

Inclusive Digital Agriculture:

Making Value Chains Work for Farmers with Disabilities

April 2021



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The GSMA Assistive Tech programme works to drive greater access and use of mobile technologies for persons with disabilities in emerging markets and maximise opportunities for social and economic inclusion. The programme works with the mobile industry and key disability and development stakeholders to address the digital inclusion gap of persons with disabilities, identify innovation opportunities and highlight the value of mobile-enabled assistive technologies. The programme is supported by the UK Foreign, Commonwealth & Development Office (FCDO).

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We bring together and support the mobile industry, agricultural sector stakeholders, innovators and investors in the agritech space to launch, improve and scale impactful and commercially viable digital solutions for smallholder farmers in the developing world.

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This initiative has been funded by UK aid from the UK Government and is supported by the GSMA and its members. The views expressed do not necessarily reflect the UK Government's official policies.

Acknowledgements

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Acknowledgements Thanks to reviewers from the GSMA Assistive Tech and AgriTech programmes, Firetail and the FCDO teams. We want to specially thank Sightsavers Kenya and Jazz for reviewing this report. Thank you to all those who participated in the interviews.

CONTENTS

Glossary of terms	4
Executive summary	6
Introduction	8
Barriers to the inclusion of farmers with disabilities in the agricultural last mile	12
Digital agriculture solutions can empower farmers with disabilities	20
The role of agribusiness in disability inclusion	24
Conclusions	34
Appendix 1: Detailed methodology	36

Glossary of terms

Accessibility	Design of products, devices, services or environments for persons with disabilities.
Assistive technology	The systems and services related to the delivery of products and services that maintain or improve an individual's functioning and independence, thereby promoting their well-being. ¹
Disability	Disability refers to the interaction between individuals with a health condition (e.g. cerebral palsy, Down syndrome and depression) and personal and environmental factors (e.g. negative attitudes, inaccessible transportation and public buildings, and limited social supports). ²
Last mile value chain	In agricultural value chains, the "last mile" refers to the web of relationships and transactions between farmers, crop buyers and input suppliers.
Person with disabilities	According to Article 1 of the United Nations Convention on the Rights of Persons with Disabilities, ³ persons with disabilities are "those 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."
Smallholder farmer	Smallholders are farmers "who produce food and non-food products on a small scale with limited external inputs, cultivating field and tree crops as well as livestock, fish and other aquatic organisms". ⁴
Washington Group Short Set of Questions	A set of questions designed to identify persons with disabilities in a survey or census. ⁵ Respondents answer questions and report difficulties experienced in six functional domains: seeing, hearing, walking, cognition, self-care and communication.



Executive summary

Smallholder farmers are responsible for producing the food on which up to 70% of world's population relies upon,[®] but poor access to services, markets and assets make it challenging to participate as equal players in the agriculture sector. This has not only limited their productivity and earning potential, but also prevented them from accessing and reaping the benefits of digital agriculture solutions.

For farmers with disabilities, there are even greater barriers to inclusion.⁷ They may encounter discrimination and stigma from those who believe agriculture is not an appropriate activity for persons with disabilities. For example, relatives may not encourage them to work in agriculture, agribusinesses may not hire them and financial institutions may not extend credit. Crop buyers may believe that produce from farmers with disabilities is lower quality, or they may take advantage of communication barriers to defraud farmers. There are also physical barriers, such as a lack of adapted agricultural tools and machinery, and step-free access to storage facilities and transportation.

More evidence is needed, but paths to inclusive digital agriculture are emerging.

Digital technologies have the potential to make agricultural value chains more resilient, sustainable and inclusive, and to unlock significantly more revenue for smallholder farmers, including those with disabilities. Digital agriculture solutions can transform how farmers interact with stakeholders in the agricultural value chain, access information and services, and make decisions about procurement, production and selling.⁸ However, a "double evidence gap"⁹ exists in terms of both disability inclusion in agriculture and existing digital interventions for smallholder farmers with disabilities in LMICs.¹⁰

Agribusiness have a crucial role to play in addressing barriers for farmers with disabilities, as shown by the two cases features in this report – Oasis Agribusiness and East African Breweries Ltd. From partnering with Organisations of Persons with Disabilities (OPDs) to making their touchpoints more accessible, these organisations are working to ensure that farmers with disabilities have equal opportunities to participate in agricultural value chains.

Agribusinesses, mobile operators and solutions providers can all use digital technologies to build more inclusive agricultural value chains. Our research shows this will require

efforts on three fronts:¹¹ working with farmers with disabilities or OPDs to embed disability inclusion in organisational strategies; generating disability- and gender-disaggregated data to identify farmers with disabilities and serve them better; and understanding the barriers farmers with disabilities face and addressing them with relevant digital content and services.

Inclusive digital agriculture benefits all

farmers. Digital solutions that empower farmers with decision-making tools and opportunities to earn a livelihood can improve their wellbeing. Tackling barriers to the digital inclusion of persons with disabilities is a commercial opportunity for the mobile industry to reach an untapped market, but accessible and inclusive digital solutions also have broad appeal.

For the first time, this report provides evidence of the barriers facing farmers with disabilities in the agricultural value chain in LMICs, and the opportunities for digital agriculture solutions to create a more equitable and inclusive sector for all farmers.





Over two and half a billion people work in smallholder agriculture.² Collectively, they produce nearly 70 per cent of the world's food on over 500 million small farms.³ In low- and middle-income countries (LMICs), smallholder farmers produce over 80 per cent of the food consumed, making a significant contribution to poverty reduction and food security.⁴

Yet, most smallholder farmers live in rural and marginalised areas where there is poor access to agronomic, market and weather information, infrastructure and modern equipment. Access to markets is fragmented or inadequate and there are higher rates of financial exclusion. Smallholder farmers are particularly vulnerable to the impacts of extreme weather events due to climate change, which are becoming more frequent.¹⁵ Women face even more obstacles. Although they represent a large part of the labour force on smallholder farms, access to assets, social capital and market information tends to be more limited than for men.

Despite these challenges, digital technologies are transforming agricultural value chains in LMICs, changing how farmers, agribusinesses, financial institutions and other stakeholders interact, and creating opportunities for smallholder farmers to move away from the margins of the agriculture sector and participate in the formal economy.

Digital agriculture can address the barriers facing smallholder farmers

Digital technologies can open access to agricultural services, markets and assets, and provide solutions to the challenges and barriers farmers face. From weather advisory to input financing and smart farming equipment, the GSMA AgriTech programme has identified a comprehensive set of use cases and subuse cases for digital agriculture, which are summarised in Figure 1.

Figure 1

Digital agriculture use cases and sub-use $cases^{\underline{16}}$

Access to services		Access to markets		Access to assets	
Digital advisory	Agri digital financial services	Digital procurement	Agri e-commerce	Smart farming	
Agri VAS	Credit and loans	Digital records	Inputs	Smart shared assets	
Smart advisory	Input financing	Digital records with payments	Outputs	Equipment monitoring	
Weather information	Credit scoring	Digital records with traceability	Inputs and outputs	Livestock and fishery management	
Pest and disease management	Crowdfunding	Digital records with payments and traceability			
Product verification	Insurance				
Record keeping	Digital agri wallet				
Savings					
	Accountability tool				
	C -1				
Smallholder farmer challenges					
Knowledge gap	Knowledge gap				
Low productivity		Poor access to markets		Low productivity	
Climate change					
Poor access to mobile networks and internet connectivity					

Despite the range and potential of digital technologies in agriculture, digital solutions are not reaching everyone. In the transition to digital societies, including the digitisation of agricultural value chains, there is a risk that smallholder farmers will be left behind. Women and persons with disabilities are particularly at risk because they face unique obstacles to adopting digital products and services. Although the barriers to digital inclusion for women have been well documented, including by the GSMA Connected Women programme,¹⁷ those faced by persons with disabilities are less understood.^{18, 19}

Disability inclusion in the agricultural value chain: the need for evidence

Worldwide, there are over one billion persons with disabilities. More than 80 per cent live in LMICs,²⁰ often living in rural areas where they do not have equal access to opportunities. Data from the UN Disability and Development Report shows that, in selected countries, persons with disabilities in rural areas are 65 per cent less likely than non-disabled persons to go to school, and 13 per cent less likely to be employed.²¹ This correlation between poverty and disability in LMICs is supported by other research, as well.²²

More research is needed to understand the involvement of persons with disabilities in agricultural activities, but evidence is growing. Recent research by the International Fund for Agricultural Development (IFAD) examined the participation of persons with disabilities in rural economic activities, including agriculture, in Ethiopia, Nigeria and Tanzania. The research found that:²³

 In Ethiopia and Nigeria, persons with disabilities are less likely to engage in agricultural activities than in non-agricultural activities. However, the likelihood of a household being involved in agricultural activities was not related to whether the household includes a family member with disabilities.

- In Nigeria, persons with disabilities are both less likely to work overall and to engage in agricultural and non-agricultural work. Households that have a member with disabilities are also less likely to sell their harvest.
- In Ethiopia and Tanzania, households that include a member with disabilities are more likely to be food insecure. Interestingly, in Tanzania, persons with and without disabilities are equally likely to be involved in agriculture.

There is a lack of research on disability inclusion in the agricultural value chain.

When documenting best practices in disability inclusion in agriculture and digital interventions for smallholder farmers with disabilities in LMICs, Alhenbäck et al²⁴ discovered a "double evidence gap". Not only was there a lack of evidence of existing approaches and activities (and limited evidence of their effectiveness), research and evidence on accessible digital solutions in smallholder farming were practically non-existent. Little data and evidence are therefore available to understand how digital agricultural solutions are reaching farmers with disabilities.

About the research

In this research study, the GSMA Assistive Tech and AgriTech programmes gathered evidence of the barriers farmers with disabilities experience in competitive agricultural value chains. The study traced the journey of farmers with disabilities in the agricultural last mile,²⁵ and identified examples of, and opportunities for, disability inclusion initiatives for smallholder farmers in LMICs.

The research addressed the following questions:

- What are the barriers experienced by farmers with disabilities in the last mile of the agricultural value chain?
- What opportunities exist for digital tools to overcome these barriers?
- How can digital agricultural solutions be designed to be inclusive for farmers with disabilities?

The findings and recommendations of this report are aimed at the mobile industry, digital agriculture solutions providers, as well as the food industry (and related services), international food and agriculture organisations, agriculture funders and donors, international organisations and disability rights organisations.

Methodology

This exploratory qualitative research study conducted a comprehensive literature review of academic and grey literature to identify emerging topics, and a characterisation of the journey of farmers with disabilities in the last mile of the agricultural value chain. Twenty-one semi-structured interviews were conducted with international farming organisations, academics, accessibility experts, international and national disability organisations, agricultural service providers and digital players. Persons with disabilities and disability organisations were consulted in different stages of the research. For more information on the methodology, please see Appendix 1.

Limitations

The findings presented in this report focus primarily on persons with mobility, visual and hearing impairments. Excluding persons with other types of impairment (physical, mental or intellectual) was not by design, but rather the result of available evidence. This highlights the need for more evidence on the experiences of persons with intellectual or psychosocial impairments in agriculture.

Terminology

This report follows the Social Model of Disability, which defines **disability** as the social barriers experienced by an individual, rather than a condition or an impairment.²⁶ These barriers can be systemic, attitudinal or environmental.

The term **accessibility** refers to the design elements of a product or service that ensure it can be accessed and used by all. This includes digital accessibility and the design of digital solutions, apps and websites to be usable for many people, including persons with disabilities.

The term **assistive technology**, as defined by the World Health Organization (WHO), "is an umbrella term covering the systems and services related to the delivery of assistive products and services".²⁷ In this report, mobile phones are included in this definition.

Barriers to the inclusion of farmers with disabilities in the agricultural last mile

If the world is to feed over 10 billion people by 2050, food production capacity will need to increase by 50 per cent,²⁸ and food production systems will need to become more efficient and resilient to harsher environmental conditions as a result of climate change.²⁹

Given that most food and beverage corporations procure from farmers in LMICs, smallholder farmers have a critical role to play in agricultural value chains and meeting global demand for food.³⁰ Figure 2 shows the six stages in which agribusinesses engage directly with farmers in the agricultural last mile: farmer recruitment, including profiling and onboarding; capacity building, including advisory and extension services; communication; programme management, including support for traceability and certification; crop purchasing and quality control; and financing, including payments, loans and invoicing.

Figure 2



The last mile of the agricultural value chain³¹

Many global policies for poverty alleviation focus on increasing the participation of smallholder farmers in agricultural value chains by improving productivity, efficiency and access to markets and financial services.³² However, these value chains are susceptible to inefficiencies that can leave smallholders vulnerable to theft and fraud, unable to reach out to mobile agents from their remote area and unable to access to up-to-date information on market prices.³³ These inefficiencies may amplify inequalities for groups already suffering discrimination and marginalisation, including women, persons with disabilities and people living in extreme poverty.

Many persons with disabilities in LMICs live in rural areas and are self-employed, often relying on subsistence farming for their livelihoods.³⁴ A study in Uganda showed that households headed by persons with disabilities are twice as likely to rely on agriculture as households not headed by persons with disabilities.³⁵ However, research is very limited on the experiences of farmers with disabilities in LMICs and their participation in agricultural value chains. This report documents three main barriers to disability inclusion at each stage of the agricultural value chain in the last mile (see Figure 2):

- **Systemic barriers** are procedures, policies and practices that do not take farmers with disabilities into account and therefore exclude them from effective and equitable participation in value chain activities.
- Attitudinal barriers are behaviours, perceptions or actions that discriminate against farmers with disabilities.
- Environmental barriers are characteristics of infrastructure (physical or digital) and tools that prevent persons with disabilities from accessing them.³⁶

It is important to note that most barriers are the result of a combination of factors and that there can also be multiple or compounding forms of discrimination based on gender, disability, race, religion and other factors. Therefore, farmers with complex or multiple disabilities are at even greater risk of exclusion.



13

Systemic barriers exclude farmers with disabilities from agricultural programmes and policies

Systemic barriers in the agricultural value chain are programmes and policies that exclude farmers with disabilities by not taking their experiences into account.

Agricultural projects and activities do not consider disability inclusion

Lack of attention to disability inclusion in agricultural projects was frequently mentioned by interviewees as a barrier. This barrier manifests in three ways.

Agriculture is not recognised as a potential source of livelihood for persons with disabilities and disability inclusion is rarely addressed strategically. Agricultural projects and activities have not taken a targeted approach to being more inclusive. Often, agricultural and development programmes focus on inclusion in terms of the gender gap rather than the disability gap,³⁷ and while disability rights movements and organisations representing persons with disabilities work on equal access to employment, disability inclusive agriculture is rarely considered.³⁸

"One interesting thing is that ...agriculture has not been a primary focus for quite so many disability organisations. We understand that so many persons with disabilities engage in small scale household labour and agriculture activities to win their livelihood. [This is in part] because formal employment is far from being an option for quite a lot of persons with disabilities because most of them have no education."

(Interview #13)

Table 1

Summary of systemic barriers experienced by farmers with disabilities

Agricultural activities in the last mile do not consider disability inclusion

Agriculture is not recognised as a livelihood for persons with disabilities.

Disability inclusion is not part of the agricultural strategy.

Information and training materials are not accessible.

Throughout the value chain, systems and policies exclude farmers with disabilities

Farmers with disabilities experience compounding inequalities (e.g. lack of ID or land ownership).

Institutions and organisations mistrust farmers with disabilities and do not have inclusive policies.

Incentives and targets from the government for disability-inclusive agriculture are lacking.

A lack of disability inclusion often results in inaccessible agricultural programmes.

Many interviewees reported that inaccessible extension services, information, resources and training materials and sessions (i.e. inaccessible locations)³⁹ had excluded and disenfranchised farmers with disabilities, and forced them to rely on someone else to access resources for them.⁴⁰ For instance, a study in Iran showed that a lack of accessible agricultural and rural extension services limited opportunities for farmers with physical impairments to access information and contribute to farming activities.⁴¹ Many interviewees mentioned the lack of information and training materials in accessible formats (i.e. Braille or sign language). As one interviewee explained, relatives often participate in training activities in their place:

"For many people [with disabilities], we found, that their family member is attending training and getting the information. The family members are supporting."

(Interview #8)

Throughout the value chain, systems and policies exclude farmers with disabilities

Other systemic barriers impact farmers with disabilities in the agricultural value chain. From compounding inequalities to lack of trust and lack of government incentives, these barriers are embedded in the everyday functioning of institutions that provide services to farmers.

Persons with disabilities are more likely to live in poverty and have less access to education and employment.⁴² For farmers with disabilities, these inequalities are compounded by the marginalisation, exclusion, discrimination and stigma they often face in rural and agricultural communities. Opportunities for farmers with disabilities and their communities to prosper are therefore minimal, and they are often left unable to cope with environmental, economic and other shocks.⁴³

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Institutions that provide services to farmers do not always trust farmers with disabilities.

For instance, financial institutions often exclude persons with disabilities from accessing financial services to invest in agriculture because they believe they will not be able to make their loan payments.⁴⁴ A lack of formal identification introduces additional challenges as many farmers with disabilities cannot prove who they are when trying to access services.⁴⁵ These barriers limit their ability to get upfront credit to buy insurance or seeds, acquire land, grow crops and purchase accessible tools,⁴⁶ often forcing them to rely on expensive forms of credit.⁴⁷

Government incentives for disability inclusion

are lacking. While governments play an important role in addressing many of these systemic barriers, there are still insufficient incentives and targets to implement disability inclusion policies and encourage the participation of persons with disabilities in farming.⁴⁸

Attitudinal barriers lead to unfair treatment and self-exclusion

Farmers with disabilities also face barriers in their interactions with others. Our interviews revealed two main attitudinal barriers: a lack of awareness of disability and discrimination and stigma towards persons with disabilities.

Table 2

Summary of attitudinal barriers experienced by farmers with disabilities

Lack of awareness of disability and existing communication barriers in commercial relationships	Discrimination and stigma towards persons with disabilities
Peers and communities are not aware of disability.	People believe farming is not the right activity for persons with disabilities.
Poor adoption of accessible modes of communication (e.g. sign language) for production, bargaining and selling activities	Employers may be reluctant to hire persons with disabilities.
	Stigma and discrimination against persons with disabilities.
	People may hold prejudices that farmers with disabilities produce poor-quality products.



Lack of awareness of disability and existing communication barriers in commercial relationships

Effective market participation is necessary for farmers to transition from subsistence farming to making investments that increase yields and allow them to sell directly to traders.⁴⁹ However, smallholder farmers often only have access to informal value chains and must rely on intermediaries to sell their produce. Farmers' bargaining power depends, in part, on how much market information they have and their ability to enforce verbally agreed terms of exchange with intermediaries. Also, the reliance on cash puts persons with disabilities at risk of thievery.

When negotiating with sellers and buyers, some farmers with disabilities experience communication barriers that exacerbate inequalities. For instance, many people in their communities or value chain are not aware of disability and do not have the skills to communicate in different ways (e.g. sign language). Farmers that experience communication barriers are often taken advantage of and exploited. As one interviewee explained:

"[Farmers with disabilities] could not communicate and bargain as easily as other farmers. They cannot express their bargaining skills power to shop attendants. People exploit them."

(Interview #5)

To overcome these communication barriers, farmers with disabilities are often forced to rely on someone else to participate in commercial and market activities on their behalf, such as an immediate family member or relative.

Discrimination and stigma towards persons with disabilities persist in many communities

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Common misconceptions lead many people to believe that farming is not an appropriate activity for persons with disabilities, despite it being an important source of livelihood for them. For instance, some parents of children with disabilities may not encourage them to participate in farming activities because they fear for their child's well-being or do not believe in their potential and abilities.⁵⁰ Also, employers rarely recognise the capabilities of persons with disabilities and are reluctant to hire them.⁵¹

Many farmers with disabilities face discrimination and stigma due to persistent negative perceptions of disability.

Discrimination and stigma lead many to selfisolate and exclude themselves from participating in agricultural activities. This, in turn, excludes them from community decision making processes about water, sanitation, agricultural inputs and other areas.⁵² There can also be an unfair perception that farmers with disabilities produce lower quality products, which can lead to buyers not wanting to purchase their products or farmers being forced to sell their products at low prices.

"Individuals with disabilities often face a lot more stigma and selling their products because people believe that they cannot work, and that their products must be of lower quality."

(Interview #18)

Socio-cultural beliefs and practices may also compound and exacerbate discrimination and stigma. For instance, women with disabilities may experience additional barriers to participation in agricultural activities.

Environmental barriers disenfranchise farmers with disabilities

Environmental barriers to disability inclusion stem from a lack of consideration of accessibility in the design of physical spaces and environments. These barriers can therefore limit opportunities for farmers with disabilities to participate in agricultural activities.

Table 3

Summary of environmental barriers experienced by farmers with disabilities

Inaccessible physical and digital environments disempower farmers with disabilities

Inaccessible agricultural environments and unavailable adapted tools and machinery for sowing and harvesting.

Inaccessible facilities and environments force persons with disabilities to be dependent on others (e.g. training centres, transportation, fields, storage facilities and markets).

Existing digital/mobile solutions for agriculture are not accessible.

Inaccessible agricultural tools, machinery and environment

Agricultural activities are extremely physical, and without the right adaptations traditional agricultural methods can be challenging. A study of urban farming in Kenya⁵³ found that 45 per cent of households with a member who has a disability do not participate in agricultural activities due to physical inaccessibility, even if they own land for growing. Environmental barriers include a lack of adapted tools for agriculture and inaccessible physical and digital spaces.

Adapted tools and machinery can create opportunities for more disability-inclusive agriculture.⁵⁴ Using adapted tools can help persons with disabilities modify traditional farming methods.⁵⁵ Inclusive tools and solutions have often emerged from the grassroots and are designed for affordability.⁵⁶ However, availability is limited in most markets and few farmers with disabilities have access to them.

Fields and other agricultural areas can be hard to access, and for farmers who use a wheelchair or have a visual impairment, access to rugged terrain can be challenging.⁵⁷ The infrastructure required for storage, transportation and selling can also be inaccessible (e.g. no step-free access and distance to storage facilities, markets, etc.), restricting participation in commercial activities and market access for many farmers with disabilities.⁵⁸ Like the barriers described above, these environmental barriers force farmers with disabilities to either rely on someone else or not participate in agricultural activities.

Digital solutions are not inclusive of persons with disabilities

- According to a recent report by the GSMA, persons with disabilities are less likely to own a mobile phone and use mobile internet than persons without disabilities.⁵⁹ However, persons with disabilities experience different barriers to mobile ownership and usage, and since barriers are contextual, they can be more relevant in some countries than others. These barriers include:
- Low literacy and skills: Difficulty reading or writing was the primary barrier to mobile ownership and use reported by persons with disabilities in the GSMA Mobile Disability Gap 2020 report. Low literacy and skills limit opportunities to access and use mobile in meaningful ways.

- Affordability: For many persons with disabilities in LMICs, handsets remain unaffordable. While smartphones offer the most accessibility features to persons with disabilities, they are usually the most expensive.
- Relevance: Products and services that are accessible or tailored to persons with disabilities are often not available. This has an influence on the perceived benefits of mobile, since persons with disabilities often do not perceive mobile as an assistive technology neither consider mobile as beneficial compared to persons without disabilities.

As digital agriculture solutions become more common, it is important to recognise that they are often not designed with accessibility in mind, creating an additional barrier to inclusion. The ways in which digital solutions can break down the barriers described in this section will now be explored.



Digital agriculture solutions can empower farmers with disabilities

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Digital technology, including mobile phones and mobile internet, can support persons with disabilities to participate and engage in socioeconomic activities.[®] For the agriculture sector, the growing focus on enabling better access to markets through e-commerce and digital procurement solutions, mobile money services have expanded how digital solutions can address barriers for farmers with disabilities and improve how agribusinesses and farmers interact.

Figure 3 summarises the various use cases for digital agriculture solutions.

Figure 3

Use cases for digital agriculture solutions⁶¹

Access to services	Digital advisory	Information-based services providing smallholder farmers with agronomic and livestock advice and best practices, information on market prices, weather and climate information as well as financial and digital literacy training.
	Agri digital financial services	Digitally enabled financial services for smallholders to facilitate their inclusion in the formal financial economy and allow investment in farming activities. These services are customised to meet farmers' needs and tailored to their cropping cycles. This category also includes financial products that enable financial service providers to lower the risk of lending to smallholders.
Access to markets	Digital procurement	Digital solutions in the agricultural last mile that enable a range of digital systems and processes to transition from paper to digital. These solutions help the agribusinesses make their transactions with smallholders more efficient operational profitability. At the same time, farmers benefit from more transparent transactions, improved market access and the ability to access a digital footprint, which can be used to access financial services.
	Agri e-commerce	Digital platforms that enable the buying and selling of agricultural produce and inputs online. Although most agri e-commerce businesses sell domestically to urban consumers, agri e-commerce also enables farmers to reach international buyers.
Access to assets	Smart farming	Smart farming refers to the use of sensors, drones, satellites and other farm assets to generate and transmit data about a specific crop, animal or practice to support agricultural activities. Smart farming solutions rely on connectivity between IoT-enabled devices to optimise production processes and growth conditions while minimising costs and saving resources.

Mobile is a vital assistive technology for persons with disabilities, especially smartphones, which provide new ways to access services and products.⁶² While efforts are needed to close the mobile disability gap, the growing number of digital solutions are an opportunity for digital agriculture to break down the barriers for farmers with disabilities.

Digital solutions can provide accessible extension services

Digital advisory services first emerged in the 1990s to address the knowledge gaps smallholder farmers were facing, but today they do much more.⁶³ Using mobile technology to disseminate information to farmers, these services provide weather forecasts, adaptive agronomic advice and access to financial products and services. They can also deploy extension services to remote areas and reach farmers who have never had access to these services before. Digital advisory services are usually delivered through basic technology channels, such as SMS, USSD, IVR or OBD.64 As mobile internet connectivity and smartphone adoption has increased, using rich media through apps and online content has led to more digital advisory services delivered via mobile apps.

One of the most significant barriers to disability inclusion is that information and training materials are not always available in accessible formats. Training centres are also often located far from farms and transportation can be inaccessible and unaffordable. When extension services are provided to farmers in person, agents may not be sensitised to disability inclusion. Through the multiple media and communication modes offered by mobile, business-to-consumer (B2C) digital advisory solutions can help remove these barriers. Box 1 presents an example of how one mobile operator is using digital advisory services for farmers with disabilities.

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The digitisation of extension services can also enable agribusinesses to provide simplified and more transparent processes. Digital advisory services can help businesses deploy tools for data collection, including farmer surveys, which can help agribusiness better serve farmers with disabilities.⁶⁵

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Box 1. BaKhabar Kissan

BaKhabar Kissan (BKK) is an agritech solution by Jazz and Switch Solutions in Pakistan. BKK offers a mix of conventional and digital services aimed at improving farmer yields and incomes. The platform facilitates access to various services for the agricultural community, ranging from weather information to access to agriculture experts, best farming practices and information on fertilisers, seeds, pesticides and other agricultural inputs.

Ensuring its services are accessible to as many farmers as possible is important to BKK. After listening to feedback from farmers, they modified their content and how they provide services across several formats and channels, including:

 A mobile app that allows farmers to access agricultural information customised to their needs. For example, the latest market rates, weather forecasts, agricultural advisory, a marketplace to buy inputs, voice recognition and video training on YouTube. Farmers who do not have access to a smartphone can subscribe to an SMS, select their preferred language and the type of information they want to receive. Text messages are then sent with timely information and region-specific classifications. IVR that allows farmers to listen to information on best practices in production technologies and critical crop stages. Through the IVR system, farmers can connect to a helpline to receive additional support, either from an agriculture graduate or subject matter experts.

Around four million farmers subscribe to BKK's information and updates via basic channels (IVR, SMS, VMS, call centre) and rich media channels (Android app, website, social media, WhatsApp, etc.). To reach all farmers in the country, BKK has made services and customer support available in seven languages: English, Urdu, Pashto, Hindko, Punjabi, Seraiki and Sindhi.

BKK's brand ambassador is a farmer with disabilities who is a regular user of the services and provides continuous feedback on his personal experience. Including a farmer with disabilities has helped BKK learn how to better support other farmers with disabilities in their customer base.

This approach has not only enabled BKK to serve more farmers with disabilities (e.g. visual and physical impairment), but also farmers who lack basic literacy skills, older farmers and those who are geographically isolated.

Digital solutions can address barriers to market access

The barriers farmers with disabilities experience when accessing markets and assets have been outlined in previous sections. While attitudinal barriers make it difficult for farmers to negotiate fairly and often leads to selling produce at belowmarket prices, environmental barriers make it difficult for farmers to participate in procurement and marketing activities, such as inaccessible storage and marketplaces, and inaccessible and expensive transportation services.

"With public procurement, like government-led procurement for fertilisers, there was some digitisation. This is where basic phones and apps could be made available to support those with disabilities. It was a good way to be able to also address nonaccessible transportation issues or when working in very remote areas."

(Interview #18)

Digital procurement and digital payments are essential to unlocking full financial inclusion for those who have not been served by traditional markets and financial institutions. For farmers with disabilities, digital procurement solutions could make financial records more accessible and purchasing histories more traceable. These solutions can also inform agribusinesses of communication requirements or preferences that could help them serve farmers better. Digital payment services can remove some of the safety and security risks for farmers with disabilities during financial transactions, and help them to access other services as well.⁶⁶

Addressing the mobile disability gap

To leverage the potential of digital solutions as drivers of disability inclusion in agriculture will require addressing the barriers to the digital inclusion of persons with disabilities. The GSMA Mobile Disability Gap Report 2020 expands on the barriers to the digital inclusion of persons with disabilities.⁶²

Ensuring that relevant and accessible mobile products and services are available for farmers with disabilities is an important step. Also, as highlighted earlier in the report, digital skills remain a barrier for persons with disabilities. For this reason, the GSMA has developed the Accessibility module of the Mobile Internet Skills Training Toolkit⁶⁸ to ensure that mobile operators and other organisations can support persons with disabilities to acquire the digital skills they need to benefit from mobile and access to mobile internet.

23

The role of agribusiness in disability inclusion

Addressing the barriers faced by farmers with disabilities is an important part of global efforts to reduce poverty and hunger. Agricultural value chain actors, and increasingly digital agribusinesses, play an important role in empowering farmers with disabilities. By creating opportunities to generate income and learn essential skills to earn a livelihood, these organisations are supporting smallholder farmers to improve their well-being while also promoting greater participation in agricultural decision making.

Embracing disability inclusion creates opportunities for agribusinesses and technology players to serve farmers in innovative ways. It can also change mindsets in the communities where they operate and encourage farmers with disabilities to participate in agricultural activities. However, there is still a significant gap in addressing barriers to inclusion. There are few examples of agribusinesses actively engaging in disability inclusion, which suggests more work needs to be done.

Disability inclusion in the agricultural last mile: lessons learned

Valuable lessons can be drawn from agribusinesses that are supporting the inclusion of persons with disabilities in the agricultural value chain. This section features two organisations that are working to remove some of the barriers to disability inclusion in the last mile:

- East African Breweries Limited (EABL), which has piloted a project for disabilityinclusive agriculture for sorghum jointly with Sightsavers.⁶⁹
- Oasis Agribusinesses, which has implemented digital solutions in their rice value chains to serve farmers more inclusively. They have worked with Light for the World.²⁰

Box 2 and Box 3 describe the projects these organisations are implementing.

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Box 2. East African Breweries Limited

East African Breweries Limited (EABL)²¹ is a leading beverage company based in Kenya that sources from over 62,000 farmers in six countries in eastern Africa. As part of their Diversity and Inclusion Strategy, EABL is embedding disability inclusion policies and practices in different business areas.

For EABL, disability and inclusion became part of their new business performance strategy. Based on the lessons from their work on gender, they decided to turn their focus to disability inclusion. EABL's goal is to increase the participation of persons with disabilities throughout the value chain, including farmers, suppliers and employees. EABL has engaged with farmers from pre-financing through to harvesting and delivery, primarily face-to-face, but also via SMS.²² Through a strategic partnership with Sightsavers, EABL is piloting a disability inclusion project in Kenya with 39 sorghum farmers with disabilities to learn about their needs and requirements, and embed inclusive practices throughout the entire value chain. Sorghum is sourced by EABL from approximately 47,000 farmers in Kenya.

Due to the risks associated with a pilot study, EABL put safety nets in place to

mitigate risks for participating farmers. Sightsavers underwrote crop failures at 0.8 tonnes per acre, while EABL provided prefinancing for seeds and other agronomyrelated inputs, as well as training and free extension services. For EABL, creating an enabling environment for farmers is key to the success of the project because they can join without fear of a negative experience or being excluded.

EABL has found that onboarding and serving farmers with disabilities require a deliberate recruitment effort and support from OPDs. However, even with incentives, reaching out to women with disabilities to participate in the sorghum value chain remains a challenge due to societal barriers. Simply ensuring nondiscriminatory practices are in place is not sufficient; specific incentives are needed to attract farmers with disabilities. Success stories from other farmers with disabilities and promoting the specific agricultural opportunity have both been important.

While there is still work to do, EABL's pilot project has been a learning opportunity in how to implement disability-inclusive practices in agriculture.

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Box 3. Oasis Agribusiness Limited

Oasis Agribusiness Limited ("Oasis")

serves over 2.300 farmers with disabilities in Alebtong, Northern Uganda, nearly a guarter of their customer base and a significant contributor to the business through input purchases.⁷³ Oasis serves farmers with visual, hearing and physical impairments, selling them high-quality rice seeds at subsidised prices and buying their crops during the harvest season. Community-based village agents provide inputs and extension services and coordinate purchase clerks or mobile money agents to pay the farmers. Oasis also provides training to community leaders using a "train-the-trainer" approach, and works with Light of the World, a disability and international development NGO, on research and training for agribusinesses.

Identifying the barriers facing farmers with disabilities

Oasis identified many barriers experienced by farmers with disabilities, including lack of access to markets and competitive value chains. In a baseline study, Oasis found that farmers with disabilities typically pay 30 per cent more for agricultural inputs (e.g. rice seeds, fertilisers) than farmers without disabilities. For instance, farmers with hearing impairment are disadvantaged when negotiating prices for inputs and selling crops due to communication barriers and fraud. Even when farmers can access inputs, they often lack the information and timely extension services to use them appropriately. This causes some farmers with disabilities to frequently rely on family members for support with many agricultural activities.

Service and communication channels and platforms

Oasis has identified multiple channels to provide services and communicate with farmers. For instance, farmers can request assistance from a third-party provider by calling a dedicated call centre or using USSD⁷⁴ on their phones. The system uses GPS to identify suitable service providers nearby and service selection is automated based on distance and current engagement. Farmers are connected through a cloud database in the most accessible way, depending on their preference. This is provided free of charge to the farmer.

Other Oasis services have been tailored to be more accessible. For instance, farmers with visual impairment who cannot see the scales are at risk of being defrauded by clerks. To address this risk, Oasis has installed digital, audible weighing scales that not only benefit farmers with visual impairment, but also those with low literacy levels.

Oasis has also developed a fingerprint registration app that will allow farmers with disabilities, particularly those with visual impairments, to authorise payments using fingerprint readers brought to them by village agents. This means that farmers are no longer required to find an agent on their own, reducing mobility and transportation challenges.

Using digital platforms, such as an SMS platform and mobile money app, Oasis communicates real-time information to farmers, such as crop planting advice and market information. Oasis is planning to expand these communication channels by launching an IVR-enabled SMS platform⁷⁵ suitable for persons with visual impairment or low literacy levels. They recently trialled a toll-free call centre to serve farmers in their language of preference, including a local language or sign language service.

Benefits of disability inclusion for Oasis

Disability inclusion has allowed Oasis to scale by adding over 2,300 farmers with disabilities, increasing its sourcing base from 8,000 to over 10,300. It has also created employment opportunities for persons with disabilities across the organisation. Meanwhile, farmers with disabilities receive the support they need to produce higher quality and higher volume outputs, which raises incomes and improves livelihoods.



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Although Oasis and EABL have only recently begun working on disability inclusion, their experiences offer rich emerging practices in how agribusiness could increase the participation of farmers with disabilities in agriculture and ensure that stakeholders throughout the value chain reap the benefits of inclusion. Figure 4 summarises the lessons and actions of these organisations in their various interactions with farmers.

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Figure 4

Key lessons for disability inclusion in the agricultural value chain

Actions	Farmer recruitment	Capacity buiding	Crop purchasing	Financing
Disability inclusion in programme design	Oasis: Works with Light for the World to understand farmers' specific needs. EABL: Works with Sightsavers and local OPDs to identify and recruit farmers with disabilities and assess their specific needs.	Oasis: Works with Light for the World to understand farmers' specific needs and how to provide training (e.g. content in accessible formats). Light for the World provides sign language training to staff and training on disability-inclusive employment. EABL: Works with Sightsavers and local OPDs to identify the areas and specific skills that farmers with disabilities may be missing and to develop tailored training.		
	supported EABL in develo	cted an accessibility audit o oping a disability inclusion s	t physical infrastructure and trategy.	a Internal policies, and
Providing tailored services and support to farmers with disabilities	Oasis: Sells rice seeds and agricultural inputs via village agents at subsidised prices.	Oasis: Trains farmers to train others. Supports service linkages with workers. Provides information via app and SMS, free call centre, support in local languages and sign language. There are plans to launch an IVR- enabled SMS.	Oasis: Installed audio software on digital scales. Storage is physically accessible.	Oasis: Identification and verification via fingerprint. Village agents (and mobile money agents) come to farmers.
	EABL: Offered pre-financing and Sightsavers underwrote crop failures during a pilot to prove the business case for disability inclusion.	EABL: Trains farmers in business skills.		

Embedding disability inclusion in programme design and working with OPDs

The main lesson from Oasis and EABL is that disability inclusion needs to be at the core of an organisation's business strategy and gradually integrated in all business areas. Initially unaware of how to become disability inclusive, Oasis and EABL partnered with OPDs to bring muchneeded expertise to the projects, understand user perspectives and connect with potential users.

Partnering with OPDs and disability organisations can add significant value.

Providing guidance on inclusive employment and offering disability awareness training to staff members can help agribusinesses embed disability inclusion in their organisation. Interviewees suggested that agribusinesses also need to adapt their recruitment practices.⁷⁶ For instance, 25 per cent of the Oasis Agribusiness workforce have disabilities, which is higher than the national prevalence of disability in Uganda (16.5 per cent of the adult population).⁷² Staff are trained in sign language to better communicate with farmers with hearing impairment.

These examples suggest that strategic partnerships with OPDs can enable agribusiness to identify barriers specific to farmers with disabilities, to pinpoint operational and business areas that need improvement and to make changes throughout the supply chain.

Understanding farmers with disabilities to provide relevant services and support

Tailoring support and services to farmers' abilities and preferences is a crucial part of inclusivity that requires data. However, disability data is often not available, and it is even more scarce for certain populations, such as those living in rural and remote areas. Oasis and EABL are working with OPDs to understand the barriers faced by farmers with disabilities and design solutions to make their services more accessible across different touchpoints.⁷⁸

For agribusinesses, generating high-quality data is an important step in understanding their customer base and how to best serve farmers.

Often, data can be collected during farmer registration or through follow-up service surveys. This data allows agribusinesses and their digital partners to identify specific barriers farmers encounter when working with an agribusiness. Insights from the data help agribusinesses to understand and record different farmer profiles, barriers and requirements for service customisation.

When collecting data, it is advisable to use a standardised approach to allow comparability with other datasets. The Washington Group Short Set of Questions⁷⁹ is recommended, as it is commonly used to collect valid, reliable and comparable data on disability. The Short Set of Questions explore whether an individual experiences any difficulty walking or climbing steps, seeing, hearing, remembering or concentrating, providing self-care or communicating. The questions are designed to identify people by their functional limitations and environmental barriers, and have been designed to reduce underreporting caused by the stigma around disability.

As the Oasis and EABL examples demonstrate, OPDs can provide vital support organisations when designing data collection and evaluation studies. This includes identifying farmers with disabilities, evaluating the barriers facing farmers with disabilities and providing guidance on designing inclusive procurement processes and support systems.

Inclusive design benefits everyone

Applying inclusive and universal design concepts can help ensure that products and services benefit all farmers. EABL and Oasis serve farmers with and without disabilities, and their targeted services, such as training through SMS, IVR and mobile apps, are designed to be easier to use for everyone. They not only benefit farmers with visual or hearing impairment, but also farmers with low literacy levels and elderly farmers. Making services more convenient and reducing mobility requirements can also benefit farmers who are wheelchair users and have a mobility impairment, as well as those who cannot afford transportation.

When designing digital agriculture solutions for farmers, whether they have a disability or not, it is important that they are at the centre of the process. A human-centered or usercentred design approach can guide the process.⁸⁰ Although evidence of best practices is lacking, a GSMA handbook⁸¹ provides guidance on using human-centred design approaches to design digital solutions for persons with disabilities.

Recommendations for agribusinesses actively engaged in disability inclusion

The previous section showcased two agribusinesses that are actively engaged in disability inclusion in the agricultural value chain. Oasis and EABL have embraced disability inclusion at the heart of their strategies, and although their journey has only just begun, their experiences offer valuable insights into how businesses can expand their potential customer base and increase their revenues by becoming more inclusive. Figure 5 offers recommendations based on insights gathered from Oasis and EABL, as well as those provided in key informant interviews.



Figure 5

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Recommendations to make digital solutions for the agricultural last mile more disability inclusive

Farmer recruitment	• Work in partnership with farmers with disabilities or organisations that represent persons with disabilities (e.g. OPDs).
~	• Capture data disaggregated by gender, literacy and disability (using the Washington Group Short Set of Questions).
える	Allow farmers to opt in to register their access requirements and communication preferences.
	 Provide clear and easy-to-read content in different formats (e.g. video captioning, alt text for images and visual communication), channels (e.g. SMS, USSD, IVR, helpline, app) and languages.
	 Register farmers with a visual impairment and those with low literacy levels in voice biometrics verification.
Capacity	Adapt formats, languages and channels with accessibility features to serve different audiences.
bunung	Make services accessible for those with basic phones and no mobile internet coverage.
-0	Provide subsidised pricing to make services affordable.
ملالاه	 Offer appropriate customer support in multiple languages and communicate in multiple formats, including sign language interpretation for farmers with hearing impairment.
	• Explore linkages with Ministry of Agriculture extension officers for agronomy training and services.
	Connect farmers to make use of peer-to-peer support.
Programme management	 Use different data collection tools to capture all users (e.g. phone surveys, interviews) through the Washington Group Short Set of Questions.
	 Conduct surveys or interviews in a language the farmer is familiar with (e.g. simple language, local language, sign language).
<u>،</u> ه	• Reduce the number of mobile apps used to track certification requirements and make them accessible for persons with disabilities.
	• Explore linkages with crop certification bodies to ensure certification programme KPIs track disability inclusion.
	Integrate visual media in digital training materials.
	 Plan farmer review meetings to understand their successes and challenges, and identify possible solutions together.
	• Explore linkages with ministries or offices representing persons with disabilities (e.g. social services, National Council of Persons with Disabilities), to ensure the project is sustainable.
Crop purchasing	 Provide a digital collection schedule in different formats, languages and channels with accessibility features.
	• Install audio software in scales to reduce the risk of fraud in weighting and to ensure accessibility.
	• Allow farmers with disabilities to request digital pickup or through a helpline at their location.
Financing	 Introduce tiered Know Your Customer (KYC) requirements to open a mobile money account, register a SIM or limit transaction levels. These considerations can only be applied if the regulations allow for them.⁸²
	 Advocating for tier-KYC in countries where the regulations do not have provisions for tiered requirements.
.0.1	• Allow users to identify themselves and verify payments using biometric voice or fingerprint. ⁸³
	Offer opt-in for customer support that meet farmers' access requirements.
	• Design mobile money features in different formats, languages and channels with accessibility features.
	• Provide a service or query line to a village agent or helpline that farmers can trust.
	 Provide digital skills and digital literacy training for farmers to ensure secure use of digital financial systems.



Conclusions

For the first time, this report provides evidence of the barriers facing farmers with disabilities in the agricultural value chain in LMICs and the opportunities to support disability inclusion in agriculture, including digital agriculture. To ensure that agricultural value chains are disability inclusive, stakeholders need to:

Embed disability inclusion in their organisation's strategy by working with farmers with disabilities or OPDs.

Embracing disability inclusion opens opportunities for agribusinesses and technology players to be innovative in how they serve farmers, and it can also help change mindsets within the organisation (for example, through disability awareness training). This can, in turn, change mindsets in the communities where they operate, influencing service providers and recognising agriculture as a meaningful livelihood for farmers with disabilities. Furthermore, it can encourage farmers with disabilities to participate in agricultural activities (e.g. offering targeted services or identifying community leaders).

Understand the barriers facing farmers with disabilities and leverage mobile to address them.

The barriers experienced by farmers with disabilities can be systematic, attitudinal or environmental. Digital has the potential to overcome some of these barriers, but solutions need to be intentionally designed to address these barriers. This means that digital agriculture solutions need to incorporate accessibility features and ensure that content and services are relevant. Furthermore, solutions need to be co-created with persons with disabilities.

Address barriers to digital inclusion for farmers with disabilities.

Literacy and digital skills remain a critical barrier to the inclusion of persons with disabilities, including farmers. Providing affordable mobile offerings and digital skills training are just two examples of how digital agriculture providers, operators and other stakeholders can support the digital inclusion of farmers with disabilities.

The GSMA Assistive Tech programme has launched the Principles for the Digital Inclusion of Persons with Disabilities,⁸⁴ which include considerations when reaching persons with disabilities with mobile services. These principles are likely to be useful for agribusinesses and digital service providers seeking to offer inclusive digital agriculture services. Inclusive agricultural value chains not only benefit farmers with disabilities, but all farmers, and represent an important commercial opportunity for agribusiness.



Appendix 1: Detailed methodology

This report presents evidence from an exploratory study of the barriers in the agricultural value chain for farmers with disabilities, and identifies opportunities and best practices for digital solutions to support inclusion. Specifically, the research aimed to address these questions:

- What are the barriers experienced by farmers with disabilities in the last mile of the agricultural value chain?
- What enablers and opportunities exist for digital tools to overcome these barriers?
- How can digital agricultural solutions be designed to be inclusive for farmers with disabilities?

The research followed a qualitative approach based on a literature review and semistructured interviews. This section describes the methodology.

Literature review

Literature searches were conducted online using Google to identify grey literature (such as reports, toolkits, guidelines and standards) and GoogleScholar, Science Direct, Elsevier, and Researchgate to identify academic literature. A combination of keywords was used to identify agricultural practices (i.e. farming, agriculture, food systems, last-mile agricultural value chains, competitive value chains, livelihoods, smallholder farming, inclusive value chains, inclusive agriculture) and disability inclusion (i.e. disabilityinclusive policies and approaches, disability inclusion, farmers with disabilities, persons with disabilities, assistive technologies). The literature review excluded examples and literature on lowtech assistive technologies, including adapting farming tools, and any references to inclusive

agriculture not specific to disability (e.g. gender inclusion) and the challenges experienced by farmers in the value chain related to disability.

Due to limited available evidence, as documented by Alhenbäck, V. et al.,⁸⁵ priority was placed on identifying resources that showcased practical examples rather than theoretical frameworks. The searches were complemented by searches of relevant organisations, such as the Food and Agriculture Organization of the United Nations (FAO) and the International Fund for Agricultural Development (IFAD), including blogs, report briefs and guidelines. The research aimed to build on existing research by the GSMA. Therefore, recommended literature was provided by GSMA AgriTech and Assistive Tech programmes.

Semi-structured interviews

Semi-structured interviews were conducted with representatives organisations to complement the findings of the literature review. Interviewees included persons with disabilities and representatives of organisations of persons with disabilities, international organisations, employment organisations, agricultural organisations and digital players.

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Interview #	Type of organisation	Area of expertise of interviewees	Interview mode
1	International Organisation	Disability Inclusive Development	Email
2	Disability inclusion organisation in LMIC	Disability-inclusive agriculture	Interview
3	International disability inclusion organisation	Disability-inclusive development	Interview
4	International advisory and management company	International development	Interview
5	Agribusiness in LMIC	Disability-inclusive agriculture	Interview
6	International NGO	Poverty alleviation	Interview
7	Agribusiness in LMIC	Disability-inclusive agriculture	Interview
8	Disability inclusion organisation in LMIC	Disability-inclusive development	Interview
9	Disability inclusion organisation	Disability-inclusive development	Interview
10	International NGO	Ethical agricultural practices	Email
11	International Organisation	Inclusive employment	Interview
12	International Organisation	Disability-inclusive agriculture	Interview
13	International organisation of persons with disabilities	Disability inclusion	Interview
14	Digital solutions provider in LMIC	Telecommunications	Interview
15	Digital solution provider in LMIC	Telecommunications	Interview
16	Academia	Disability inclusion expert	Interview
17	Innovation accelerator and incubator in LMIC	Disability innovation and assistive technologies	Interview
18	International disability inclusion organisation	Disability-inclusive development	Interview
19	Disability inclusion organisation	Disability-inclusive agriculture	Interview
20	Disability inclusion organisation	Disability-inclusive agriculture	Interview
21	User of a digital solution in LMIC	Farmer with disabilities	Email

37

To answer the research questions, the interviews explored the following topics:

- Characteristics of the journey and barriers in the agriculture value chain experienced by farmers with disabilities;
- Approaches and policies for disability inclusion (in agriculture, but also other sectors); and
- Recommendations for disability inclusive digital agriculture.

These interviews were conducted in May and June 2020. Eighteen interviews were conducted remotely over the phone or via a videoconferencing platform. In some interviews, more than one person from the organisation participated in the interview. On average, these interviews lasted one hour. Three interviews were conducted in writing via email, one with a user via a digital solutions provider in an LMIC. Where verbal consent was provided, interviews were recorded and transcribed. Transcriptions, email responses and interview notes were digitised and anonymised.

Qualitative analysis

All relevant literature and interview transcripts and notes were analysed using thematic analysis. Using a grounded theory approach, two iterations of coding were completed. In the first iteration of the analysis, themes were identified that allowed research questions to be answered (e.g. barriers to disability inclusion in agriculture, enablers of disability inclusion in agriculture and opportunities for digital solutions). Through a second iteration of analysis, the themes were further refined, and sub-themes were identified. To validate the themes, coded interview and literature excerpts and a thematic framework were shared with two researchers unfamiliar with the study, who were asked to assign codes to each interview excerpt. An inter-coder agreement of around 60 per cent was accepted as an indication of being in fair agreement. To exemplify the analysis, quotes from the interviews and text were used throughout the report. These have been edited for readability.

Limitations

The narrow scope of this study required a qualitative and largely exploratory research approach. For this reason, the research builds on the experiences of the different organisations interviewed; hence, many views from other organisations and experiences from many farmers with disabilities have not been captured. This research is theory building (inductive) rather than hypothesis testing (deductive). The frameworks presented here can serve to inform future research.



Endnotes

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- 83. Distributing entities can innovate around their vetting procedures to ensure funds reach the correct recipients account but they need to work closely with mobile money providers for any customised digital solutions.
- 84. More information about the Principles can be found at: <u>https://www.gsma.com/mobilefordevelopment/principles-for-driving-the-digital-inclusion-of-people-with-disabilities/</u>
- Alhenbäck, V., Lee, H. and Coe, S. (2019). <u>Mobile phone technology disability-inclusive agricultural development: findings from an evidence review and webinar</u>. Disability Inclusion Helpdesk Report No.17. Agriculture Research Team, DFID



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