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Agriculture and mobile-based interventions for smallholder farmers: best practice on disability inclusion

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Query: What is current best practice in addressing disability and including people with disabilities within agricultural development programming?

What is current best practice in mobile agriculture programming (i.e. mobile-based interventions targeted at smallholder farmers) to include smallholder farmers with disabilities as well as empower them and address key barriers they are facing?

Enquirer: Agriculture Research Team, DFID

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Definitions

Disability: DFID follows the United Nations Convention on the Rights of Persons with Disabilities (CRPD) in promoting a **human rights-based approach** to disability. **Persons/people 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.' (Article 1, CRPD)

Small-holder farming: Smallholders are those farmers 'who produce food and non-food products on s small scale with limited external inputs, cultivating field and tree crops as well as livestock, fish and other aquatic organisms' (IFAD, 2013, p. 10). There is no universally held definition of the size of a smallholder farm, and what is considered a small farm varies between countries and contexts. However, the Food and Agricultural Organization (FAO) considers two hectares as a general threshold for a 'small farm'. Many smallholder farmers struggle with limited access to resources, information, technology, capital and assets and experience varied degrees of marginalisation.

Mobile based interventions in agriculture: Mobile technology is playing an increasing role in agriculture programming and is used in a range of innovative ways, such as keeping farmers informed about agricultural events, climate and weather forecasts, availability of inputs, market prices and connecting them to financial services, suppliers and buyers (FAO, 2017).

1. Overview

The proportion of people with disabilities and older people[1] who are engaged in agriculture in developing countries is increasing, partly due to rural-urban migration of younger and middle-aged people which has led to the phenomenon of 'skipped generations' where children, older people, and people with disabilities are left behind in rural areas (IFAD, 2017; UNFPA and HelpAge International, 2012). The global disability prevalence rate is estimated to be 15%, with higher prevalence in lower- and middle-income countries (LMICs) (WHO, 2011). Women make up three-fourths of persons with disabilities in LMICs, with an estimated 65% to 70% living in rural areas (UN, 2011). Evidence from developing countries suggest that persons with disabilities have lower educational attainment than non-disabled people, and lower levels of employment (Mitra, Posarac and Vick, 2011; World Bank, 2019). Smallholder farming is an important livelihood trajectory in LMICs, including for those with disabilities. However, people with disabilities face multiple barriers to participating in agricultural activities and programming (see table on p. 4 for summary). For instance, people with disabilities are disadvantaged when it comes to land ownership. A recent literature review found that people with disabilities are excluded by family inheritance and in some societies customary law restricts people with disabilities from owning land (Groce, London & Stein, 2014). **Despite people with disabilities' engagement in agriculture, disability has received little attention in agriculture programming and there is limited evidence on how agriculture programmes can best include people with disabilities.**

This report provides a rapid review of the evidence on best practice to address disability and include people with disabilities in agriculture programming, as well as a review of current best practice in inclusive mobile agriculture programming. The review looks at evidence from LMICs and focuses on smallholder farming. It is important to note that other types of rural livelihoods, such as non-agricultural income-generating activities, and food security for people with disabilities in humanitarian contexts are not within the scope of this query.

Following this overview, section two outlines the methodology of this query. Section three provides an overview of evidence on best practice in disability inclusion in agriculture programmes. Section four focuses on evidence of best practice in mobile interventions in smallholder agriculture programming. However, **due to limited programming and evidence in the area of inquiry**, section four adopts a two-step approach to answering the query: first it provides a review of mobile-based interventions for people with disabilities in LMICs and lessons learned from the field, and secondly it provides insights on how these approaches can potentially be adopted to smallholder agriculture programming. The report identifies *potential entry-points* for use of accessible mobile technology to address barriers people with disabilities commonly face in smallholder farming activities and accessing agriculture programmes.
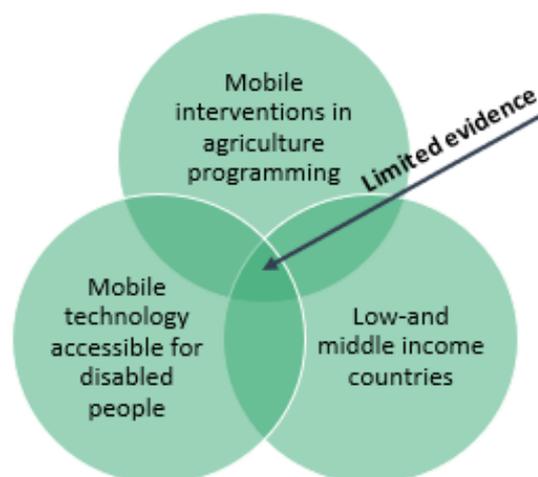
Agriculture as a livelihood trajectory and means for food security is closely connected to several rights enshrined in the United Nation's Convention on the Rights of Persons with Disabilities (CRPD) (UN General Assembly, 2007). Article 28 refers to the **right to an adequate standard of living** (Article 28.1, CRDP) and Article 27 recognises **the right of persons with disabilities to work on an equal basis**

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[1] 'Older people' are by commonly used definitions considered people over the age of 60 years old. Disability prevalence rates are higher among older people. It is estimated that globally, 46% of people aged 60 and over have disabilities, and most of them are living in developing countries (UNFPA and HelpAge, 2012).

with others, promotes opportunities for **self-employment and entrepreneurship** as well as access to **technical and vocational training** for persons with disabilities (Article 27.1; 27.1(f), 27.1(d), CRPD). The CRPD further promotes availability and use of **information and communication technologies** and recognises the importance of accessibility to information and communication (Article 4.1(g); *Preamble*(v), CRPD).

This review finds that whilst there is some programming at the intersection of agriculture development and disability inclusion, there is limited evidence of what works and what does not work in this field. This rapid review did not identify any systematic review or other rigorous evidence and is thus limited to grey literature produced by NGOs working in the field such as learning briefs, project reports, presentation material and case studies. **A lack of rigorous evidence and disaggregated data from programmes means that it has been difficult for this review to establish best practice in this area.** FAO has highlighted that a lack of data and evidence hinder meaningful engagement of people with disabilities in the agricultural sector (FAO, 2018). A key-question is whether the current evidence gap is mainly a result of limited *existence* of programming that address disability and include disabled persons, or if it is a result of lack of *practice* to capture learnings, evaluate interventions and establish best practice in the field. **Key emerging learning includes:**

- Taking a strategic approach to inclusion from the outset, including design, delivery and M&E
- Addressing attitudinal barriers as well as those relating to the environment such as inaccessible infrastructure
- The need to consider gender, age and other variables related to inclusion when designing and delivering inclusive agriculture programming
- Adapt tools, techniques and methodologies to be more inclusive of people with disabilities
- Include mixed groups of people with disabilities and non-disabled people to address negative attitudes to disability
- Offering non-agricultural support alongside agriculture interventions, including referrals for health and other services

There is more limited evidence still on accessible mobile interventions in smallholder farming in LMICs, **highlighting a lack of programming**. This rapid review did not identify any disability specific programming in this area and there is a lack of data and evidence on whether and how mainstream interventions are reaching people with disabilities. **Since the field of disability inclusive mobile interventions in LMICs is still in its infancy, any interventions in this area will by nature be *innovative* and be part of *establishing* best practice.** This underscores the importance of designing programmes that prioritise ongoing learning through collecting and disaggregating data, monitoring outcomes, evaluating results and sharing evidence and lessons learned.

Given the *double evidence gap* that this rapid research has identified, this report cannot establish any thorough evidence of best practice in the areas of inquiry but can shed light on some insights/learnings from existing programmes and identify *potential entry-points* for mobile-based interventions to consider when moving into the field of disability inclusive agriculture. These must be understood within the limitations of a *very limited evidence-base,* and further research is needed to delve deeper into the causes of the apparent lack of programming and/or best practice in this field. **Key entry points include** designing accessible mobile technology, making training and information, markets and access to finance accessible, addressing negative attitudes and social exclusion, and working with mobile phone service providers to standardise technology and applications.

The following table summarises the multiple barriers people with disabilities face when accessing agricultural programming, as identified through the literature and highlighted by our expert contributors (further outlined in section 4).

Factors affecting access to agricultural programming for people with disabilities			
Individual	**Environmental**	**Attitudinal**	**Institutional**
Intersecting and compounding forms of discrimination and disadvantage, with barriers differ depending on **type and severity of impairment**, and: **Universal factors** (fixed aspects of one's identity regardless of setting), including age, gender, disability and health status. **Contextual factors** (more complex and changeable factors and those that vary by setting), including language, caste, family status, and migration and refugee status. **For example: Older age and disability** create intersecting inequalities, and so can **'triple-disadvantage'** – being a woman, poor, and disabled increase the risk of encountering multiple barriers**.**	**Physical barriers** to agricultural work due to inaccessible pathways/ farming grounds, lack of assistive devices, and lack of adapted farming tools and techniques. **Inaccessible agriculture training** due to non-accessible locations, inaccessible format and content. **Barriers to access technology** – non-availability, cost and affordability, inaccessibility (format, content etc.). **Lack of information about market prices, weather forecast etc.** due to inaccessible information. **Inaccessible infrastructure and cost of transport limits access to markets** e.g. to sell produce and buy farming inputs.	**Negative attitudes and prejudice against people with disabilities (by community and development workers),** who are commonly seen as incapable of doing farming and hence not included in agricultural programming. **Misconceptions and stigma** lead to exclusion from taking part in agriculture. For instance, people with disabilities are seen as cursed and myths that disability is contagious. **Distrust towards people with disabilities excluding them from accessing financial opportunities** such as loans and saving groups that could allow access capital e.g. to invest in agriculture. For example, that people with disabilities will not be able to pay back loans/ contribute to savings groups. **Self-exclusion from taking part in agriculture** due to internalised oppression.	**Lack of consideration by development actors** (governmental and non-governmental) in agricultural policies, programmes and interventions – they do not recognise or acknowledge the need to consciously include disabled people. **Lack of targeted approaches by farming input subsidy programmes (and similar)** – the barriers people with disabilities face to access livelihood options are not recognised or addressed – "non-targeted" approaches can by default exclude disabled people. **Lack of disability disaggregated data** in agricultural and mobile phone programming. **Discriminatory policies** for opening bank accounts and taking out loans. **Lack of access/ ownership of land.** **Lack of accessibility standardisation** for mobile technology and systems.

Crosscutting barrier: Lack of basic literacy and numerical skills is the culminative result of multiple barriers that prevent children with disabilities from accessing education which leads to disadvantage also later in life. For instance, low levels of education can restrict people from meaningfully participating in agriculture trainings and restrict effective use of mobile technology.

2. Methodology

This rapid research query has been conducted as systematically as possible within three days of a researcher's time. The methodology is described below.

Search strategy: Studies were identified through a variety of search strategies:

- **Google and relevant electronic databases** (PubMed, Science Direct, and Google Scholar) for priority sources using a selection of key search terms.[2]

- **Review of key disability portals and resource centres**, such as the Leonard Cheshire Disability and Inclusive Development Centre, Disability Data Portal, Source, International Centre for Evidence in Disability, International online resource centre on disability and inclusion, the Impact Initiative, and Sightsavers Research Centre.

- **Disability-focused journals**, such as Disability & Society, and the Asia Pacific Disability Rehabilitation Journal.

- **E-mail requests to International Disability and Development Consortium (IDDC) members and a selection of disability consultants** (see page 16 for a list of all expert contributors).

The review aimed to first identify syntheses, evidence reviews, and systematic reviews in order to draw on the fullest range of evidence possible in the area of inquiry. However, no relevant systematic reviews were identified, and the search was therefore widened to include grey literature such as guidelines, information posted on websites, learning briefs and similar sources.

Criteria for inclusion: To be eligible for inclusion in this rapid review of the literature, studies had to fulfil the following criteria:

- **Focus**: Disability inclusion, agriculture programming, smallholder farmers, mobile interventions.

- **Time period**: 2008[3] – 2019.

- **Language**: English.

- **Publication status**: Publicly available – in almost all cases published online.

- **Geographical focus**: Lower- and middle-income countries (LMICs)[4].

- **Rights-based approach**[5]: Only studies/ evidence from programmes/ projects that reflect a rights-based approach to disability have been included in the best practice examples highlighted in this report. Studies and documents from projects/programmes that did not demonstrate a rights-based approach were reviewed as part of the search for evidence, however, *suggested* best practice/

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[2] Key search terms included: agriculture, farming, smallholder farming; AND disability, disabilities, disabled, disability inclusion; AND technology, mobile, programming, inclusive; AND low and middle-income countries; developing countries; AND programmes, best practices, reviews, research, studies, interventions.

[3] Note: The Disability Inclusion Helpdesk reviews evidence from 2008 onwards as this is the year that the Convention on the Rights of Persons with Disabilities and its Optional Protocol came into force.

[4] For definitions of lower income countries and middle income countries (lower-middle and upper-middle), see the World Bank's Country Classification: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

[5] A rights-based approach to disability builds on the principles set out in the Universal Declaration of Human Rights and the Convention on the Rights of Persons with disabilities, recalling that people with disabilities are active members of society with equal and inalienable human rights like any other members of society, and are entitled these rights without discrimination of any kind (CRPD, *Preamble*). A rights-based approach to disability shifts focus from the previously dominating charity-model to disability, which positions persons with disabilities as objects of charity rather than active subjects and rights-holders. A rights-based approach to disability further entails focus on barriers that prevent persons with disabilities from full and effective participation in society, and holds states responsible to remove barriers (CRPD, *Preamble (e)*).

lessons learned from these sources have not been included in this report as they were based on an individualistic, medical and/or charity approach to working with people with disabilities. A rights-based approach to disability inclusion is a fundamental pillar of the CRPD and likewise underpins all work of the Disability Inclusion Helpdesk.

- **Limitations:** The Disability Inclusion Helpdesk follows CRPD's definition of 'disability' which calls for paying attention to different impairments including physical, mental and intellectual. However, a limitation of this report is that it focuses on people with mobility, visual and hearing impairments as no relevant information was found specifically referring people with intellectual and psychosocial disabilities in agriculture or mobile technology.

3. Best practice in addressing disability and including people with disabilities within agricultural programming

This section reviews the existing evidence of practices addressing disability and including disabled women and men in agricultural programming in LMICs, in order to identify best practice.

Overall, the existing evidence on how and whether agricultural programmes address disability and ensure the participation of people with disabilities is limited and there is consequently a lack of best practice in the field. This review found **evidence of limited existing programming** both in terms of *disability inclusion* in mainstream agriculture programmes and of *disability-specific* agriculture programmes, however, the review found more examples of existing programmes that fall in the latter category. Some of these programmes are highlighted as examples further below. **It is not clear whether the lack of evidence reflects a lack of programming versus a lack of practice of systematic documentation and information sharing in this field, and in particular a lack of disaggregated data**. There is more evidence, yet limited, of disability inclusion in livelihoods programming more broadly, where farming activities are sometimes one of several components in a programme. However, the scope of evidence relevant to agriculture identified programmes in this field was too limited to draw out any best practices.

This review did not find any systematic review or comprehensive synthesis of evidence to date that can generate a clear picture of best practice in what still appears to be a limited field of disability inclusive agriculture programming. Yet in the absence of systematic reviews and robust evidence, some learning briefs and guidelines from agriculture programmes/projects that have included people with disabilities have been identified. However, the evidence-base it too limited to label this 'best practice'. Rather, it can be seen as emerging insights/ learnings which should be read with caution as they cannot necessarily be generalised to the broader field of agriculture/disability inclusion and are best understood in the context they derive from.

Emerging learnings/ insights in the field of agriculture programming and disability inclusion:

- **Projects and interventions should consider aspirations, needs and capabilities of people with disabilities and tailor activities accordingly**, recognising diversity by identifying what barriers people with different levels and types of impairment, age and gender may face (Drain, 2017; Drain 2018; Bruijn and Mulder-Baart, undated).

- **Using adapted farming tools, methods and technologies to be inclusive of people with different types and levels of disability**. There are many opportunities to make agriculture more inclusive by assessing the abilities required for different agricultural activities and use adapted tools, methods and technologies to accommodate people with different levels and types of impairment (Leprosy Research Initiative, 2018). This can for instance be through using disability-friendly tools and develop alternative methods of watering the fields (ibid;). Such initiatives can address different environmental barriers that people with disabilities may face in agriculture.

- **Activities and groups that include both people with and without disabilities can challenge negative attitudes and prejudices around disability** as people with disabilities can gain recognition for their work and develop social networks, with improved self-confidence as a result (Bruijn and Mulder-Baart, undated). However, just "mixing" people may not be a sufficient approach on its own, but conscious efforts to raise awareness about disability and tackle common prejudices against people with disabilities are important to make sure that groups members without disabilities accept and respect the group members with disabilities (ibid;).

- **Non-agricultural initiatives, such as savings groups and health interventions, should operate in parallel to agricultural activities to expand opportunities, networks and access to services for people with disabilities** to address other key-issues and barriers that prevent people with disabilities from fully and equally participating in agricultural development. This can be done through referrals to service providers, and by establishing groups that provide social networks, financial opportunities and/or address health issues (Bruijn and Mulder-Baart, undated; NUNISA Conslutor Lda, undated).

- **Activities that address environmental barriers such as inaccessible information, transport and physical environments are not sufficient on their own but need to go hand in hand with activities that address attitudinal barriers on multiple frontiers.** For instance, raising awareness of the rights of people with disabilities among community members, family members, and among agricultural development workers can challenge misconceptions, prejudices and negative attitudes towards people with disabilities (Bruijn and Mulder-Baart, undated; NUNISA Conslutor Lda, undated).

- **Projects and programmes should consider how disability intersects with other forms of discrimination to affect people with disabilities' ability to participate in different activities.** For instance, power inequalities between people with and without disabilities, different types and severity of impairment, men and women, young and older people, may impact who gets to voice their opinions and participate in activities (Drain, 2017; Drain 2018).

- **Disability inclusion does not require specialised approaches, such as separate training sessions, but a strategic and inclusive approach** from the stage of designing a project, including accessibility considerations in all phases of the project and systematic collection of disability disaggregated data (Adam Smith International, 2016; Bruijn and Mulder-Baart, undated; Ovington, 2018).

The key learnings/insights outlined above draw on examples provided by past and current agriculture programmes/projects identified by this rapid review as detailed below.

Examples of agriculture programmes/projects which include people with disabilities:

- *Inclusive organic agriculture farming for all* – is an intervention delivered by CBM India since 2012 which sought to **address the barrier of lack of training and support that prevent people with disabilities from joining the agricultural work force** (CBM, n.d.). About half of the project's 11,000 participants were people with disabilities. The project provided training in organic farming, connected farmers to producer groups and established 'inclusive self-help groups' consisting of both disabled and non-disabled members which among other things pooled money to create a fund from which members could borrow. A case study illustrates that the project supported people with disabilities to **overcome prejudices** which view them as 'burdens' to their families by engaging in farming and earning their own income (Singh, 2016).

- *Farming for Prosperity (TOMAK)* in Timor Leste – TOMAK is an agriculture programme that works with rural communities, including people with disabilities. In an evaluation of the

Australian Department of Foreign Affairs and Trade's (DFAT) work to strengthening disability inclusion, TOMAK is featured as a programme that has taken a strategic approach to considering disability from the onset including a gender equality and social inclusion analysis to understand the situation of vulnerable groups (Ovington, 2018). A highlighted recommendation from the analysis is that **disability inclusion does not require specialised approaches but ongoing consideration of the perspectives of people with disabilities at all stages of the programme cycle** (Adam Smith International, 2016).

- *Inclusive Agriculture* in Cambodia – is a project in collaboration between Light of the World, Engineers without Borders Australia, and Massey University that focused on co-creation of farming technology to improve agricultural livelihoods for people with disabilities and improve social inclusion in communities (Drain, 2017; Drain 2018). The project summaries from 2017 and 2018 shed light on insights from the project from design to implementation. **The project consulted people with disabilities from the early stages of design to identify focus areas, including consideration of barriers faced by those with different impairment types.** The pre-design phase identified barriers to participation in farming, amongst these were: difficulties for people with physical disabilities to fetch and carry water from the source to the farm; people with visual impairments found it challenging to care for chickens; **people with disabilities encountered communication barriers and stigma when they try to sell their produce at the local market**, and people with mobility impairments found it challenging to get to the fields when the ground is slippery and had difficulties carrying their tools. The project adopted a highly participatory approach where people with disabilities were part of developing and testing technical solutions to the identified barriers. **An insight from this phase was that men tended to dominate the use of power tools and machinery in construction activities, while women were more active in feedback and refinement activities**. This was addressed through additional technical training for the female participants after which they showed increased confidence in how to use power tools in the construction sessions. One intervention which the community was very satisfied with was the design of a cart that can be attached to wheelchairs to carry water to the fields.

- An evaluation of the programme "*Livelihoods and food security in leprosy-affected communities in Cabo Delgado Province project in Mozambique[6]*", found that **the approach of combining agricultural activities, community sensitisation about leprosy, and running self-help groups for people with leprosy was successful** in improving livelihood outcomes as well as building self-esteem and confidence among project participants (NUNISA Consultor Lda, n.d). The evaluation results showed increased knowledge and practice of selected agriculture practices with improved production and dietary intake among participants; changes in attitudes towards people with leprosy who used to be thought of as not capable of doing farming; and people with leprosy reported that being part of the project had reduced stigma and isolation by being part of agriculture groups and saving groups (ibid, n.d).

- The *FSUP Gaibandha project[7]* (2009-2013) targeted disabled and non-disabled ultra-poor women in Bangladesh with income generating activities to improve food security (Bruijn and Mulder-Baart, undated). The project did not have an exclusive agricultural focus but included some income generating activities that were agricultural in nature such as chicken, goat and

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[6] The project was funded by the Leprosy Mission England and Wales and DFID and implemented by the Leprosy Mission Mozambique and Food for The Hungry Association Mozambique. The evaluation was undertaken by NUNISA Consultor Lda.
[7] The project which run between 2009-2013 in northern Bangladesh included 40,000 women organized in 1600 women groups. 21.8% of the households enrolled in the project had a disabled member. The lessons learned report builds on data collected as part of the project monitoring, reports and surveys, 120 stories from more than 50 project participants and staff members, as well as study of the inclusion of persons with disabilities in the project conducted by an external consultancy team which included 43 case studies, 16 key-informant interviews and 13 focus group discussions.

beef rearing and homestead gardening. A lesson learned report states that women with disabilities who participated in activities perceived that **social acceptance from family and society increased**, from 32% reporting social acceptance at the start of the project to 74% at the end. Furthermore, the report states that women's position in their families changed as **being engaged in income generating activities gave them more power in decision-making and more freedom to voice their opinions.** Apart from the income generating activities, disabled women took part in **village groups which helped break isolation, gave women recognition and created support networks outside their families**. Another highlighted learning is that projects should be careful with making assumptions of what women with disabilities can and cannot do, and tailor income generating activities to individuals' abilities and interests (ibid;).

4. Best practice in mobile-based interventions for smallholder farmers

Despite the major interest mobile technology for agricultural development in LMICs has received in recent years, there appears to have been little-or no consideration of how people with disabilities can be included in such efforts. The FAO states that ICTs play an increasingly crucial role in agricultural development and describes mobile phones as a technology with 'great potential for promoting inclusiveness' (FAO, 2017, p. 54). However, **this rapid review did not identify any existing programming in the nexus of mobile-based interventions in agriculture and disability inclusion in LMICs, and consequently has not been able to identify best practice within this field.** As such, any interventions in this space will inevitably have to adopt an innovative approach and will play a crucial role in generating learnings and best practice for the future.

In the absence of best practice in the area of inquiry, this section will instead take a two-step approach to attempt to answer the query; 1) to identify current practice of mobile-based interventions for people with disabilities in LMICs, and 2) to identify entry points for how this practice may be applicable in agricultural programming in general, and in addressing the identified key-barriers to people with disabilities 'participation in agriculture in particular.

Mobile-based interventions for people with disabilities – best practice from LMICs

Mobile technology has revolutionised communication and access to information for people with disabilities across the world. Mobile-enabled means of communication and accessing information include text services, voice services, and video services which can allow people with hearing and speech impairments to overcome communications barriers, and hands-free and control by gesture can assist people with severe mobility impairments to communicate and use digital technologies (World Bank, 2016). Mobile technology further allows people to communicate in remote places, which can help break isolation and enable new forms of social interaction for people with disabilities who face restricted physical movement and/or social isolation (Thompson, 2018). **However, the technological opportunities are not equally accessible over the world, and this technology is currently only benefiting a small fraction of people with disabilities globally** due to costs and non-availability of accessible technology in many LMICs (Deepti, 2016).

There are gaps in access to mobile technology between countries and within countries, with people in LMICs having least access to mobile technology globally and poor and marginalised people within LMICs being least likely to have access to a mobile phone. **Location, age, gender, and disability impact access to mobile technology, where people in rural areas, older people, women and people with disabilities are less likely to use or own mobile technology** (The World Bank, 2016; Disability Data Portal, 2019). Lack of accessibility standardisation for mobile technology and systems and costs of accessible technology mean its use is currently limited (Thompson, 2018).

Despite these prevailing inequalities, there is a widespread consensus that mobile technology holds the potential to further inclusive development, with some promising practices relating to how this can be achieved emerging from LMICs (Deepti, Matter & Harniss, 2013; Thompson, 2018;

Deepti, 2016). From a rapid review of evidence[8] of best practices in existing mobile phone-based interventions that include people with disabilities in LMICs, the following insights have been identified:

- Thompson (2018) suggests using the model of the five 'A's as a **best practice to understand who has- and who has not access to technology**. The five A's refer to: **Availability** [to who is technology (un)available]; **Affordability** [to who is technology (un)affordable]; **Awareness** [who is (un)aware of technology]; **Ability** [who does (not) have the skills to use technology effectively]; and **Accessibility** [in which language is the technology available? Can blind or visually impaired use the technology?].

- **Involving disabled people in the development of ICT products and systems** in early stages of its development appears beneficial for the end-result as this will allow the development of solutions that better meet the needs and preferences of people with disabilities. This can be done for instance through testing and focus group discussions, and by engaging disabled people's organisations (DPOs) in the process (UNESCO and partners, 2013). Making sure that newly developed systems and content are produced in accessible formats for people with different types and severity of impairment and that language is available in an easy-to-understand format and in the languages used locally is important. Lack of local language ICT solutions has been found as a barrier to accessible ICT (Deepti, 2016).

- **Mobile phones can improve people with disabilities' access to mobile money and other financial services..** Mobile technology can help people with disabilities overcome institutional, attitudinal and environmental barriers that restrict access to these services. In some cases, banks have polices preventing people with disabilities from accessing services, in some cases it is prejudices and negative attitudes held by people working in the financial institutions that exclude people with disabilities (Thompson 2018). Some persons with disabilities may also face difficulties to physically access financial institutions due to inaccessible infrastructure and transport (Thompson 2018; Deepti, 2016).

- **Evidence suggests that mobile phones are becoming increasingly common and important tools for people with disabilities who are engaged in micro-enterprises and who conduct business**. Mobile phones allow users to maintain contact with customers and suppliers to run their businesses more effectively (Thompson, 2018).

- **Mobile phone-based systems that use text messages, voice recordings or video can be used for a variety of purposes such as sharing information about community events, health and life skills, education messages and work opportunities**. Different systems are designed to be accessible for people with different impairments. Those that can be used on regular mobile phones (i.e. text and voice messages) may provide more realistic and affordable options as they do not require a smartphone. Existing initiatives have shown that the message services can link people with disabilities to opportunities, improve knowledge and increase sense of belonging in the community (Thompson, 2018). This form of communication system can simultaneously be used as a **query service for people with disabilities to directly ask relevant actors/ service-providers questions** about different issues (Thompson, 2018).

The disability inclusive practices depicted above have been synthesised from existing evidence reviews as well as drawn from examples of programming/initiatives identified through this rapid review where

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[8] No systematic review of evidence of best practice in the field of accessible mobile technology in LMICs was identified as part of this rapid review, and the best practices outlined in this section rely on findings of other non-systematic evidence reviews and synthesis of emerging evidence of best practices in the field. As such, the findings should be read with caution as more robust data and evidence is needed to be able establish evidence of "best practice" in the field.

mobile technology has demonstrated impact in the lives of people with disabilities. Below are a few relevant examples:

- A community-based research project in Colombia used FrontlineSMS, **an open-source text message delivery programme which allowed people with disabilities to send questions and receive information about health-related issues as well as community events**. A medical clinician and a community leader sent information, and the clinician answered questions related to health. The project resulted in an increased sense of community belonging among participants with disabilities and more than half of the participants had attended at least one community event as a result of the messages they received on their phones (Thompson, 2018).

- An NGO in India has developed **a mobile phone-based information sharing service to address the barrier of lack to accessible information for persons with disabilities**. The service allows its users to access information through listening and responding to recorded voice messages. The service relies on non-smartphones and has mainly been used to share information about employment opportunities but also messages relating to education, trainings and life skills (Essl Foundation, 2018).

- A project in Colombia developed **a system to improve communication for those with hearing impairments through a video-based interpretation service via mobile telephone**. The service links people who want to communicate to a signing interpreter, who translates in real time. The interpreter can also assist in communication with service providers (Essl Foundation, 2018).

- A case-study of a female fruit vendor in Jamaica who has a physical disability and uses a wheelchair illustrates how **mobile technology can have an impact on opportunities to conduct business.** According to the case study, since the woman has been able to access a mobile phone, she has been able to communicate directly with her suppliers and agree on a specific time and place to meet them, which eases planning of her daily commute to the local market. Using the mobile phone, she can also instruct suppliers to deliver her goods directly to an agreed location and coordinate pick up of the goods (Thompson, 2018).

Against the backdrop of the current practice in accessible mobile technology in LMICs and considering the barriers to people with disabilities' inclusion in agricultural programming that have emerged throughout this review, the following potential entry-points for addressing common environmental, attitudinal, institutional and cross cutting barriers to inclusive mobile technology in agriculture programming have been identified.

Potential entry-points for use of accessible mobile technology in agriculture programming

Environmental barriers:

- **Inaccessibility of mobile technology:** Ensuring mobile based systems and content are accessible to people with different types and severity of impairments (visual, hearing, physical, intellectual) and including people with disabilities in the design and testing of the mobile technology and systems.

- **Inaccessible agricultural information and trainings:** Accessible mobile systems which allow for receiving information and sending questions could be used to share information about events, agriculture lessons/best practice, and other relevant information such as climate forecasts and warnings, as well as allow smallholder farmers with disabilities to send questions directly to agriculture experts. Using simple and customary language and avoiding excessive use of technical terms to include farmers who have low educational levels.

- **Inaccessible financial services:** Accessible mobile banking could be used to link smallholder farmers with disabilities to financial institutions that could provide opportunities to access loans and other financial services to support their agricultural activities/ business. This would address physical barriers as people with disabilities would not have to travel which can be practically challenging due to inaccessible transport and infrastructure. This may also respond to the **attitudinal barrier** of institutions providing financial services being hesitant to offer services for people with disabilities due to prejudices.

- **Inaccessible markets:** Accessible mobile technology could enable smallholder farmers with disabilities to communicate with suppliers and buyers, allowing them to plan their access to markets better (e.g. arranging deliveries at set times and locations).

Attitudinal barriers

- **Negative attitudes towards people with disabilities:** Use mobile technology to share messages about disabilities and disability rights, such as information about barriers facing people with different types of impairment, as well as information about the rights of people with disabilities' in order to raise awareness and potentially challenge negative attitudes. The messages could target community members as well as key-stakeholders for instance suppliers of farm inputs, farmers groups, extension workers, and buyers of products.

- **Social isolation and exclusion:** Mobile connectiveness can enable people with disabilities who experience social isolation due to negative attitudes/stigma and/or physical immobility to connect with others, either in agriculture-focused groups or in non-agricultural groups that can run parallel to the agricultural activities. Mobile phones can allow people to stay connected in between meetings and expand their social networks.

- **Programmes targeting smallholder farmers with disabilities with mobile technology inherently holds the potential to challenge attitudinal barriers** as their active participation in such programmes directly challenges prejudices that people with disabilities are incapable of being successful farmers and can lead to recognition and respect from family members and community members.

Institutional barriers

- **Lack of consideration by development actors:** Recognition by programme providers that inclusion of people with disabilities requires targeted consideration and strategic approaches by programmes in order that they are not excluded from mainstream service provision such as agricultural subsidy programmes. This includes consideration of accessibility at all stages of the project cycle, for example through engagement with DPOs, and systematic collection of disability disaggregated data.

- **Lack of accessibility standardisation for mobile phones and systems:** Commitments by mobile phone/ device manufacturer to develop phones and applications/ systems that are accessible to people with disabilities.

- **Policies restricting people with disabilities' access to financial services:** Banks willingness to lend to people with disabilities could be challenged by mobile-based banking solutions.

Crosscutting barriers:

- **Low levels of education**: It is suggested that programmes assess disabled participants' literacy/numeracy skills and their ability to use mobile technology prior to any intervention. Depending on identified needs, conduct pre-trainings and adjust the mobile technology to the abilities of the users.

- **Poverty:** Given the established link between poverty and disability, it is suggested that programmes assess what costs may be associated with use of mobile technology (e.g. charging of phone and buying bundles for calling/texting/mobile data) and consider how the programme can address socio-economic barriers that smallholder farmers with disabilities may experience in regards to their use of mobile technology.

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