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SHORT NOTE

Extension Delivery Strategies, Challenges, and Best Practices of Agricultural Extension Workers (AEWs)

Lealyn M. Gumban[1]* and Ardniel A. Baladjay[2]

[1]*Bachelor of Science in Agriculture Department, Davao Oriental State University, City of Mati, Davao Oriental, 8200 Philippines*
ORCID Lealyn M. Gumban: https://orcid.org/0000-0003-1309-490X
[2]*University of Southern Mindanao, Kabacan, Cotabato, 9407 Philippines ORCID Ardniel A. Baldjay: https://orcid.org/0009-0001-6489-2787*

*Corresponding author: *gumban.dorsu@gmail.com*

ABSTRACT

Agricultural Extension Workers (AEWs) in Davao Oriental, Philippines, are vital in linking research institutions with farming communities to promote productivity and sustainable practices. Yet, they face critical challenges, limited resources, inadequate training, logistical constraints, and low farmer receptivity. This study, involving 155 of 199 AEWs, examined strategies, best practices, and systemic barriers. The findings show reliance on face-to-face interactions, technology demonstrations, and Farmers Field Schools, while digital tools remain underused due to low literacy and access. About 58% of AEWs cited mobility and logistical issues as their foremost challenge, followed by 44% mentioning funding gaps and 28% reporting farmer resistance to innovation, patterns that mirror global trends. Recommended interventions include boosting logistical and financial support, strengthening training, and improving coordination between LGUs and extension agencies. This study highlights the urgent need for context-driven, localized solutions and provides actionable insights for policymakers and stakeholders to empower AEWs, advance rural development, ensure food security, and help smallholder farmers adapt to climate change and economic pressures.

Keywords: *Capacity building, knowledge transfer, rural development, stakeholder engagement, technology adoptio*

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Agricultural Extension Workers (AEWs) in Davao Oriental, Philippines, play a critical role in bridging the gap between agricultural research and farming communities, delivering essential knowledge and technologies to improve productivity and sustainability in rural areas (Arowosegbe et al., 2024). Despite their importance, AEWs face numerous challenges, including limited resources, inadequate training, and difficulties addressing the diverse needs of farmers (Indraningsih et al., 2023). While strategies such as participatory approaches, the use of digital platforms, and farmer-to-farmer knowledge sharing have been identified as effective solutions (Arundhathi et al., 2025; Dilleen et al., 2023; Izuchukwu et al., 2023), AEWs continue to struggle with systemic issues like insufficient funding and weak infrastructure, which hamper their ability to provide consistent and impactful services (Raveena et al., 2022).

Unlike earlier studies conducted in broader national or international contexts, this research focused specifically on the local experiences of AEWs operating under devolved governance structures in Davao Oriental. It examined how local institutional dynamics, limited digital literacy, and geographic isolation shape extension delivery, dimensions often overlooked in global extension literature.

This study offered high-impact insights by documenting field-tested extension strategies, context-specific challenges, and adaptive best practices that have demonstrably improved service delivery and farmer engagement in Davao Oriental. It aimed to examine the extension delivery strategies employed by AEWs, determined the major challenges that affected their performance and service delivery, and identified best practices that could be replicated to strengthen the local extension system. It also sought to provide evidence-based insights to guide policymakers and stakeholders in improving institutional support and enhancing the overall effectiveness of agricultural extension services in the province. This study is vital for the Philippine economy, as AEWs directly influence agricultural productivity, which remains a cornerstone of rural livelihoods and food supply. By identifying best practices and systemic barriers, the study provides actionable insights for policymakers to strengthen extension services, enhance farmer access to knowledge and resources, and promote sustainable agriculture, key drivers of food security, employment, and inclusive rural development in a sector that contributes nearly a tenth of the national GDP.

By presenting grounded, locally derived findings, the study contributes new evidence to the discourse on decentralized and participatory agricultural extension, offering lessons relevant to other provinces facing similar resource and governance constraints. Given agriculture's central role in the Philippine economy, employing about 11 million workers (≈ 22–24 % of the country's total labour force) and contributing around 9% of national GDP (Philippine Statistics Authority, 2024), addressing

agricultural-employment-worker challenges is critical (Custodio and Sombilla, 2025). The findings are expected to contribute to strengthening the national extension system, improving institutional responsiveness, and fostering innovation-driven, sustainable agricultural development.

The study used a complete enumeration sampling approach to engage all 199 AEWs across Davao Oriental, ensuring full representation of the province's extension workforce. Of these, 155 (77.88%) participated despite heavy workloads and scheduling constraints, allowing for a robust and inclusive assessment of extension delivery systems. Data were collected through one-on-one interviews using a structured questionnaire and focus group discussions (FGDs) with Municipal Agriculturist's Offices (MAOs). The interviews focused on extension delivery strategies, while FGDs explored challenges, best practices, and recommendations for improvement. Focus group discussions (FGDs) were conducted with representatives from the Municipal Agriculturist's Offices (MAOs) in all 12 municipalities of Davao Oriental. Each session involved 8–12 Agricultural Extension Workers (AEWs) and lasted approximately 60–90 minutes. The FGDs aimed to validate survey findings, identify key operational challenges, and gather actionable recommendations for improvement. Guiding questions included: (1) What are the major challenges you encounter in delivering extension services? (2) What strategies or practices have worked well in addressing these challenges? (3) What recommendations can improve extension delivery and support systems? A total of 112 AEWs participated in the FGDs across the 12 LGUs.

A thematic analysis, adapted from Mokoena et al. (2023), was applied to the qualitative data. Transcripts from interviews and FGDs were repeatedly reviewed, and initial codes were generated to capture meaningful responses. Related codes were grouped into categories and refined into broader themes that reflected recurring patterns across municipalities, such as logistical issues, participatory learning, and adaptive innovations. To ensure credibility, the themes were validated through peer debriefing with research colleagues and consistency checking against raw data, following standard qualitative validation procedures (Lincoln and Guba, 1985).

Quantitative data were analyzed using frequencies, percentages, and rankings to describe the prevalence and prioritization of strategies, challenges, and best practices. Integrating descriptive statistics with thematic analysis provided both breadth and contextual depth, allowing for a comprehensive understanding of AEWs' extension delivery systems in Davao Oriental.

Based on focus group discussions, 10 out of 12 Municipal Agriculturist's Offices (83%) reported that face-to-face interactions remain the most effective method for delivering services to beneficiaries, while only 2 offices (17%) favored a mixed approach combining online or no-contact strategies. AEWs and their clientele prefer in-person engagement because farmers and fisherfolk better understand new technologies when demonstrated directly, reflecting the belief that "seeing is believing." Antwi-Agyei and Stringer (2021) emphasize that extension agents should regularly visit rural farmers to provide improved technologies and services, while Dahlan et al. (2024) highlight the continued importance of face-to-face interactions. Previous studies (Adamsone-Fiskovica and Grivins, 2022; Norton and Alwang, 2020) also underscore the value of in-person engagement, and Neyman and Wenninger (2023) note that such interactions enable "meaningful dialogue," which is essential for overcoming skepticism, particularly regarding issues like climate change. These findings support the ongoing reliance on face-to-face extension methods despite the growing presence of digital technologies in rural development.

Table 1 presents the range of extension delivery strategies employed by AEWs in Davao Oriental. Results indicate that face-to-face and group-based methods remain dominant, with meetings (98%), farm and home visits (93%), and lectures (92%) consistently ranked among the top practices. These findings affirm that personal interaction continues to underpin effective knowledge transfer, as it fosters trust, immediate feedback, and experiential learning between AEWs and farmers

Table 1. Extension delivery strategies employed by the AEWs in Davao Oriental.

Extension delivery strategies[a]	Frequency (n=155)	Percentage (%)[b]	Rank
INDIVIDUAL			
Farm & Home Visits	144	93	2
Telephone / Cellphone Calls	132	85	5
Texts	125	81	6
Farm Walks	108	70	8
Farmer/PO Leaders	96	62	9
via social media (FB, messenger)	93	60	11
e-mail	91	59	12
Personal Office Calls	76	49	17
Memos/Orders	63	41	20
Personal Letters	61	39	21
ATI website/platforms	57	37	22
Google Search Engines	55	35	23
Digital Marketing Platforms	40	26	25
Google (Forms, Classroom)	37	24	26
GROUP			
Meetings	152	98	1
Lecture	142	92	3
Group Discussion	135	87	4
Field Day	126	81	6
Demonstration	110	71	7
Farmer Field Schools	95	61	10
Exhibits/Fairs	84	54	13

Informal gatherings	84	54	13
Tours & Field Trips	83	54	13
Participatory techniques	79	51	15
Educational Campaign	77	50	16
MASS			
Audio-Visual Aids	82	53	14
Print Media	71	46	18
Zoom / Google Meet	65	42	19
Radio	45	29	24
Television	33	21	27
Others	15	10	28

[a] Multiple responses
[b] Percentage from the total number of respondents

While individual communication tools such as phone calls (85%) and text messaging (81%) are widely used, digital strategies show only partial adoption, with 60% using social media platforms and 59% relying on e-mail. Similarly, the limited utilization of Zoom or Google Meet (42%) reflects ongoing barriers to digital transformation, including inconsistent internet access, low digital literacy, and lack of institutional support for ICT integration in extension.

Group approaches such as field days (81%), demonstrations (71%), and Farmers Field Schools (61%) highlight AEWs' emphasis on hands-on and participatory learning, which aligns with findings by Adamsone-Fiskovica and Grivins (2022) and Norton and Alwang (2020), who emphasized that experiential and peer-based learning strengthens farmers' understanding and confidence in adopting new technologies.

In contrast, mass media strategies like radio (29%) and television (21%) remain underutilized, suggesting that mass communication is being replaced by more interactive and targeted channels. This shift may also indicate AEWs' preference for localized engagement rather than one-way communication.

Hence, the results reveal that while AEWs are gradually embracing modern communication platforms, traditional interpersonal methods continue to serve as the backbone of extension delivery in Davao Oriental. This pattern underscores the need for a hybrid communication model, one that leverages both digital tools and interpersonal approaches, to enhance information reach, efficiency, and inclusivity in agricultural extension.

Table 2 presents the major challenges faced by AEWs in Davao Oriental and their corresponding recommendations for improvement. Mobility and logistical constraints emerged as the most critical issue, primarily due to inadequate fuel allocation, lack of service vehicles, and the expansive geographical coverage of extension areas. These limitations hindered AEWs' ability to conduct regular field visits and deliver timely technical assistance to farmers. Such challenges mirror findings in other developing regions where logistical barriers constrain fieldwork efficiency and service reach (Kibrom et al., 2025; Lalican et al., 2013). Addressing these concerns through the proposed Magna Carta for AEWs, increased travel budgets, and stronger LGU–national government coordination would enhance their operational capacity and morale. Suggestions and recommendations were elicited during FGDs and KIIs through open-ended follow-up questions after participants described each challenge they faced in extension delivery. Facilitators encouraged participants to share strategies or support mechanisms they deemed effective. These responses were transcribed and incorporated into the thematic coding process, forming the basis for Table 2.

Table 2. Challenges encountered by AEWs in extension delivery and corresponding recommendations for enhancement.

Rank	Challenges	Total	Recommendations
1	Mobility / logistics (fuel, vehicles)	9	Magna Carta, travel budget, LGU/national support
2	No hazard pay	7	Magna Carta
3	Farmer resistance / low tech adoption	5	Demo farms, trainings, field monitoring, PO engagement
4	Limited local budget	4	LGU/national support, strengthen farmer orgs
5	Limited client interventions	3	Extra budget, LGU/national support, simplify SOPs
5	Lack of manpower	3	Request additional staff
6	AEWs need technical skills	2	Trainings/seminars
6	Climate change / weather issues	2	Promote resilient varieties
6	Farmer knowledge gaps	2	Trainings, social media, farm visits
6	Traditional practices	2	Introduce new tools/tech/machinery
6	Inaccessible areas	2	LGU/national support
6	Poor marketing support	2	Market linkages
6	Insufficient funds	2	Extra budget, project planning, demo farms, NGO support
6	Delayed procurement	2	Expedite procurement, monitor programs
6	Political interference	2	Set aside political colors
6	Limited internet	2	Stable mobile/internet access
7	Others	16	Various (one response each)

[a] The number of responses from the FGDs conducted
[b] based on the responses from the participants during the FGDs
[c] Others – Wild animal encounters, poor roads, uninformed farmers, no post-training support, farmer unavailability, government-controlled interventions, missing farmer database, low technology adoption, low AEW salaries, insufficient farmer inputs, no overtime pay, security issues, low motivation among some AEWs, limited mobile signal, few beneficiaries due to restricted projects.

The lack of hazard pay consistently emerged as a key issue raised by AEWs, underscoring disparities in benefits compared with other field-oriented sectors. Notably, Philippine literature on hazard compensation for agricultural extension workers remains scarce, suggesting a critical gap in understanding how financial and occupational support mechanisms affect their motivation, safety, and performance in the field. Providing equitable incentives could help boost motivation and retention, particularly in remote and high-risk areas. Farmers' resistance to new technologies ranked among the top challenges, reflecting both cultural and informational barriers (Becerra-Encinales et al., 2024; Manning, 2024). Many AEWs noted that farmers are more receptive to innovations demonstrated through practical, hands-on approaches, a finding consistent with the "seeing is believing" principle in extension work (Antwi-Agyei and Stringer, 2021). This suggests that expanding demonstration farms, conducting follow-up monitoring, and strengthening people's organizations (POs) are vital strategies for improving adoption rates.

Other constraints, including limited local budgets, inadequate manpower, and insufficient technical skills, underscore the need for capacity-building programs, inter-agency collaboration, and recruitment of additional extension staff. Likewise, systemic issues such as delayed procurement, political interference, and limited internet connectivity reveal administrative and infrastructural weaknesses that affect program implementation. Less frequent but still significant concerns, such as climate change impacts, poor marketing support, and low farmer participation, point to the broader challenges of sustaining agricultural productivity under dynamic environmental and socio-economic conditions (Das and Ansari, 2021). AEWs' recommendations to strengthen farmer organizations, enhance project sustainability, and improve stakeholder coordination reflect an awareness of the need for a holistic, systems-based approach to agricultural development.

Hence, the results emphasize that institutional reforms, adequate resourcing, and continuous training are crucial to enhancing the effectiveness and resilience of agricultural extension delivery. These findings reinforce global calls for empowering extension systems through policy support, logistical investment, and participatory governance mechanisms, ensuring that front-line workers are fully equipped to drive agricultural transformation in rural areas.

Based on focus group discussions, nine out of twelve LGUs (75%) identified mobility and logistical support, particularly the lack of fuel and service vehicles, as the top challenge for AEWs, with several using personal motorcycles to conduct fieldwork. Recommendations include increasing travel budgets, passing the Magna Carta for AEWs, and securing LGU and national support. Seven agencies noted the absence of hazard pay, unlike DOH and DSWD personnel, which the Magna Carta could address. Farmers' resistance to new technologies, reported by five agencies, could be mitigated through demonstration farms and training seminars, reflecting the "to see is to believe" mindset. Other challenges include limited local budgets, insufficient interventions, and lack of manpower. Addressing these, including systemic issues like funding gaps and political interference, is crucial for sustainable agricultural extension, as highlighted in the Philippine Agriculture and Fisheries Extension Strategic Plan 2023–2028 and previous studies (Ezima et al., 2023; Fabregas et al., 2022).

Table 3 summarizes the best practices of Municipal Agriculturist's Offices (MAOs) across the 12 local government units (LGUs) of Davao Oriental. The results reveal a consistent implementation of core extension strategies such as the conduct of Farmers Field Schools (FFS) and Field Days, which were practiced in all municipalities. These methods emphasize experiential and participatory learning, allowing farmers to acquire practical skills through hands-on demonstrations and peer exchange. Such approaches align with global best practices in agricultural extension that promote learning-by-doing and farmer empowerment (Adamsone-Fiskovica and Grivins, 2022; Norton and Alwang, 2020).

Table 3. List of best practices employed by the Municipal Agriculturist's Offices.

No.	List of best practices	PAG	MAT	BAN	LUP	SAN	GOV	TAR	MAN	CAR	BAG	CAT	BOS	TOTAL
1	Conduct of Farmers Field School and Field Days	1	1	1	1	1	1	1	1	1	1	1	1	12
2	Farmers Registration on Registry System on Basic Sector in Agriculture (RSPSA)	1	1	1	1	1	1	1	1	1	1	1	1	12
3	Integrated Pest Management (IPM)	1	1	1	1	1	1	1	1	1	1	1	1	12
4	Intervention Support and Livelihood Assistance	1	1	1	1	1	1	1	1	1	1	1	1	12
5	LGU-Initiated Projects	1	1	1	1	1	1	1	1	1	1	1	1	12
6	Organized POs, RBOs, and 4-H Clubs	1	1	1	1	1	1	1	1	1	1	1	1	12
7	Provision of vegetable seeds, fruit trees, and other agricultural inputs	1	1	1	1	1	1	1	1	1	1	1	1	12
8	Technology Demonstrations	1	1	1	1	1	1	1	1	1	1	1	1	12
9	Others[a]	10	8	12	4	1	1	0	0	2	1	0	2	
	TOTAL	18	16	20	12	9	9	8	8	10	9	8	11	

Legend:
PAG - PAGRO-Davao Oriental
MAT - CAGRO-City of Mati
BAN - MAGRO-Banaybanay
LUP - MAGRO-Lupon
SAN - MAGRO-San Isidro
GOV - MAGRO-Governor Generoso
TAR - MAGRO-Tarragona
MAN - MAGRO-Manay
CAR - MAGRO-Caraga
BAG - MAGRO-Baganga
CAT - MAGRO-Cateel
BOS - MAGRO-Boston

[a] Others - 16-week Palay Check Training; Seed Distribution Area Validation; Barangay Vegetable Gardening; Barangay IEC Strengthening; Cash Assistance for Rice Farmers; Commercial Poultry Production; Farmers/Fisherfolk Forum; Meetings of Registered Associations; Soil Sampling (Corn); Palay-Check on Rice; Crop Rotation; Fish Port Establishment; Hog Semen Collection (AI); KADIWA Store; Mushroom Lab (Spawn Production); Farm Mechanization; Geo-tagging Rice Areas; Good Agricultural Practices; AEW Hiring (Job Order per Barangay); Intensified Farming System; Monthly AMBET Meetings; Urban/Peri-Urban Agriculture Program; Organic Agriculture Application; Tech Packages for Banana, Vegetable, Cacao, Coffee, Rubber, Fruit Trees; Colored Organic Rice Promotion; Hybrid Rice Technology; Friendly Fishing Gears; Project Monitoring & Annual Evaluation; Relay Cropping; Rice Crop Manager; Solar-Powered Agri-Water System; No Rice Straw Burning; Corn & Vegetable Support; Sustainable Corn Production in Sloping Areas (SCOPSA); Farmer-Level Training of Trainers; Certified Rice Seeds Promotion.

In this study, "best practices" refer to proven approaches, methods, or innovations that have demonstrated effectiveness in achieving desired outcomes and can be adapted in similar contexts (Osburn et al., 2011). Within agricultural extension, best practices are characterized by their practical applicability, sustainability, and contribution to farmer empowerment and productivity (Becerra-Encinales et al., 2024). Best practices by Municipal Agriculturist's Offices (MAOs) included the conduct of Farmers Field Schools (FFS) and Field Days, implementation of Integrated Pest Management (IPM), farmers' registration under the Registry System for Basic Sectors in Agriculture (RSB-SA), organization of People's Organizations (POs), provision of livelihood and intervention support, and establishment of technology demonstration farms. Other locally driven initiatives included LGU-initiated projects, distribution of agricultural inputs, and climate-resilient or organic agriculture programs. These practices reflect both traditional and innovative approaches to strengthen farmer participation and technology adoption. The practices identified in Davao Oriental were validated by AEWs and MAOs based on their consistent success in improving farmer participation, technology adoption, and local capacity. While strategies such as Farmers Field Schools or technology demonstrations may be common, their localized adaptation, replicability, and sustained impact under resource-constrained conditions justify their classification as best practices (Vasavi et al., 2025).

Similarly, Integrated Pest Management (IPM), Farmers Registration under the Registry System for Basic Sectors in Agriculture (RSBSA), and livelihood and intervention support programs were universally implemented. These practices reflect the LGUs' commitment to ensuring inclusive farmer participation, targeted resource distribution, and the integration of environmental sustainability in agricultural management.

Beyond these institutionalized activities, LGU-initiated projects and the organization of farmers' and rural-based organizations (RBOs) demonstrate the adaptive and decentralized character of extension delivery in Davao Oriental. These initiatives highlight how local governments exercise flexibility to design context-specific interventions that address local production challenges and socio-economic conditions.

Technology demonstrations and the provision of agricultural inputs, such as seeds, fruit trees, and fertilizers, further underscore the importance of direct material and technical support in fostering technology adoption and productivity gains. These approaches remain effective in bridging the gap between research and on-farm application, particularly in resource-limited farming communities.

Notably, the "Other" category in Table 3 showcases a range of innovative and locally driven initiatives, including fish port development, mushroom spawn production, cash assistance programs for rice farmers, farm mechanization, hybrid rice promotion, and the establishment of solar-powered agri-water systems. These practices illustrate the diversity and innovation emerging from grassroots-level governance, where MAOs tailor interventions to local ecological and economic contexts. The inclusion of urban and peri-urban agriculture programs, organic farming, and climate-resilient technologies reflects growing responsiveness to sustainability and market integration challenges.

Hence, the best practices documented across Davao Oriental demonstrate a hybrid extension model that effectively integrates traditional, experiential approaches with emerging innovations and localized governance mechanisms. While political dynamics inevitably influence program implementation, the model's participatory and community-based design helps buffer such effects by fostering accountability, shared ownership, and collaboration among AEWs, farmers, and local institutions. These findings reinforce the idea that empowering LGUs to implement context-driven programs can enhance farmer participation, accelerate technology diffusion, and strengthen the overall resilience of the agricultural extension system.

AEWs in Davao Oriental play a pivotal role in enhancing agricultural productivity and sustainability in rural communities. However, like extension workers globally, they face challenges such as inadequate resources, limited manpower, low farmer receptivity, and insufficient logistical support (Lalican et al., 2013). Studies in Ethiopia (Kibrom et al., 2025) and India (Anshuman et al., 2023) similarly highlight logistical constraints, lack of trained staff, and financial limitations, emphasizing the need for improved funding, manpower, and support.

Despite these challenges, AEWs employ strategies to meet farmers' needs, with a strong preference for face-to-face interactions, echoing international findings (Silvert et al., 2022; Maseko, 2021; Thorn et al., 2017). They are beginning to integrate digital tools such as social media and online meetings, though with limited success, reflecting barriers noted by Bansal and Choudhary (2024). Mobility, funding, and farmer resistance are global issues (Arbuckle et al., 2013), and solutions like travel allowances, demonstration farms, and continuous training align with recommendations from Akpalu (2013) and Antwi-Agyei and Stringer (2021).

Best practices by Municipal Agriculturist's Offices (MAOs), including Farmers Field Schools, technology demonstrations, and farmer organizations, reflect both traditional and innovative approaches. These practices mirror global experiences, such as participatory approaches in Uganda (Muteti et al., 2023) and technology demonstrations in Nigeria, Malawi, South Africa, and Kenya (Agwu et al., 2023), highlighting the value of localized, context-specific solutions in agricultural extension.

This study contributes new understanding to the field of agricultural extension by documenting how AEWs in a devolved provincial context adapt traditional methods and innovate under resource constraints. Unlike previous studies conducted at national or regional levels, the findings from Davao Oriental highlight a localized model of extension characterized by adaptive learning, participatory engagement, and practical innovation. These results extend existing literature by offering an evidence-based framework for strengthening decentralized extension systems and guiding future policy interventions under the Philippine Agriculture and Fisheries Extension Strategic Plan (2023–2028).

CONCLUSION

This study underscores the critical challenges faced by AEWs in Davao Oriental and identifies scalable strategies and best practices to enhance extension services. With agriculture confronting climate change, economic pressures, and technological shifts, effective and well-supported extension systems are urgent. Strategic interventions at local and national levels, addressing logistical, financial, and capacity gaps, are essential to strengthen agricultural extension in the Philippines, ensuring sustainable productivity, farmer empowerment, and rural development.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed to strengthen agricultural extension service delivery in Davao Oriental and similar contexts:

- Provide adequate fuel allocations, service vehicles, and travel budgets to enable Agricultural Extension Workers (AEWs) to conduct regular field activities efficiently, particularly in remote and hard-to-reach areas.

- Implement provisions of the Magna Carta for Agricultural Workers, including hazard pay and other incentives, to recognize the occupational risks and field-based nature of AEWs' work.
- Conduct regular training and skills-upgrading sessions to equip AEWs with updated knowledge on climate-resilient technologies, participatory extension approaches, and adaptive innovations identified during field engagements.
- Encourage the establishment of demonstration farms, farmer field schools, and peer-learning platforms to improve technology adoption, strengthen trust, and foster collaboration between AEWs and farmers.
- Strengthen collaboration among Local Government Units (LGUs), DA–Regional Field Office XI, and the Agricultural Training Institute to address manpower and budget limitations, ensuring sustainable and well-coordinated extension programs.

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AUTHOR CONTRIBUTIONS

L.M.G: Conceptualized the study, developed instruments, conducted data collection and analysis, and drafted the manuscript. A.A.B: Assisted in study design, data collection, data analysis, and manuscript revision. Both authors approved the final manuscript.

DECLARATION

Informed consent statement

This study complied with all institutional and ethical standards for research involving human participants. Ethical clearance was granted by the University of Southern Mindanao Research Ethics Committee (USM-REC), which reviewed and approved the research protocol, informed consent form, and related materials (Certificate to Conduct dated January 30, 2024). In addition, the Davao Oriental State University Research Ethics Office (DOrSU-REO) issued a Certificate of Exemption from Review (dated March 1, 2024), confirming that the study posed minimal risk to participants. Participation of Agricultural Extension Workers (AEWs) was voluntary, and informed consent was obtained prior to data collection. All responses were treated with strict confidentiality, and data were used solely for research and publication purposes.

Conflict of interest

The authors report there are no competing interests to declare.

AI Desclosure

The authors declare that no Artificial Intelligence (AI) or AI-assisted technologies were used in the preparatin of this manuscript.

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