.033
Household size	0.011	0.014	-0.037	-0.753	0.452
Income	3.215×10 ⁻⁶	0.000	0.313	4.129	0.000
Stock size	4.211×10 ⁻⁵	0.000	0.128	2.079	0.038
Years in poultry production	0.005	0.005	0.040	0.976	0.329

adopt digital tools than older ones, who may be less familiar or comfortable with new technologies (Afolabi *et al.*, 2024; Amoussouhoui *et al.*, 2024; Ayalew *et al.*, 2025).

The predominance of males (76.2%) reflects traditional gender roles and greater male access to productive resources, though gender did not significantly predict DCT use (Michael *et al.*, 2019). Marital status, however, was a positive factor. Married farmers tend to benefit from household cooperation, financial pooling, and joint decision-making, which can enhance willingness to adopt DCTs (Malabayabas *et al.*, 2023; Adebayo *et al.*, 2020).

Education emerged as a strong determinant of DCT use. Many respondents possessed more than twelve years of formal education, which supports digital literacy and openness to innovation (Ogunjobi, 2024; Okwuokenye *et al.*, 2023). Farmers with higher educational attainment are better equipped to understand and apply digital information in production and marketing. Income also showed a positive influence, consistent with Balana & Oyeyemi (2022), since higher-earning farmers can afford smartphones, data services, and software tools. The mean monthly income of ₦106,440.60 (≈US 65.47at1,626/US) suggested moderate financial capability for sustaining digital engagement (Dennis *et al.*, 2024).

Experience and scale of operation further shaped adoption patterns. Respondents with longer experience displayed confidence in applying DCTs to improve productivity (Omodara, 2023). Medium- and large-scale producers were more likely to utilise DCTs for management and marketing, as larger enterprises require better coordination and record-keeping (Udoh *et al.*, 2024; Ajayi *et al.*, 2023). Conversely, household size and years of farming experience were not statistically significant predictors of DCTs use, implying that while they influence general farm behaviour, they do not directly affect technology adoption decisions.

Overall, the major determinants of DCTs adoption among poultry producers were age, marital status, education, income and scale of production. These findings highlight the need for tailored training and financial inclusion programmes to strengthen farmers' digital capacity and competitiveness in poultry agribusiness.

4.2 Awareness, motivations and patterns of digital communication tool use

The study revealed that poultry producers in South-West Nigeria possessed a high level of awareness of DCTs commonly used for agricultural communication and management. Farmers were most familiar with widely accessible platforms such as WhatsApp, Facebook, Google and YouTube, reflecting their integration into daily routines and their value for peer interaction and market information exchange. The prominence of these tools supports findings by Akin-tunde *et al.* (2020) and Edeoghon & Esene (2018), who noted that farmers' digital literacy and preference for familiar platforms enhance participation in information-sharing networks.

Awareness also extended to visual and interactive tools such as Instagram, Zoom and Skype, which facilitate remote meetings and online learning. However, the relatively lower recognition of specialised applications like Trello, poultry management software and sensor technologies pointed to a limited understanding of advanced DCTs. This gap highlights the need for targeted capacity-building and educational interventions to promote the adoption of more technical DCTs (Adebayo *et al.*, 2020; Michael *et al.*, 2019).

Motivationally, poultry producers used DCTs primarily for communication, marketing and sourcing inputs. Many respondents relied on social media groups and messaging platforms to exchange knowledge with fellow farmers and access timely market price updates. This supports Umehai *et al.* (2024) and Ejem *et al.* (2023), who found that DCTs foster social learning and collective problem-solving in rural agricultural systems. The use of DCTs to contact customers, suppliers and experts further underscores their role in strengthening market linkages and technical support networks (Mwakifwamba *et al.*, 2024; Nwangwu *et al.*, 2024).

Beyond communication, DCTs also serve economic and informational purposes. Farmers utilise search engines like Google to obtain real-time information on poultry diseases, feed composition and production techniques. Ragasa *et al.* (2020) observed that such open-access tools enhance decision-making and supplement traditional extension systems. Similarly, the visual appeal of Instagram facilitates marketing of poultry products and peer demonstration of best practices (Kawerau *et al.*, 2023).

In terms of usage patterns, Facebook and WhatsApp emerged as the most frequently used platforms, confirming their dominance in agricultural communication due to affordability and simplicity. Afolabi *et al.* (2024) and Gwazo *et al.* (2023) similarly observed that these platforms remain the most accessible for smallholder farmers in Nigeria. The growing reliance on these tools illustrates how farmers integrate mobile-based communication into everyday management and market interaction (Adejo, 2019). However, the limited use of professional or specialised DCTs such as sensor systems, management software or online conferencing platforms reflected a digital divide between general-purpose and advanced technologies.

Barriers such as high cost, technical complexity and limited connectivity continue to restrict the adoption of advanced DCTs. Ayim *et al.* (2020) emphasised that infrastructural and educational limitations hinder farmers' ability to explore more sophisticated tools. Likewise, the low utilisation of productivity and record-keeping apps suggested a need for context-appropriate, locally designed digital solutions. The finding that over half (52.7%) of respondents demonstrated low utilisation of DCTs indicated that despite high awareness, actual engagement remained shallow. Abdulai *et al.* (2023) therefore argue that digital transformation in agriculture depends not only on awareness but also on consistent training, affordability and institutional support to enable effective use.

Overall, while poultry producers show high awareness and motivation to use digital tools for communication and marketing, the transition toward advanced, knowledge-driven applications remains limited. Bridging this gap requires improved training, digital literacy enhancement and affordable access to technology tailored to the needs of small-scale poultry farmers.

4.3 Implications for policy, training, and practice

The findings underscore the need for policies and programs that strengthen farmers' access to affordable and user-friendly DCTs. Strengthening digital extension systems will enhance knowledge dissemination and bridge the gap between farmers and advisory services. This aligns with the National Agricultural Technology and Innovation Policy (NATIP, 2022–2027), which emphasises integrating digital platforms such as the National Electronic Extension Platform (NEEP) to improve agricultural service delivery in Nigeria.

Continuous farmer training and capacity development are essential to improve digital literacy and tool utilisation. Structured workshops, mobile-based learning and demonstration projects can help farmers gain practical skills for

using platforms such as WhatsApp and sensor-based technologies more effectively. This supports the FAO Digital Village Initiative (2025), which promotes digital transformation in rural communities through skills development and innovation. Collaboration among government agencies, private stakeholders and research institutions is also crucial for designing localised and context-specific DCTs tailored to small-scale poultry producers. Partnerships between ICT companies and extension agencies can help develop solutions that address farmers' production and marketing needs. As Izuogu *et al.* (2023) emphasized, digitalisation efforts in Nigeria will only succeed when infrastructure, training and institutional support are effectively integrated.

Finally, addressing barriers such as high data costs, unreliable internet connectivity and limited technical know-how remains critical. Providing subsidised data plans, establishing rural ICT hubs and enhancing extension personnel's digital competence will promote wider adoption of DCTs and increase productivity in the poultry sector. These actions can help actualise the goals of NATIP (2022–2027) and ongoing FAO-led initiatives for building inclusive, tech-driven agricultural systems in Nigeria.

5 Conclusions

This study showed that socioeconomic characteristics significantly shaped the adoption of digital communication tools among poultry farmers in South-West Nigeria, underscoring that awareness alone does not translate into meaningful use. The central implication is that digital uptake depends on farmers' capacity, resources and confidence to integrate these tools into production and marketing decisions.

Strengthening digital literacy – particularly for older and less-educated farmers – remains essential for closing the awareness–utilisation gap. Policies that support youth engagement, affordable access to smartphones and data services, and targeted training can accelerate adoption. Collaboration among ICT companies, extension agencies and farmer cooperatives can further reduce the cost of advanced tools and ensure that digital solutions are relevant to small-scale producers.

Integrating digital platforms into extension systems will enhance advisory support, information flow and market connectivity. Future research should examine regional differences in digital uptake and assess the usability and cost-effectiveness of specific tools for smallholders. Advancing these areas will help improve productivity, competitiveness and the long-term sustainability of poultry farming in South-West Nigeria.

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Ethics statement

Each participant was informed of the conditions for participation and provided written consent. The study was conducted in accordance with the Belmont Report (1979) Ethical Principles and Guidelines for the Protection of Human Subjects of Research. Ethical approval was granted by the Bowen University Ethics Committee under approval number BUI/COAES/AGR/0004.

Conflict of interest

The authors declare that they have no competing interests.

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