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EMPOWERING FARMERS WITH DISABILITIES IN GHANA: TAILORED AGRICULTURAL EXTENSION ADVISORY SERVICES

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ABSTRACT

The factors influencing the targeting of farmers with disabilities for agricultural extension advisory services by extension agents were examined using survey data in Ghana. Using a simple random technique, a questionnaire hosted on Google form was adopted to gather data from 528 extension agents in all 16 administrative regions. Frequencies, percentages, means, standard deviation, Kendal's coefficient of concordance, and binary logistic regression were utilized to analyse the data using the International Business Machine Statistical Package for Social Sciences (IBM-SPSS version 26). The study revealed that nine out of 10 extension agents target farmers with disabilities. Socio-demographic characteristics and institutional factors such as age, experience, level of education, specialisation in general agriculture, participation in needs assessment, and extension agents' accessibility accounted for between 23.0 to 49.4% of the variation in the decision of the extension agents to target farmers with disabilities for extension advisory services. Our study points to the need for policies that seeks to support extension agents improve the targeting of farmers with disabilities in Ghana in order to improve their livelihoods and welfare.

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INTRODUCTION

Persons with Disabilities (PWDs) are "individuals who have long-term physical, mental, intellectual, or sensory impairments which in interaction with various barriers, may hinder their full and effective participation in society on an equal basis with others" (United Nations [UN], 2006, p. 4). Globally, an estimated 1.3 billion, or one in six people live with significant forms of disabilities (World Health Organization [WHO], 2022), out of which 190 million are faced with substantial challenges in carrying out routine socio-economic activities (Sight Savers, 2018). Over the last few years, the global population of persons living with disabilities has been rising, partly due to old age, age related illnesses and chronic life threatening diseases (WHO, 2022). In the mist of the rising numbers of the people with disabilities, an estimated 10 – 15% of the 400 million individuals living in low and middle income countries live with some form of disabilities (WHO & World Bank Group, 2011; Mitra & Yap, 2021). This prevalence of disability is higher than that of high-income countries. Of these, 80 million people reside in Africa (Seidu et al., 2021). In Ghana, people with disabilities make up 3.7% of the population (Sight

Savers, 2018). Due to its close association with exclusion, inequality, and poverty, disability in Ghana is seen as both a human rights concern and a developmental issue (Asuman et al., 2021). Subject to the context, disability invokes various social constructions which depends on interactions among health, environmental, and personal factors (WHO & World Bank Group, 2011). Disability can occur at three levels: impairment of body function or structure; restriction of action, such as difficulty reading or moving; and restriction in participation, such as exclusion from work (Ghana Statistical Service [GSS], 2014). Therefore, people with disability encompass both those who are typically considered to be disabled (such as those who use wheelchairs and have visual, hearing, and intellectual impairments) and those who have functional challenges brought on by a variety of medical conditions, such as chronic illnesses, severe mental disorders, multiple sclerosis, or old age (WHO, 2022). The various categories of PWDs identified in Ghana include; visual, hearing, speech, emotional disturbance, intellectual, and physical impairments (GSS, 2014).

PWDs are one of the largest vulnerable groups who suffer most oppression in Ghana and continue to experience poverty, stigma and discrimination, and social exclusion from education and employment (Ocran, 2019), leading to poor standard of living (WHO, 2022). Agriculture, particularly in terms of the increase rate of production, is directly associated with different rates of poverty reduction interventions (Corral et al., 2017). In sub-Saharan Africa (SSA), the majority of the people reside in rural areas, where poverty rates are higher than urban areas and nearly all rural households depend on agriculture either directly or indirectly (Bigler et al., 2017). Agriculture is thus an essential industry in the development of nations south of the Sahara, Ghana inclusive, as it is a significant contributor to its economy (Cervantes-Godoy & Dewbre, 2010; Al-hassan & Jatoe, 2014) and employs more than half of the labour force (GSS, 2018). It is estimated that 3,037,381 farmers are employed in the Ghanaian agricultural sector (GSS, 2020). Studies have shown that PWDs are involved in agriculture and form part of the general population of farmers in Ghana (Gomda et al., 2018, 2021).

All categories of farmers are expected to access adequate resources like inputs, seeds and timely information from key stakeholders in agriculture especially agricultural extension agents to improve the farming enterprise. PWDs, however, one of society's most marginalized groups, are often denied employment prospects in agriculture (FAO et al., 2013; Ocran, 2019). It is worth noting that the likelihood that someone without disabilities would have access to farming space, land lease, and credit to pay for initial farming expenses like tools is higher than for farmers with disabilities (FWDs) (WHO & World Bank Group, 2011). Additionally, financial services providers and extension agents are often inaccessible to these FWDs (Gomda et al., 2021). Extension agents are state-mandated professionals who assist farmers in their agricultural activities (Peters & Davis, 2019). Agricultural extension is an informal educational approach aimed at rural people where guidance and knowledge is provided to assist them resolve their problems and help boost the productivity of farm household and generally raise the standard of living of the household (FAO, 2019).

Farmers would not have access to the assistance and services needed to advance their agriculture and other productive endeavours without agricultural extension (Danso-Abbeam et al., 2018). Agricultural extension works to develop farmer organizations, connect them to markets and serve as an avenue for empowering farmers, the rural poor and the vulnerable (Manteaw et al., 2020). An effective agricultural extension programme depends on the extension agent. Thus, it does not matter how creative the extension strategy is or how remarkable the supply of inputs and resources for extension activities is, if the extension agent as a trained professional is unable to respond to the circumstances of farmers, many of whom have limited or no education and are also vulnerable, the process would fail (FAO, 2019). Extension agents help farmers solve problems, transfer technology, encourage adult learning in rural areas, and engage them in agricultural knowledge and information systems in order to tackle rural poverty and food insecurity (Danso-Abbeam et al., 2018). FWDs are a group of people with special needs who are faced with a myriad of challenges that go beyond different aspects of their lives, hence, require special attention from extension agents (Seidu et al., 2021).

To reduce the difficulties faced by PWDs, many global policies and plans have been launched over the years. The United Nations Convention on the Rights of PWDs (UNCRPWD), which has been adopted by 182 nations is one of such international initiatives (UN, 2006). The United Nations Sustainable Development Goals (SDGs)

10 also outlines the commitment to "Leave no-one behind" (UN, 2015) in the context of specific national programmes and policies intended to remove the challenges of PWDs. In response to global demands, the Ghanaian government passed the Disability Act 715 in 2006 to ensure the participation of PWDs in all aspects of society including agriculture, and to increase their well-being (Asuman et al., 2021). Despite the ratifications, little is known about the deliberate targeting of FWDs by agricultural extension agents in Ghana and the factors influencing the decision of extension agents to target these marginalized groups. Limited empirical data also exist on the nature of disabilities, the type of extension advisory services and technologies extended to them.

Previous studies have focused on the participation of FWDs in agriculture, factors that influence their participation in agriculture and its impact on their food security (Gomda et al., 2018, 2021). Little is, however, known about the participation of extension agents in assessing the needs of FWDs and their accessibility to these farmers to address their needs holistically. The absence of an inclusive policy framework on agricultural extension relates explicitly to the needs of FWDs, due partially to the limited data on FWDs in agriculture in Ghana requires immediate attention (Mitra & Yap, 2021). Hence, a debate for a comprehensive and accurate data on the needs of FWDs and the role extension agents could play in addressing the needs of these farmers which could serve as a tool for poverty reduction has been on going (Agyeman et al., 2022). This has led to a clear knowledge gap that needs to be filled through empirical research on the deliberate targeting of FWDs and the factors influencing that in agriculture to contribute knowledge to inform the planning and implementation of policies on disability-inclusive agricultural extension in Ghana. It is known that some socio-demographic and institutional factors influence decisions in agriculture (Anang & Yeboah, 2019; Konja et al., 2019; Anang et al., 2021). Information available about these factors that influence the decision of extension agents to target FWDs is inadequate. This knowledge also needs to be addressed. In the paper, PWDs and FWDs are used interchangeably.

The objectives of the paper were to examine:

(1) the nature of disability of farmers.
(2) the types of technologies or advisory services they receive from extension agents.
(3) the number of extension agents targeting FWDs.
(4) extension agents' participation in needs assessment and their accessibility to FWDs.
(5) the factors contributing to their participation in needs assessment and accessibility.
(6) the socio demographic characteristics and institutional factors influencing their targeting decision.

Theoretical framework

Different conceptual theories and models have been used to explain the issue of disability in the literature. This paper is underpinned by the Critical Disability Theory (CDT), which has its origin in the tradition of critical theory from 1937 in the Frankfurt School, where a group of Western social researchers and philosophers who initially worked in Frankfurt Germany, are known for their contribution to the development of critical theory as it is known today (Hosking, 2008). CDT is an emancipatory and development theory used by researchers to follow the effect of social construction of oppressed people, including but not limited to those whom the concept of "disability" clings, as well as to describe the socio-political construction of disability (Hall, 2019).

According to Hosking (2008), the foundation of CDT is a critique of existing debates and assumptions about disability that are used to marginalize people with disabilities and violate their human rights. The theory posits that "disability is not simply a concern of medicine or health, neither is it only a matter of sensitivity and compassion; rather it is a question of politics and power (lenses), power over, and power to" (Gillies, 2014). Thus, CDT is intended to be "explanatory, practical, and normative". Therefore, identifying what is wrong with the current social reality, determining the actors who can change it, and introducing precise criteria into social discourse are the three main goals of critical disability theory (Sztobryn-Giercuszkiewicz, 2017). Hosking (2008), a leading researcher in the field of disability, enumerated seven assumptions of the critical disability theory as:

(1) Social disability model: Where CDT assumes that (i) disability is a social construct rather than an inevitable result of a disease or bodily dysfunction, and (ii) disability is best defined as a system of relationships between a dysfunction, a personal response to this dysfunction, and the environment, and (iii) the physical

and institutional surroundings as well as the attitudes in this environment toward PWDs who do not fit the social expectation of "normality" are what lead to the negative social consequences experienced by people with disabilities. (2) Multidimensionality of the disability phenomenon: Here Hosking sees the multidimensionality of the phenomenon as an essential component of the critical disability theory for two reasons: (i) to avoid the exclusion and conformism pitfalls that depict public policies, and (ii) to emphasize the fact that people with disabilities differ and make up a diverse and variable population that lacks any social structure (country, ethnic group, class affiliation, etc.) and are present in all the world's cultures.

(3) Diversity as value: The idea of political and legal equality, regardless of gender, race, nationality, or sexual orientation, is the cornerstone of modern liberalism. However, Hosking asserts that a strategy centred on the demand for equality in the political and legal systems is frequently ineffective for individuals with disabilities. (4) Approach based on the rights: CDT views the rights-based approach as an essential tool for promoting the equality claims of people with disabilities and for supporting their full integration into society in all aspects while bringing into the society the value of diversity, despite considerable scepticism regarding respecting the rights of disadvantaged groups in society. CDT must acknowledge the rights of people with disabilities to autonomy (as a group) and full participation in society (as a group).

(5) Giving voice to people with disabilities: According to Hosking, voices of people with disabilities who challenge "mainstream" notions of disability and highlight their value and potential are marginalized. He asserts that those who are not disabled only hear from them what they want to hear and what is consistent with their conception of impairment. If a person with a disability expresses an opinion that is in opposition to this vision, the non-disabled community will simply discount their voice by insinuating that they have a negative view of disability. (6) Influence of language on understanding disability: The critical disability theory is also interested in how language affects perceptions of disability and the position of those with disabilities. Here, the terms used to identify people with impairments as well as the ideas and image used to define disability have significance. According to critical theory, language is always political and has more or less obvious ideological connotations.

(7) Transformative policies: The fundamental goal of critical social theory has always been to reform society's economic, political, and social structures in order to liberate humankind. This connection between theory and practice is maintained by critical disability theory, which can be described as "self-politicized." The approach was developed to promote empowerment and genuine equality as opposed to just nominal equality. Hosking notes that social programs are a significant priority in Western democracies, but these programs exhibit paternalism and rigidity. The CDT offers a theoretical framework for categorizing disability policies—policies that take into account the inclusion, equality, and autonomy of people with disabilities (pp. 6-16). This paper adopted the CDT because some elements of the theory are used in interdisciplinary studies on disability (Hosking, 2008; Sztobryn-Giercuszkiewicz, 2017). CDT was adopted as a social model of disability, and human rights approach that calls for equal access to all facets of social life; to provide the framework for a transformative policy that gives a voice to PWDs including employment in agriculture, having access to agricultural extension agents as well as providing "key spots of power and privilege" to agricultural production resources as a tool for economic empowerment and poverty reduction (Gillies, 2014).

METHODOLOGY

Profile of study area

The study was conducted in the 261 metropolitan, municipal and district departments of agriculture in 16 administrative regions in Ghana. The country is bordered to the west by Cote d'Ivoire, north by Burkina Faso, east by Togo and south by the Gulf of Guinea (The World Bank, 2021). Ghana's population is projected to be around 30.8 million (GSS, 2021). Administratively, the country is sub-divided into regions which are further delineated into metropolitan, municipal and district assemblies. The metropolitan, municipal and district assemblies form a second-level administrative structure below the regions (Ministry of Local Government and Rural Development [MLGRD], 2022). Agriculture forms a significant share of the Ghanaian economy (Quartey et al., 2012). In 2021, the agricultural sector contributed 20% to the country's gross domestic product (Bichard et al., 2021). Agricultural extension agents who interact with both agricultural and non-agricultural stakeholders are important in ensuring that Ghana becomes self-

sufficient in food production (Danso-Abbeam et al., 2018). The extension agents are stationed with the departments of agriculture established in all the 261 metropolitan, municipal and district assemblies under the direct supervision of the Ministry of Local Government and Rural Development (MoFA-DAES, 2021). Each extension agent interacts with farmers in a cluster of communities known as operational areas where they provide leadership (Manteaw et al., 2020). The map of the study area within the African context is presented in Figure 1.

Design, population, sampling and data collection instrument

A descriptive survey design was used to gauge and analyse agricultural extension agents' perception and opinion about targeting FWDs for extension advisory services and their associated characteristics in Ghana (Setia, 2016). Descriptive survey was used to describe the attitude of extension agents and their interaction with FWDs at one-point in time (Zangirolami-Raimundo et al., 2018). The design provided the opportunity to determine the socio-demographic characteristics influencing the decision of extension agents to target FWDs (Prince et al., 2020). The target population was all the 3850 front-line agricultural extension agents in Ghana (N = 3,850).

To determine the appropriate sample size for the study, the Krejcie and Morgan (1970) table was used. The table indicates that the appropriate sample size required from a population of 3,850 extension agents was 354 participants. A structured questionnaire was used as the instrument for data collection. The questionnaire was divided into four main parts which comprised of items including the socio-demographic characteristics, the nature of disabilities and extension services received by the farmers, targeting of FWDs and extension agents' participation in needs assessment and accessibility to FWDs respectively. A five-point unidimensional Likert-type scale was used to measure the extension agent's participation in needs assessment (six items) and accessibility (four items).

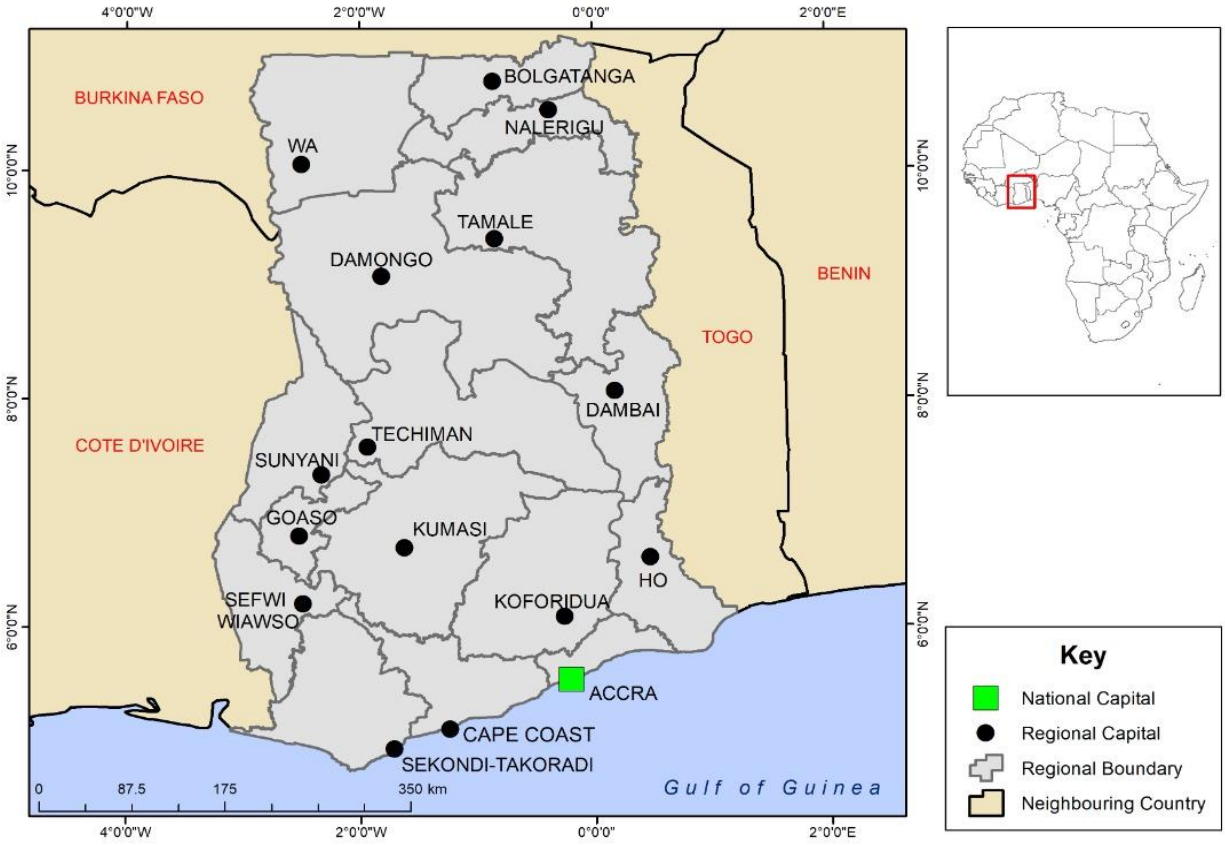

Figure 1. Map of Ghana showing the continental African context.

The Likert type scale was interpreted as follows, 1 = very low agreement, 2 = low agreement, 3 = moderate agreement, 4 = high agreement, and 5 = very high agreement. Face and content validity of the instrument was determined by two experts in agricultural extension and disability inclusiveness from the Department of Agricultural Science Education and Department of Special Education at the University of Education, Winneba and one local extension manager in Ghana to ensure that the instrument was suitable and applicable for data collection. The experts also ensured that the content of the instrument validly measured the objective of the study. The instrument was pre-tested with 30 agricultural science education students of the Department of Agricultural Science Education studying agricultural extension. The reliability of the instrument was determined using the Cronbach alpha coefficient method in IBM SPSS version 26. Cronbach's alpha coefficients of the sub-scales on the Likert-type scale were extension agents' participation in needs assessment (0.86) and accessibility (0.79), indicating the items in the construct showed internal consistency and hence reliable for data collection (Reynaldo & Santos, 1999). A Google form online platform was then used to host the instrument in preparation for data collection. The link to the survey was shared on group WhatsApp platforms of extension agents at the district and regional levels to enhance the response rate. Before completing the online survey, agricultural extension agents were asked to voluntarily consent to participate in the study by providing their informed consent. They were assured that their responses would be kept anonymous and that the researchers would not ever disclose any of their personal information to any third party (Neuman, 2014; Kesmodel, 2018). Extension agents were contacted and followed ups made with a view of getting them to respond to the online survey. A total of 528 extension agents (n=528 representing 149% response rate) responded to the online survey following the two months of data collection in September and October 2022.

Data processing and analysis

IBM SPSS version 26 was used for data processing and analysis. Data were coded and entered into the software. The respondents' socio-demographic characteristics were analysed using frequencies, percentages, means and standard deviation. The nature of disability and extension services received by FWDs was analysed using frequencies and percentages. Participation in needs assessment and accessibility were analysed with mean, standard deviation and Kendall's W coefficient of concordance. To analyse the decision of extension agents to target FWDs, frequencies, percentages, means, standard deviation and binary logistic regression were used. Furthermore, in analysing the decision of extension agents to target FWDs and its influencing factors, a binary logistic regression model was used. This was premised on the fact that the choice-dependent variable (i.e., the decision to target) was dichotomous, thereby making the binary logistic regression model the most appropriate to test the effects of the predictor variables on the decision variable (Pallant, 2016). The theoretical underpinning of the binary logistic regression assumes that there is a latent dichotomous variable that defines the value of the observed dependent variable and this can be specified as;

$$Y=\begin{cases} P_i \ if\ y=1 \\ 1-p_i \ if\ y=0 \end{cases} \quad \text{.....(1)}$$

$$P(x) = \frac{1}{1+e^{-((x-\mu)/\sigma}} \quad \text{.....(2)}$$

Where μ is a location parameter. $\sigma - Scale\ parameter$

$$\mu = \frac{-\beta_0}{\beta_1}$$

$$\sigma = \frac{1}{\beta_1}$$

$$P(x) = \frac{1}{1+e^{-((\beta_0+\beta_1 X)}} \quad \text{.....(3)}$$

Where $\beta_0 = -\frac{\mu}{\sigma}$

$$\beta_0 = \frac{1}{\sigma}$$

$$\frac{p(x)}{1-p(x)} = e^{\beta_0+\beta_1 X}$$

$$\text{Logit } p(x) = \ln\left(\frac{p(x)}{1-p(x)}\right) = \beta_0+\beta_1 X \quad \text{.....(4)}$$

As a result, the empirical binary logit model as implemented in this study was defined as follows;

$$Y_i = \beta 0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + U_i$$

The study assumed that the binary choice decision of extension agents to either self-target FWDs or otherwise is influenced by specific intrinsic and extrinsic characteristics. We modelled the individual self-electing choice decision of extension agents to target FWDs as a function of their socioeconomic and institutional variables as specified in the empirical model above. Thus, the (agricultural extension agents') socio-demographic characteristics and institutional factors influence the decision to target these farmers. Table 1

presents the independent variables used in the binary logistic regression model.

Table 1. Variables used in the binary logistic model.

Variables	Description	Measurement	Hypothesized sign
Y	Targeting of disabled farmers	Dummied 1 = targeted; 0 = otherwise	
X_1	Sex of extension agents	Dummied 1 = male; 0 = female	+/-
X_2	Age of extension agents	Years	+
X_3	Experience of extension agents	Years	+
X_4	Level of education	Level of education; Certificate Diploma Bachelor's degree Master's degree	+
X_5	Area of specialization	Dummied 1 = General agriculture; 0 = otherwise	+/-
X_6	Position in organization	Dummied 1 = frontline; 0 = otherwise	+/-
X_7	Participation in needs assessment	Needs assessment	+/-
X_8	Extension agents' accessibility	Accessibility	+/-

Source: Authors' construct (2023)

RESULTS

Socio-demographic characteristics of agricultural extension agents

Table 2 presents the socio-demographic characteristics of the extension agents. Majority (90.0%) of the extension agents were males with a mean age of 36.65±6.91 years. Eight out of ten are between the age 21 and 40 years. Most of the respondents possess work experience of 1 to 20 years. The mean years of working experience were 8.81±7.46 years. The majority (71%) of the extension agents had bachelor's or master's degree certificates in diverse fields of agriculture. More than half (51.1%) specialized in general agriculture, with close to one-fifth (19.9%) specializing in agricultural extension. The rest have specialties in crop science, agricultural engineering, animal science, post-harvest technologies, veterinary and horticulture. More than two-thirds (68.8%) of the staff are active frontline staff who interact with both farmers and other actors in the agricultural value chain.

Table 2. Socio-demographic characteristics of extension agents.

Variables	Frequency	%	μ	σ
Sex				
Males	475	90.0		
Females	53	10.0		
Age (years)				
21 – 40	425	80.5	36.65	6.91
41 – 60	103	19.5		
Experience (years)				
1 – 20	495	93.8	8.71	7.46
21 – 40	26	4.9		
41 and above	7	1.3		
Level of education				
Certificate	51	9.7		
Diploma	102	19.3		

Bachelor's degree	280	53.0
Master's degree	95	18.0
Area of specialization		
General agriculture	270	51.1
Agricultural extension	105	19.9
Crop science	41	7.8
Agricultural engineering	30	5.7
Animal science	29	5.5
Post-harvest technology	28	5.3
Animal health (Veterinary)	19	3.6
Horticulture	6	1.1
Position		
Frontline staff	363	68.8
District/Municipal Agric. officers	97	18.4
M.I.S officers	48	9.1
District directors	20	3.8

Nature and services received by FWDs

The nature and services received by FWDs are presented in Table 3. Farmers with physical impairment (95.1%) dominate other FWDs who receive extension advisory services from extension agents nationwide. Close to one-third (32.8%) of the respondents indicated they provide advisory services to farmers with visual impairment. Additionally, farmers with hearing impairment (23.7%) and speech impairment (22.0%) also receive advisory services whiles a few farmers with intellectual (5.7%) and emotional (2.3) impairments also receive extension advisory services. All extension agents indicated that they provide crop related services (100.0%) to the FWDs. The most important crops-related services provided to FWDs were land preparation (75.9%), good agronomic practices (68.0%), climate-smart agriculture (54.0%) and conservation agriculture (50.9%). Apart from the crops related services, more than three fourth (76.3%) of the extension agents provide animal related services.

Key among the animal related services provided by the extension agents are, small ruminants production and housing (68.5%), poultry production (52.6%), and feed formulation and preparation (56.7%). Other animal related services received by FWDs include snail production (32.5%) and fish farming (28.0%).

Table 3. Nature and services received by FWDs.

Variables	Frequency*	Percent
Nature of disabilities		
Physical impairment	502	95.1
Visual impairment	173	32.8
Hearing impairment	125	23.7
Speech impairment	116	22.0
Intellectual impairment	30	5.7
Emotional impairment	12	2.3
Types of advisory services		
Crops related services	528*	100.0
Land preparation	401	75.9
Good agronomic practices (GAPS)	359	68.0
Climate smart agriculture (CSA)	285	54.0
Conservation agriculture (CA)	269	50.9
Post-harvest management	253	47.9

Food processing	168	31.8
Animals related services	403*	76.3
Small ruminants production and housing	276	68.5
Poultry production	212	52.6
Feed formulation and preparation	188	46.7
Snail production	131	32.5
Fish farming	113	28.0

*= multiple responses

Targeting of FWDs by extension agents

Table 4 presents results on extension agents deliberately targeting of FWDs to receive extension advisory services. Nine out ten of the respondents (90%) indicated that they deliberately target FWDs. Three quarters of the respondents (75.3%) who deliberately target FWDs noted that between one and 20 FWDs were visited in 2021. The mean number of farmers visited was 11.25±12.31. The results show a wide variation in the number of farmers the extension agents visited in 2021. For instance, one-tenth (10.9%) of the extension agents visited between 21 and 40 FWDs whiles half (5.1%) visited 41 FWDS respectively in the same year. It is worth noting that although, a few (8.8%) of the respondent's target FWDs, they did not visit any of such farmers in the 2021 planting season. Seven out of ten of the respondents (71.2%) indicated that they randomly selected one to 15 FWDs to participate in special extension training programmes. The mean number of farmers selected for the extension trainings programmes were 5.25±7.13. Four-fifth (84.1%) of the respondents extended fifteen different technologies to FWDs. Also, 72.4% of the extension agents resolved eight different technology needs of FWDs. On average, 2.02±3.01 FWDs were selected to host 1.48±2.24 extension demonstration plots in 2021. Out of this number, a mean number of demonstration plots established for FWDs was 1.48±2.24.

Table 4. Targeting of FWDs by extension agents.

Variables	Frequency	Percent	μ	σ
Targeting of FWDs				
Yes	478	90.5		
No	50	9.5		
Number of FWDs visited in 2021				
No visit	42	8.8	11.25	15.31
1 – 20	360	75.3		
21 – 40	52	10.9		
41 – 60	18	3.8		
61 and above	6	1.3		
Total	478	100		
Number of FWDs randomly selected for special extension trainings				
None	72	23.1	5.25	7.13
1 – 15	376	71.2		
16 – 30	30	5.7		
Total	478	100		
Number of technologies extended to FWDs				
None	52	10.9	4.85	4.82
1 – 15	402	84.1		
16 – 30	24	5.0		
Total	478	100.0		
Number of technology problems of FWDs solved				

None	101	21.1	2.78	3.41
1 – 8	346	72.4		
9 – 16	31	6.5		
Total	478	100		
Number of FWDs selected as host of demonstration plots				
None	163	34.1	2.02	3.01
1 – 8	286	59.8		
9 – 16	29	6.1		
Total	478	100.0		
Number of demonstration plots established for FWDs				
None	175	36.6	1.48	2.24
1 – 8	289	60.5		
9 – 16	14	2.9		
Total	478	100.0		

Extension agents conducting needs assessment of FWDs

Table 5 presents the needs assessment results of FWDs conducted by extension agents. Generally, the extension agents 'moderately agreed' that they conduct needs assessment of FWDs (overall μ = 2.98±0.90). Even though extension agents 'moderately agreed' they hold discussions with FWDs about their needs, compile information about the technology needs and hold training programmes on confirmed needs of the farmers, they 'highly agreed' that they participate in the needs assessment of FWDs. Kendall's coefficient of concordance (W) was used to rank how extension agents prioritized the needs assessment of FWDs (Table 5). Extension agents' participation in needs assessment was ranked highest (Mean rank = 4.48) and discussions with FWDs about their extension needs (Mean rank = 4.04). Compilation of information about farmers' technology needs (Mean rank = 3.33), random selection of FWDs for special extension activities (Mean rank = 3.11) and holding training programmes on confirmed needs of farmers (Mean rank = 3.05) followed in that order. The Kendall's coefficient [W = 0.15, X^2 (5) = 403.60, p < 0.001] suggests that the extension agents are not in full concordance about prioritizing needs assessment of FWDs. The Kendall's W figure of 0.15 shows that the degree of agreement in the ranking of the needs assessment indicators was about 15 percent; demonstrating significant low-convergence of extension agents' prioritization of needs assessment of FWDs.

Table 5. Extension agents conducting needs assessment of FWDs

Statements					μ	σ
Participate in needs assessment of FWDs					3.65	1.16
Hold discussions with FWDs about their extension needs					3.25	1.09
Compile information about technology needs of FWDs					2.87	1.23
Hold training on confirmed needs of FWDs					2.72	1.23
Random selection of FWDs for special extension activities					2.68	1.26
Design forms to collect information on FWDs' extension needs					2.68	1.05
Overall mean					2.98	0.90
Ranking of needs assessment indicators						
Statements	Mean rank	Kendall's W	Chi-square	df	Asymp. Sig	
Participate in needs assessment for all FWDs	4.48	0.15	403.60	5	0.00	
Hold discussion with FWDs about their extension needs	4.04					
Compile information about FWDs' technology needs	3.33					

Random selection of FWDs for special extension activities	3.11
Hold training on confirmed needs of FWDs	3.05
Design forms to collect information on FWDs' extension needs	3.00

Means were computed from a scale of 1 = very low agreement, 2 = low agreement, 3 = moderate agreement, 4 = high agreement, and 5 = very high agreement.

Accessibility of extension agents to FWDs

Accessibility of extension agents to FWDs is presented in Table 6. Overall, extension agents 'highly agreed' that they are accessible to attend to FWDs (overall μ = 3.74±0.92). Extension agents 'highly agreed' they ensure FWDs have access to them at all times (24-hour phone access) to provide them with extension advisory, on-call services for emergency problems, and effective services to meet their needs. To compute the concordance strength among extension agents to evaluate their accessibility to FWDs, Kendall's coefficient of concordance (W) was used. The results indicate that, extension agents ensure FWDs have 24-hour access to them was ranked highest (Mean rank = 2.66), responsible for extension to FWDs at the village level was ranked second (Mean rank = 2.60), provide adequate services to meet the needs of FWDs was ranked third (Mean rank = 2.42), whiles on-call services for emergency problems of farmers (Mean rank = 2.32) was ranked fourth respectively.

The Kendall's coefficient (W = 0.02) indicates that there was a very low degree of agreement (2%) among extension agents on their accessibility to FWDs [W = 0.02, X^2 (4) = 49.49, $p < 0.001$]. The significant Kendall's coefficient W value, albeit very low, indicates that extension agents consider their accessibility to FWDs as essential to improving extension services to this vulnerable farmer population.

Table 6. Availability of extension agents' availability to attend to the needs of FWDs

Statements				μ	σ
Ensure FWDs have access to me at all times (24 hours telephone access)				3.92	1.08
Responsible for extension to FWDs at the village level				3.81	1.19
On-call services for emergency problems of FWDs				3.67	1.25
Provide effective services to meet the needs of FWDs				3.64	1.16
Overall mean				3.76	0.92
Ranking of accessibility indicators					
Statements	Mean rank	Kendall's W	Chi-square	df	Asymp. Sig
Ensure FWDs have access to me at all times (24 hours telephone access)	2.66	0.02	37.65	3	0.00
Responsible for extension FWDs at the village level	2.60				
Provide effective services to meet the needs of all FWDs	2.42				
On-call services for emergency problems of FWDs	2.32				

Means were computed from a scale of 1 = very low agreement, 2 = low agreement, 3 = moderate agreement, 4 = high agreement, and 5 = very high agreement.

Socio-demographic and institutional factors predicting extension agents' decision to target of FWDs

As shown in Table 7, male extension agents (90.0%), frontline staff (68.8%) and extension agents whose area of specialization is general agriculture (51.0%) were in the majority when it comes to targeting of FWDs. Generally, more than 90% of the respondents indicated that they deliberately target FWDs. Binary logistic regression analysis was utilized to predict the probability that an extension agent would deliberately target FWDs for extension advisory services. The predictor variables were sex of extension agents, age at last birthday, years of experience, level of education,

area of specialization, position in the organization, extension agents' participation in needs assessment and accessibility. A test of the full model versus a model with intercept only was statistically significant, χ^2 (df = 7, N = 528) = 192.81, p < 0.001 (Table 8). The model classified 90.0% of the extension agents who deliberately target FWDs, and 10.0% who did not, for a total success rate of 94.5%. The *Cox & Snell R^2 = 0.230, and Nagelkerke R^2 = 0.494* indicate that between 23.0% and 49.4% of the variation in the decision of an extension agent to target FWDs is predicted by the socio-demographic characteristics and related variables.

Table 7. Characteristics of extension agents targeting FWDs.

Predictor variables	Frequency	Percent
Males	475	90.0
Position	363	68.8
Area of specialization	270	51.1
Females	53	10.0

Table 8 shows the binary logistic regression coefficient, Wald test, and odds ratios for each predictor. Using a 0.05 alpha level of statistical significance, age, years of experience, level of education, area of specialization as a dummy variable, participation in needs assessment, extension agents' accessibility had significant partial effects on the decision of extension agents for targeting FWDs. The odds ratio for age indicate that when holding all variables constant, older extension agents are 1.30 times more likely to target FWDs than younger ones. Inverting the odds ratio for years of experience reveal that for a year's increase in the experience of an extension agent, there is a 0.66 times chances that the agent will not target FWDs. In other words, the less experienced extension agents are, the 0.66 times more likely they were to target FWDs than the more experienced ones. Although significant, the impact of level of education was greater than that of experience, with a unit increase on the five-point level of education scale being associated with the odds ratio of targeting FWDs increasing by a multiplicative factor of 1.98. The area of specialization was dummy-coded using the general agriculture specialization as the reference group. The odds ratio of an extension agent with general agriculture as an area of specialization targeting FWDs is 12.56 times more likely than agents whose area of specialization is agricultural extension, crop science, agricultural engineering, animal science, post-harvest, animal health (veterinary), and horticulture. Additionally, the odd ratio of extension agents targeting FWDs are 3.11 times more likely for agents who moderately participate in needs assessment than those who lowly engage in needs assessment. On the contrary, the inverse odd ratio of accessibility indicates that a unit increase in the level of accessibility of an extension agent is most likely to result in a 0.58 chance of not targeting FWDs for extension advisory services.

Univariate analysis showed that age of extension agents who target FWDs are significantly younger (μ = 36.19±6.31) than those that do not target (μ = 41±10.19), [t (df = 53, N = 528) = -3.31, p < 0.001], and those who deliberately target FWDs are significantly less experienced (μ = 7.68±5.71) than those who do not (μ = 18.58±*13.09*), [t (df = 51, N = 528) = -5.83, p < 0.001], the likelihood ratio of highly educated extension agents targeting FWDs is significant [χ^2 (df = 3, N = 528) = 16.55, p < 0.001], and the number of extension agents whose area of specialization is general agriculture are more likely to target FWDs (49%) than agents with other areas of specialization (5%) χ^2 (df = 7, N = 270) = 111.99, p < 0.001. Sex of extension agents [χ^2 (df = 1, N = 528) = 11.15, p = 0.99] and position [χ^2 (df = 1, N = 363) = 0.04, p = 0.98] in the organization fell short of statistical significance respectively. Also, FWDs are significantly targeted by extension agents who moderately (μ = 3.03±0.88) participate or conduct in needs assessment compared to those who lowly (μ = 2.42±0.88) participate in needs assessment [t (df = 526, N = 528) = 4.70, p < 0.001]. On the contrary, FWDs are more likely to be significantly targeted by extension agent with moderate (μ = 3.24±0.83) accessibility than those with high (μ = 3.82±0.91) accessibility [t (df = 526, N = 528) = 4.32, p < 0.001].

Table 8. Binary logistic regression predicting targeting of FWDs from socio-demographic characteristics.

Predictors	B	S.E.	Wald X^2	df	p value	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Constant	-5.81	1.94	8.99	1	0.00	0.00		

Sex	18.73	4575.00	0.00	1	0.99	0.00	0.00	0.00
Age	0.26	0.06	19.50	1	0.00*	1.30	1.16	1.45
Experience	-0.42	0.07	31.73	1	0.00*	0.66	0.57	0.76
Level of education	0.68	0.27	6.32	1	0.01*	1.98	1.16	3.38
Area of specialization	2.53	0.53	22.86	1	0.00*	12.56	4.45	35.45
Position	-0.02	0.40	0.00	1	0.95	0.98	0.44	2.15
Participation in needs assessment	1.134	0.339	11.173	1	0.00*	3.11	0.36	0.87
Accessibility	-0.542	0.260	4.340	1	0.04*	0.58	0.32	0.84
Test			X^2	df	p value			
Overall model evaluation								
-2 Log Likelihood ratio test			192.81	7	0.00			
Wald test			230.70	1	0.00			

* = p<0.05 Cox & Snell R^2 = 0.230, Nagelkerke R^2 = 0.494, Overall percentage = 94.5%

DISCUSSION

Underpinned by the critical disability theory (CDT), our present study which is the first of its kind in Ghana, examined the decision of extension agents to deliberately target FWDs operating in the agricultural sector in the country. To provide the framework for transformative policy, CDT was adopted as a social model of disability and human rights approach that calls for equal access to all facets of social life. This includes agricultural employment, access to agricultural extension agents, and provision of "key spots of power and privilege" to agricultural production resources (Gillies, 2014). Our study provides new data that will help clarify on the decision of extension agents to deliberately target FWDs in the agricultural sector for extension advisory services. It also provides significant information on their activities towards these farmers and the factors influencing their targeting decision which would help improve the success of extension services delivery in Ghana and provide the data necessary for formulating policies on disability inclusivity in agricultural extension in Ghana. We discovered that nine out of ten of the extension agents deliberately targeted FWDs. On the average the extension agents targeted 11 FWDs in 2021. Our results confirm Gomda's et al. (2018, 2021) finding that FWDs are active in the Ghanaian agricultural sector. Additionally, the results align with that of Grider and Wydick (2016) which reported on interventions that deliberately targeted PWDs in Ethiopia. Also in line with results of this study is the work of Zhang et al. (2017) which reported efforts to provide employment opportunities in the agricultural sector for PWDs in China.

Out of the average 11 FWDs who extension agents targeted, an average of 5.25 farmers were randomly selected for special extension training, with 4.85 technologies being extended to them. Additionally, the extension agents indicated that an average of 2.78 technology challenges of FWDs were resolved, with a mean of 2.02 being selected as hosts of demonstration plots. However, only 1.48 demonstration plots were established. The results show that although most extension agents targeted FWDs, the number of extension agents extending these services to FWDs was dwindling. Developmental ideals of humanity and impartiality, are mirrored in an altruistic obligation, and are essential to reaching those who need help the most (Perry et al., 2019). Compared to those without impairments, these FWDs have a higher risk of suffering discrimination, with restricted access to information. The lack of knowledge and skills among extension agents regarding how to support them, and the lack of awareness regarding the knowledge and abilities of the FWDs which can contribute to the improvement of their livelihoods in agriculture (Ton et al., 2021), could be among the factors contributing to the dwindling number of extension agents extending services to FWDs.

We again found that the nature of disabilities of farmers who receive extension advisory services from extension agents are persons with physical, visual, hearing, speech, intellectual and emotional impairments. The results are consistent with that of GSS (2014), which reported similar categories of PWDs in Ghana. The extension agents indicated that FWDs receive both crops and animal-related services. Crops-related advisory services these farmers receive include land preparation, good agronomic practices, climate smart agriculture,

conservation agriculture, post-harvest management and food processing. The animal-related services included small ruminant production and housing, poultry production, feed formulation and preparation, snail production, and fish farming. The FAO (2017) noted that extension agents should be empowered to provide crops, and animal-related advisory services. The results mirror that of Danso-Abbeam et al. (2018), which revealed that good agronomic practices, linking farmers to value chain actors to access inputs and land preparation services and commodity value addition techniques like food processing are critical components of the services provided by extension agents in the northern part of Ghana.

Similarly, Manteaw et al. (2020) revealed that issues with production dominate extension advisory services rendered by extension agents in Ghana. Our results concerning climate smart agriculture is consistent with the findings of Olorunfemi et al. (2020) which found that extension agents provided extension services on climate-smart agriculture to farmers in South West Nigeria. Also consistent with this study is Bawa's (2019) findings that farmers into poultry, and small ruminant production receive extension services in Ghana. It is worth noting that livestock production systems are key components of extension advisory services of extension agents in North-Central Nigeria (Adisa, 2015). According to Danso-Abbeam et al. (2018), all extension advisory services are geared towards boosting production, poverty reduction and enhancing food security among farmers. Hunt et al. (2022) noted that interventions given to FWDs should improve their livelihood outcomes, such as education and training, access to finance and social protection and social support, and access to production resources.

Additionally, our study revealed that age, experience, level of education, general agriculture as the area of specialization of the extension agents, participation in needs assessment and extension agents' accessibility to FWDs are the factors influencing their decision to target FWDs for extension advisory services. The results imply that extension agents above 36 years are more likely to target FWDs, compared to those under 36 years of age. This result does not project the extension agents as experienced ones as observed in the study. Extension agents over 36 years with less than 8 years of experience are more likely to target FWDs than relatively older agents who have acquired lots of experience. Our results are at variance with the assertion of Tata and McNamara (2018) that promoting innovations among farmer population needs technical experience acquired over a period of time. Our findings bring to the fore the work ethics of the recently recruited extension agents who have minimal experience, but are targeting FWDs with agricultural advisory services. Again extension agents with higher education with general agriculture as their area of specialization are more likely to target FWDs than those with lower education and other areas of specialization. This results conform with those of previous studies, which reported that higher level of education and training significantly contribute to improved competences of extension agents (Akpotosu et al., 2017; Danso-Abbeam et al., 2018; Tata & McNamara, 2018). These findings indicate an urgent need to provide continuing formal education and training for agents with lower formal education to specialize in general agriculture to improve the targeting of FWDs in Ghana. Technology adaptation involves integrating diverse skills and knowledge for handling challenges confronting farmers (FAO, 2017; Tata & McNamara, 2018).

The extension agents confirmed that they moderately participate in the needs assessment of FWDs and target these vulnerable farmers. The key indicators show the areas where they participate in needs assessment: holding of discussions with FWDs, compiling information about technology needs of FWDs, and holding training programmes on the confirmed needs of the FWDs. Extension agents work with farmers to identify their needs, and handling the identified needs is one of the fundamental responsibilities of agricultural extension (Khalil et al., 2009). Hence, there is a need to actively involve farmers in the extension delivery process (Asiedu-Darko, 2013). Extension agents must use the right methodologies to support target clients in identifying their needs and capacity gaps and providing the necessary remedies to address the gaps (FAO, 2019; USAID, 2019). Our results point to the fact that extension agents are carrying out these roles with FWDs on a moderate scale. The extension agents must take on a more active and involved role in needs assessment of FWDs, acting as knowledge/information agents who initiate and support equitable knowledge-based interactions with primary producers like FWDs (Singh & Burman, 2019). Despite moderately participating in needs assessment, the extension agents rated their accessibility to FWDs is high. This they do by ensuring

that FWDs have 24-hour access to them on the telephone, at the village level, they are available for on-call services for emergency problems of FWDs at all material times. This result is in line with the Anang and Asante, (2020), which concluded that extension agents are highly accessible to abled farmers. The assertion of Gomda et al. (2021) that very few FWDs had contact with extension agents is confirmed by this study.

Though government and non-governmental agencies have worked to improve the lives of individuals with disabilities over the years (Sight Savers, 2018; Ocran, 2019) through improved access to livelihood initiatives like agricultural extension, the demand for extension services far surpasses the existing services being provided due to the poor extension agents to farmers ratio (Akpotosu et al., 2017). This limit FWDs' access to extension services, and as a result, when extension services are provided, FWDs are generally treated as any other farmers (Gomda et al., 2021). More effort is, however, needed to curb this worrying trend. One strength of this study is the number of extension agents who voluntarily participated (528 in all). The final sample size represented a 149% response rate, which was higher than the expected sample size for the study. Also, using nationwide data ensured that selection bias was minimized, thereby improving the validity and generalizability of the findings. This present study which is the first of its kind in the country, provides empirical evidence that can serve as the foundation for policy formulation on disability-inclusive extension delivery in Ghana. A limitation of the study is that data was collected from only extension agents. Hence, their perspectives about their work may be biased. Further studies should focus on how FWDs and other stakeholders in the agricultural value chain perceive extension advisory services received by FWDs. Qualitative methodologies may also be explored to provide more clarity on the phenomenon of disability inclusive extension delivery in Ghana.

CONCLUSION

The present study demonstrates that nine out of 10 extension agents deliberately target FWDs, even though the number of FWDs selected for specific activities such as extension training, hosting of demonstration plots, number of technology challenges and demonstration plots established for FWDs have reduced over time. The Ministry of Food and Agriculture should enact policies that ensure efforts are geared towards improving the number of FWDs selected to participate in extension training, technologies for solving problems, hosting demonstration plots and actual demonstration plots established. The Ministry of Food and Agriculture, when developing policies for implementation on inclusive extension delivery in Ghana can tap into the experience of average-aged extension agents with lower experience, higher level of education with specialization in general agriculture as trainers of trainees to train their other colleagues on targeting FWDs in their operational areas. Persons with physical, visual, hearing, speech, intellectual and emotional impairments are categories of farmers receiving crops and animal-related services on land preparation, GAPs, CSA, CA, post-harvest management, food processing, ruminant production and housing, poultry and snail production, feed formulation and preparation, and fish farming respectively. Extension agents should focus more on the thematic areas above when planning for FWDs in their operational areas. FWDs identified could also be introduced to these innovations. Additionally, extension agents should hold more discussions, compile information about technology needs during the needs assessment of FWDs and organise training programmes to train the farmers on the confirmed needs. Furthermore, all agents should improve on their accessibility to FWDs through 24-hour phone contacts and on-call services for emergency problems of FWDs.

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