



# BMJ Open Formative qualitative research on the potential for digital solutions to address diabetes care gaps in Tanzania and Sri Lanka

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## ABSTRACT

**Objectives** Diabetes care remains unavailable and unaffordable for many people. Adapting models of care to low-income and middle-income country contexts is a priority. Digital technology offers substantial potential yet must surmount health system, technological and acceptability issues. This formative research aimed to identify the potential for a digital technology solution (Diabetes Compass) to address diabetes care gaps in primary healthcare.

**Design** Qualitative research was conducted in selected districts of Sri Lanka and Tanzania with practitioners, patients and family members. In-depth interviews assessed how digital solutions may improve diabetes care, acceptability and usability; contextual and clinical observations identified practitioner clinical competencies, strengths and weaknesses, and the influence of the care environment on service delivery; and workshop discussions explored strategies to encourage digital solution uptake and sustain use.

**Setting** The research was undertaken in 2022 at nine health facilities in Sri Lanka's Southern Province (Galle), and 16 health facilities in Tanzania's Lindi and Pwani Regions.

**Participants** Participants included primary and secondary care practitioners, facility managers, patients and family members.

**Results** There was striking concordance in the diabetes care gaps and potential for digital solutions in the two countries, and between practitioners, patients and family members. Five main gaps were practitioner training; health information systems and data; service delivery; infrastructure, equipment and medication; and community awareness and knowledge. Practitioners, patients and family members saw strong potential for digital solutions to improve early detection, diagnosis, secondary prevention of complications and improve patients' and families' experience of living with diabetes. They identified specific design and implementation considerations to enable the Diabetes Compass to realistically meet these needs and overcome challenges.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study takes a system approach, across the continuum of care and a multidimensional perspective, including practitioners, patients and family members.
- ⇒ Practitioners, patients and family members in other regions and countries may identify different or additional issues or perspectives.
- ⇒ Using this study's deep, qualitative insights to develop and conduct a quantitative survey to understand the extent the needs, experiences and preferences are shared or differ within practitioner and patient populations more widely would benefit digital service planning.

**Conclusion** There was a strong appetite among practitioners, patients and family members for a digital solution to strengthen diabetes care. Their experience of challenges and practical recommendations informed the Diabetes Compass design.

## INTRODUCTION

Diabetes is the ninth largest cause of death globally,<sup>1</sup> with prevalence growing most rapidly among low-income and middle-income country (LMIC) populations, where 80% of the global population with the condition live.<sup>2</sup> Moreover, the unavailability and unaffordability of diabetes care in many LMICs have contributed to a 10% higher mortality rate among LMIC populations compared with high-income countries.<sup>3</sup> To improve coverage of appropriate services and make efficient use of limited resources, the WHO recommends integration of diagnosis, screening, treatment and disease management within primary care settings.<sup>4</sup> However, health systems in LMICs often face critical

gaps including limited awareness and training among health staff, an insufficient number of endocrinologists, and a lack of laboratory equipment, facilities, medications and medical supplies, alongside low community awareness and prevalent misapprehensions about the condition.<sup>2</sup> Therefore, adapting models of care to LMIC contexts and identifying ways to surmount these obstacles is a priority.

Models of care that have been piloted in LMICs have included an emphasis on early diagnosis, training practitioners to manage common diabetic complications at the primary healthcare (PHC) level, prevention among at-risk individuals and peer-to-peer learning among community members.<sup>2</sup> However, despite rapid developments in recent decades in applying digital technologies to improve diagnosis; clinical decision-making and treatment; self-management and monitoring and supporting continuity of care for various health issues,<sup>5</sup> the potential to develop feasible and effective models of diabetes care in LMICs remains largely unexplored. To date, most digital interventions for diabetes have focused on patient support, such as health promotion messaging, clinic appointment reminders, support for self-care practices and remote monitoring via wireless or wearable sensors.<sup>6 7</sup> Relatively few interventions have provided technical support to practitioners or strengthened aspects of the health system, such as referrals or prescribing.<sup>8</sup> Therefore, given the body of evidence that digital technology can cost-effectively impact time between diagnosis and receiving care, attendance, medication adherence, clinical outcomes and quality of life,<sup>9–11</sup> there appears to be an important opportunity to harness this potential to upscale and enhance diabetes care in LMICs.

This paper presents the findings of formative research to inform the design of the World Diabetes Foundation's Diabetes Compass initiative to develop digital technology solutions to enhance the delivery and experience of care for people with type 2 diabetes in LMICs.<sup>12</sup> This formative research is meant to inform a needs-based approach that develops a deep understanding of existing needs and considers how technology can address those needs in the early phases of product development. Rather than starting with a specific technology and looking for problems to solve with that technology, Diabetes Compass aims to understand the needs and capabilities of practitioners and patients for using customised digital health solutions to ultimately improve diabetes care in the public PHC system.

## METHODOLOGY

### Study design and setting

Qualitative research, guided by grounded theory, was undertaken in 2022 in Tanzania and Sri Lanka—two of the Diabetes Compass pilot countries. These countries were selected based on the national prevalence of type 2 diabetes and government interest in collaboration. Diabetes prevalence in Sri Lanka increased from 3.0%

to 11.3% between 1990 and 2019, at which point it was responsible for 9.8% of deaths and 8.6% of disability-adjusted life-years (DALYs). Tanzania has the highest diabetes age-adjusted prevalence in Africa, estimated at 12.3% in 2019 and responsible for 2.4% of deaths and 1.3% of DALYs.<sup>13 14</sup>

The aim of this study was to provide insight into current gaps and unmet needs related to diabetes care and to identify the potential role for Diabetes Compass to address critical gaps and enhance care. This information was intended to inform a user-centred design process. The research was undertaken at nine health facilities in Sri Lanka's Southern Province (Galle), and 16 health facilities in Tanzania's Lindi Region (Lindi Municipal Council and Kilwa District Council) and Pwani Region (Kisarawe and Rufiji District Councils). Sites were purposively selected in consultation with the Ministry of Health, and the Ministry of Health, Community Development, Gender, Elderly and Children in Sri Lanka and the President's Office Regional and Local Government in Tanzania.

### Participants

Study participants included PHC practitioners (doctors, nurses and—less commonly—ancillary practitioners, such as a nutritionist); facility managers or medical officers-in-charge (MOIC); secondary and tertiary care practitioners (doctors and nurses); patients with diabetes in PHC facilities; patients with diabetes in secondary and tertiary care facilities; and family members of patients with diabetes. Participants were purposively selected to reflect a range of specific characteristics known to potentially affect the delivery and experience of healthcare, including gender, age, location (rural and urban), practitioner role and patient socioeconomic characteristics. Patients with diabetes were recruited at PHC diabetes clinics; practitioners were invited to participate in liaison with facility managers or MOIC.

The sample sizes for this research were selected based on the anticipated number of participants required to reach saturation in the selected qualitative methodologies described below (in-depth interviews, contextual and clinical observations, and workshops). According to standard approaches in grounded theory, the aim of reaching conceptual density and saturation is to not be fully exhaustive but to reach a sufficient depth of understanding that enables researchers to develop a theory to characterise the given population or phenomena.<sup>15</sup> Participants were recruited specifically for each research activity and there were no preexisting relationships between researchers and participants.

### Data collection

Researchers with training in qualitative research collected data via three activities in Tanzania and Sri Lanka: in-depth interviews regarding digital readiness, clinical and contextual observations, and workshops on motivating and supporting use of a Diabetes Compass digital

**Table 1** Formative research participants

Activity	Participants (n)		Country
Digital readiness in-depth interviews	8 practitioners Clinical officers=4 Nurses=2 Medical officer=1 Doctor=1	8 Patients	Tanzania
	6 practitioners Medical officers=4 Doctor=1 District medical officer=1	6 Patients	Sri Lanka
Clinical and contextual observations	4 practitioners (3 facilities) Doctors (n=2) Clinical officer (n=1) Nutritionist (n=1)		Tanzania
	4 practitioners (4 facilities) Medical officers (n=2) MOIC (n=2)		Sri Lanka
Workshops on motivating and supporting diabetes compass uptake and sustained use	1 workshop Patients=7 Family members=3	1 workshop Doctors=5 Nurses=4	Tanzania
	1 workshop Patients=8 Family members=2	1 workshop Medical officers=5 MOIC=2 Nursing officer=3	Sri Lanka

MOIC, medical officers-in-charge.

solution. All activities were conducted in person and in local languages. [Table 1](#) specifies the number of participants per research activity.

Digital readiness in-depth interviews were conducted with PHC practitioners (Tanzania, n=8; Sri Lanka, n=6) and PHC patients with diabetes (Tanzania, n=8; Sri Lanka, n=6). Semistructured interviews explored interviewees' perceptions of how digital solutions may improve diabetes care, impacts of past and current digital health initiatives, and the acceptability and usability of digital solutions. Interview guides were developed and used to conduct interviews with both practitioners and patients with diabetes. The interview guide contained questions related to what types of technology are used, level of comfort using different types of technology, data and privacy concerns, history of contact with the health system through technology and app usage. The interview guides are available in online supplemental materials.

Contextual and clinical observations (Tanzania n=4; Sri Lanka n=4) provided insight into practitioners' clinical competencies, strengths and weaknesses, and how the care environment can influence service delivery. Two researchers shadowed each participating practitioner for a full shift, including at least three clinical consultations with patients with diabetes and tasks not directly involving patients such as referrals, data entry and liaising with colleagues. One researcher (trained clinician) observed clinical competencies and skills using a validated tool<sup>16</sup>; the second researcher observed practitioners'

environment, duties and relationships. Field notes were recorded using a structured observation guide and a brief semistructured interview was conducted at the end of the session.

Workshops on motivating and supporting Diabetes Compass use were conducted with PHC practitioners (Tanzania, n=8; Sri Lanka, n=9), facility managers (Sri Lanka, n=2), patients with diabetes (Tanzania, n=7; Sri Lanka, n=8) and diabetes patients' family members (Tanzania, n=3; Sri Lanka, n=2). The aim was to identify and consider advantages and challenges of potential methods to encourage uptake and sustain Diabetes Compass use among practitioners and patients. Topic guides were developed for the workshop facilitators and are available in online supplemental materials.

### Data analysis

Sessions were audio recorded and subsequently transcribed, translated into English for analysis and back-translated to check translation quality. The guiding questions developed for each activity were used to develop code books. Two coders extracted and analysed the data using deductive coding. Themes were identified by analysing similarities and differences across responses, and frequency of agreed on similarities and differences was used to create hierarchies of identified themes. Themes were validated by in-country team members.

## Patient and public involvement

Patients and practitioners were involved as participants in the study and contributed via various qualitative methods to enable patients' own experiences and perspectives to be at the forefront. Research questions were informed by prior review of published studies on patient and practitioner perspectives of healthcare in LMICs, and by stakeholder workshops held in each country by the World Diabetes Foundation.

## RESULTS

Five main gaps related to diabetes care were identified in relation to (1) practitioner training, (2) PHC service delivery, (3) health information systems and data, (4) infrastructure, equipment and medication and (5) community awareness and knowledge.

### Practitioner training

PHC practitioners in both countries highlighted the lack of in-service opportunities to enhance their diabetes knowledge and skills. Although sporadic in-service training was offered, for example, by the Tanzania Diabetes Society, participation was said to be restricted to more senior personnel and most practitioners were unable to access this. This was compounded by a lack of information sharing by attenders with non-participant colleagues. In Sri Lanka, although Regional Health Service Directors organised occasional training, practitioners had to forgo income to attend in lieu of service delivery, and this was a deterrent.

The practitioner training gap was identified as significant in relation to clinical decision-making and complications management, particularly as practitioners reported that their existing knowledge was already limited to their basic preservice training in NCDs. Moreover, it was reported that awareness of national clinical guidelines was low, and they were rarely followed. Practitioners resorted to peer support, personal experience and the internet to address their questions. According to one practitioner, 'We don't have any training. We are just using our experience and knowledge', while another reported that, 'For something I don't know, I normally Google'. In practice, the knowledge gap was reported to limit primary care service delivery to diagnosis and patient education, requiring complications management to be undertaken in secondary or tertiary care.

Although practitioners generally used some form of digital technology in everyday life (personal smartphones or tablet computers) and used the internet to address clinical questions, a lack of training in Health Information System and digital technology use was identified as a problem. This gap was indicated to adversely impact practitioners' ability to accurately produce and use data for clinical decision-making and delay prescriptions. Whereas Tanzanian practitioners sometimes received basic introductory HIS training on joining facilities, they and their

Sri Lankan counterparts primarily relied on peer support and on-the-job experience.

Patients and family members also discussed PHC practitioner training. Although they universally desired better access to quality diabetes care locally, they currently perceive that better care is available at secondary/tertiary level. They said that they would only seek local care if their faith in PHC services was bolstered, part of which entailed confidence that local practitioners have received training in diabetes care. This applied also to their views about the potential for community health workers or volunteers to undertake diabetes screening and advice using digital solutions. A priority consideration was to have confidence that personnel had received adequate training in diabetes.

### PHC service delivery

Practitioners and patients and their family members in Sri Lanka and Tanzania highlighted the gap in the range and quality of services available at community level. It was commonly perceived that this relates primarily to a lack of practitioners with specialised diabetes training, resulting in primary care delivery focusing almost exclusively on screening and diagnosis. However, sometimes lack of testing equipment and supplies could impede even these basic functions and required patients to be referred to higher-level facilities, which entailed significant out-of-pocket travel costs and may prove inaccessible for some owing to work or family commitments. As one practitioner noted, 'I don't think many health centers have clinical chemistry machines. Diabetic patients need to be monitored monthly...so we fail to do some basic examinations since [there are] no supportive facilities'. Patients requiring complications management or additional services would generally be referred to secondary or tertiary facilities, and follow-up thereafter was perceived to be weak, partly because travel time and cost often encouraged patients to resort to complementary medicine for treatment. Patients and practitioners reported long waiting times at clinics, with delays being fuelled by the gaps in practitioner knowledge (and needing, eg, to ask colleagues' advice), and HIS and other data-related delays.

Although not a majority experience, some patients indicated that they had experienced or been aware of community-level diabetes screening events. These were described as ad hoc and links to follow-up care at clinics were perceived to have been poor. Thus, whereas patients and family members welcomed diabetes care being available locally, they preferred a less 'one-off' model, ongoing engagement with diabetes practitioners and for community screening better linked into the health system.

### Health information systems and data

Health information system management was identified as a critical current weakness, leading to patient data loss and impeding quality care. Currently, across Sri Lanka and Tanzania, paper-based systems are concurrently used



alongside the (digital) Health Information Systems. This is perceived as duplicative, undermines data quality and reduces available time for service delivery. Fundamentally, however, many lower-level facilities in both countries lack HIS access and rely on paper records that delay and impede continuity of care between PHC and secondary/tertiary facilities. According to one practitioner, 'We have a paper-based system to enter patient data. Due to heavy number of patients for clinics, the practitioners do not have time to enter real time data', while another noted that, 'We definitely have to change this system. So, moving from a paper-based to a digital system is better'.

Facilities in both countries are required to share data with their respective Ministries of Health and to develop reports describing the local diabetes epidemiological profile including the disease burden. Practitioners who used HIS identified data gaps and uncertainties, for example, gender and age are not included in monthly reports in Tanzania, whereas in Sri Lanka rural practitioners were unsure if their data was included in reports to MOH. In particular, practitioners expressed concerns about poor data quality related to dual or paper-based systems, their lack of training, limited time and an absence of data quality checks and feedback or even confirmation of receipt for data submitted.

Patients and family members were aware that data system weaknesses could affect the quality of care they received. They reported delays obtaining prescriptions due to data loss, and due to delayed data entry by practitioners. Also, patients perceived that PHC level practitioners sometimes lacked accurate information relating to their care, for example, due to delayed data record updates related to prior consultations, or in secondary/tertiary care. This was a common component of patients' rationale for seeking care at tertiary or secondary level.

### Infrastructure, equipment and medication

Specific systemic weaknesses impeded primary care practitioners' abilities to provide care. In infrastructure terms, practitioners in both countries said they regularly experience power outages and unstable internet connections. 'No point in having these machines as long as we do not have internet', noted one practitioner. These systemic weaknesses limit the ability to view or upload patient data and the option of using the internet to support clinical decision-making, as well as making data entry more time-consuming. Although mitigation strategies exist, including back-up generators and advice from regional technical or senior staff, these were not always accessible and proved to be time-consuming.

Access to diagnostic equipment and medications at primary care level was an issue in both countries. The former results in delays and patient referral to secondary or tertiary care for testing, greater out-of-pocket costs for patients and their families due to additional travel and sometimes lost wages, and practitioners believed it contributed to the number of patients lost to follow-up. Lack of available medication was highlighted by practitioners, patients and family members as

an ongoing difficulty. In Tanzania, this was related to frequent stock-outs and poor public system supply. In Sri Lanka, practitioners reported that delayed data input (due to outages or workload) delayed prescriptions. In both countries, patients said they sometimes left facilities without prescriptions, and either incurred greater expense seeking medication in the private sector, or where this was not an option, they resorted to sharing pills, complementary medicine or prioritising medication for some family members over others.

### Community awareness and self-management knowledge

Practitioners and patients in Tanzania and Sri Lanka concurred in perceiving that diabetes received far less public attention and priority compared with other diseases and is not considered to be as prevalent or as problematic. 'For me, I think this disease has not been given that much attention, [for other issues] they do have their clean clinics but for us, it is not like that. The government has announced that this is also a special disease but when you are coming into the grassroots the implementation is not as intended', noted one patient.

The lack of public attention and priority was indicated as a factor that deterred people from perceiving diabetes screening as important. Weak community awareness about available screening and management services was seen to contribute to the sizeable number of people who only seek care for late-stage disease and complications. Country-specific factors were also at play: in Sri Lanka diabetes is stigmatised, and fear of the social implications of a positive diagnosis was said to deter patients from screening or seeking care; whereas in Tanzania, patients' greater familiarity with infectious diseases was said to result in diabetes symptoms being mistakenly attributed to more familiar diseases, such as malaria.<sup>17</sup>

Low community awareness was also described as limiting diagnosed people's capacity to self-manage. Although patients in both countries received diet and physical activity advice when diagnosed, this was sporadic and was said to generally fail to reflect everyday realities and thus be difficult to implement. Reflecting on the advice they had received, one patient stated, 'When you wake up in the morning, don't eat pancakes, don't drink tea, don't eat rice, don't eat everything! In other words, diabetes has tormented us'. Patients and family members said that they had received insufficient information about self-management and how to prevent, identify and manage complications as reflected by one patient's observation that, 'Until today we still do not know the symptoms of diabetes...because we get services but we don't get the chance to get the lessons—to be taught'.

### The potential for digital solutions to address the identified diabetes care gaps

#### Practitioners: perceived benefits and utility, and functionality requirements

Practitioners in both countries universally welcomed the potential for digital solutions to enhance their diabetes care capacities. Their existing foundation of basic digital literacy due to using personal digital technology in their

everyday lives was commonly mentioned. A key caveat was the requirement for digital solutions to be user-friendly (simple to use and accessible). Priority areas for support included complication screening and management (specifically wound and foot care, renal care and neurovascular care), symptom identification, data capture, and monitoring, and medication prescription management. Additionally, the potential for digital asynchronous training was universally welcomed, to enable practitioners to receive training at convenient times and without impeding service provision.

Practitioners perceived that a digital solution could address data gaps and enhance decision-making, procurement and budgeting, resulting in improved patient and facility management. Automatic data cross-checks and storage were proposed as important functions. Foremost, practitioners emphasised the need for a digital solution to be integrated with each country's existing national HIS to avoid duplication of effort and because using national HIS (where available) is a requirement rather than optional. Practitioners identified the potential to streamline data entry to replace the dual entry process (paper and digital) and to prevent patient data loss. They suggested practical features to ensure a digital solution could be useful and functional in their context. Offline functionality was recommended to enable use during power or internet outages. In Tanzania, a portable solution that may be used in the field was identified as useful, possibly combined with GPS to identify a patient's location. In Sri Lanka, automatic troubleshooting was proposed to avoid time-consuming delays and limit reliance on the stretched regional technical support, as well as laboratory results being automatically entered into a digital solution.

Nonetheless, whereas practitioners identified various ways that a digital solution could enhance their capacity to deliver quality diabetes care and identified their own priorities for usability, a caveat was raised in both countries. Practitioners suggested that data entry into a digital solution could potentially be performed by administrative personnel (based on the experience of some national programmes having dedicated data clerks) and said this would further enable them to prioritise clinical delivery. While such administrative capacity for diabetes does not currently exist and the model of practitioner data entry may be unlikely to change, the point does highlight the critical need for a diabetes digital solution to be user-friendly and relieve practitioners' existing burden.

#### Patients and family members: perceived benefits and utility, access needs, and preferences

This openness to digital solutions to improve locally available diabetes care was found also among patients and family members. This willingness was conditional on an assurance of a similar quality of care and services to those available at higher-level facilities, continuity of care, one-off activities and enhanced provision of lifestyle and treatment advice. A further important point was the need for a

digital solution to be compatible with the button phones that most patients had access to, rather than smartphones and to recognise that some patients shared a family mobile phone.

Patients perceived that a digital solution for their own use could facilitate care-seeking and help address self-management issues at an earlier stage, particularly regarding complication development, and when patients were unable to attend a clinic. They believed that digital solutions could potentially help them identify where to access services and obtain medicines and provide between-appointment support, such as SMS messages containing specific health promotion information and advice. A communication channel for asking questions and seeking advice was also proposed, again particularly regarding diabetic complications and lifestyle management.

Table 2 summarises the potential for digital solutions to address identified diabetes care gaps.

## DISCUSSION

Prior studies on diabetes care in Tanzania and Sri Lanka and more widely across LMICs have tended to range from the 'skyscraper view' of national system surveys relating to service delivery and readiness studies of the experience or knowledge, skills and practices of people living with diabetes or, less frequently, among practitioners.<sup>18–21</sup> This study took a multidimensional perspective to generate detailed insight into the delivery and experience of diabetes care and the potential for digital solutions from a system perspective, across the care continuum from prevention to condition management.

Notably, there was striking concordance between the two diverse countries and also in the perceptions of practitioners, patients and family members relating to the gaps in diabetes care and the potential for digital solutions. Although, several country-specific features and needs were identified, these were relatively few and less significant in comparison to the similarities. The identified major themes related to the gaps in diabetes care at the PHC level (practitioner training; health information systems and data; PHC service delivery; infrastructure, equipment and medication; and community awareness and self-management knowledge) broadly reflect the 'big picture' seen in the available LMIC and country-specific data and literature.<sup>22</sup> For example, practitioners, patients and family members in both countries each independently highlighted the need for further training for PHC practitioners to be able to enhance diabetes care provision; that the most difficult aspects of condition management for patients are complications and lifestyle, particularly diet; and that the strong linkage between the current health information ecosystem and the related issues and patient outcomes including access to treatment or medication, medication compliance, complication management.

The study's findings provide new insight regarding the potential for digital solutions to enhance diabetes

**Table 2** Summary of the potential for digital solutions to address identified diabetes care gaps

Identified gaps in diabetes care	The potential role of digital solutions in addressing diabetes care gaps
Practitioner training	<ul style="list-style-type: none"> <li>▶ Asynchronous training, accessible per practitioner availability</li> <li>▶ Easy access to information and guidance on diabetes care, including complication screening and management, medication and treatment options</li> <li>▶ Training and mentorship for potential CHW/CHV involvement in diabetes care</li> </ul>
Health information systems and data	<ul style="list-style-type: none"> <li>▶ Simplified and streamlined data entry</li> <li>▶ Information centralisation, improving referral and reducing patients 'lost to follow-up'</li> <li>▶ Easier access to time-critical data to inform clinical decision-making, procurement and budgeting</li> <li>▶ Reduce prescription delays for patients</li> </ul>
Primary healthcare (PHC) service delivery	<ul style="list-style-type: none"> <li>▶ Enhance capacity to screen and undertake diagnosis at PHC level</li> <li>▶ Address delays and waiting times due to data issues</li> </ul>
Infrastructure, equipment and medication	<ul style="list-style-type: none"> <li>▶ Offline options to address infrastructure constraints in power, internet and technical support availability</li> <li>▶ Guide patients and family members regarding sites with available medication</li> <li>▶ Improve prescription management</li> </ul>
Community awareness and self-management knowledge	<ul style="list-style-type: none"> <li>▶ Information on available services</li> <li>▶ Information and advice to guide self-management, particularly for complications and lifestyle modification</li> <li>▶ Enhance communication with practitioners between appointments</li> </ul>

CHV, Community Health Volunteer; CHW, community health worker.

care from the dual perspectives of practitioners involved in service delivery and people in need of care. Most of the prior digital technology research and pilot projects for diabetes care in LMICs have focused exclusively on patient information and communication.<sup>7 10</sup> Far fewer studies related to supporting practitioners and undertaking health system strengthening, and these tended to be hospital based or focused on specific aspects of care delivery.

The Diabetes Compass initiative set out to understand and address both the supply (provider) side and the demand (service user) side of diabetes care by including the needs of practitioners as well as patients and their families and the formative research provided insight from this holistic perspective. On the PHC practitioner side, the findings indicated the considerable appetite in both countries regarding the potential for digital solutions to enhance their knowledge and skills and help address the major issues they experienced with diabetes data and HIS and related core functions. Nonetheless, practitioners, whether they had HIS access or not, were acutely aware of the need for a digital solution to be integrated with national HIS, recognising the importance of centralised data and the potential to better use and communicate data between different levels of the health system. Like many countries, Tanzania and Sri Lanka have developed and are implementing digital health strategies,<sup>23</sup> and although roll-out is gradual and technical and capacity challenges exist, a proportion of PHC diabetes practitioners have HIS access. The findings suggest that digital solutions could widen access to digital patient data and HIS for those currently without access, as well as address some of current users' challenges related to connectivity,

duplicate systems, poor data quality and linking to critical functions such as referrals and prescriptions.

Patients and family members shared practitioners' sense of the potential for digital solutions and were keen to consider how they could use such technology to improve their ability to access diabetes diagnosis and care, source medication more easily and to receive advice regarding self-management. Their vision thereby comprised almost the full breadth of functions that various digital diabetes technology pilot projects have previously explored (apart from glucose monitoring),<sup>7 8 24</sup> and some of which are already in use among patients and families in high-income countries. They qualified this by indicating that the technology needed to match what they had access to without significant expense, which for most people meant button mobile phones (rather than smartphones), that could also be shared with other family members. This caveat reflects a wider picture across many LMICs where, although mobile phone penetration is now vast and over 90% of the world's population has access to a phone, access to internet-capable devices is far lower and constrained by connectivity as well as device and data costs.<sup>25</sup> For example, in Sri Lanka, internet-capable devices are above the global average with 94.9 active mobile-broadband subscriptions per 100 people, whereas in Tanzania there are only 28.6 subscriptions per 100 people.<sup>26</sup> This difference likely reflects that broadband services are part of a universal access scheme in Sri Lanka.<sup>26</sup>

It was perhaps unsurprising that patients and family members identified tangible ways that a digital solution available to them personally could be beneficial, yet more notable was their perception of the benefit of digital



solutions for practitioners. Patients and family members were acutely aware that some of the deficiencies in their experience of diabetes care, such as long waiting times, and delays in obtaining prescriptions, and sometimes having to be referred to higher-level facilities, could be directly caused or exacerbated by practitioners' difficulties with data systems and inadequate access to information. This finding appears less common in the wider literature, possibly because most studies have focused on patient or practitioners needs, adding a new dimension to understanding the potential significance of digital solutions to address the needs of provider, patient and community needs.

The study identified gaps in diabetes care that might be categorised as systemic challenges within LMIC health systems more widely in relation to noncommunicable diseases (NCDs): access to medications, medical supplies and equipment, and workforce capacity,<sup>2 22</sup> alongside the broader societal challenges of reliable power supply, access to information technology and connectivity.<sup>24</sup> Clearly, a digital solution, such as the Diabetes Compass, cannot provide a panacea for structural issues requiring multifaceted and multisectoral solutions, yet the findings identified highly specific ways that a digital solution could be designed to help patients and practitioners navigate such challenges. For example, practitioners recommended offline functionality, linking to wider Health Information Systems (HIS) referral and prescription systems, digitally available training, and information and guidance to enhance their clinical practice. In parallel, patients and family members identified the possibility to use button rather than smartphones for signposting to available services and medication availability (while not guaranteeing supply, at least making them aware of where supplies may be obtained).

This formative research was undertaken in selected districts of two countries and sampling was purposive rather than cross-sectional. It is possible that different or additional issues or perspectives may be identified by practitioners, patients and family members in other regions and in other countries. However, the purposive sample included various dimensions of diversity indicated in the literature to be important in relation to healthcare, and moreover, there was strong concordance in the findings between two different countries, between districts, and between practitioners, patients and family members. This suggests that the findings may reasonably be expected to resonate more widely in the two countries and in other LMICs. Nonetheless, future implementation and scale up in other regions and countries should include pilot testing to identify the degree that needs are different or similar.

## CONCLUSION

This study investigated experiences and needs in relation to diabetes care across the continuum from prevention to condition management from the dual perspectives of

service delivery (practitioners) and care needs (service users) and identified the potential for digital solutions to address current challenges and gaps. There was notable concordance regarding the aspects of diabetes care where improvements could be made both from the service delivery and the service user perspectives and between the two LMICs. Commonly defined needs were articulated in relation to: practitioner training, health information systems and data, PHC service delivery, infrastructure, equipment, and medication, and community awareness and self-management knowledge. Practitioners, patients and family members shared the view that digital solutions offer considerable potential to help address many of the specific needs and recommended how digital solutions could be most feasible and acceptable in their contexts.

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**SUPPLEMENTARY MATERIALS**

## In-Depth Interview Guide: Patients

### Instructions to the researcher

#### Purpose

To gain insight into patient experiences and expectations towards digital health solutions to improve diabetes care, the social and technical impacts of past and current digital health initiatives, and the acceptability and usability of digital health solutions.

#### Interview overview

Eight people living with diabetes will be purposively invited to participate, as per the recruitment procedure. Interviews will take place at the clinic location, in a private room (excepting a family member companion, if appropriate), and space and be audio recorded for later transcription and thematic analysis. Interviews will be arranged to occur at a time that does not interfere with patient's appointment to minimize disruption to clinic operations. The interviews will be 60 minutes in duration.

#### Session formalities

Consent for patients will occur at the health facility where they visit for consultation or treatment services. In-depth interviews with patients will be undertaken on the same date, following the consent process, in a space on the clinic premises where the interview may be conducted with privacy.

The interviewer will provide a complete overview of the study, requirements for participation, participant's data privacy rights, their confidentiality obligations, and the compensation given for their participation in the study (payment of LKR 1000 for time spent participating in any data collection activities. Additionally, travel expenses will be reimbursed if any participant travelled to attend). Following discussion of the consent materials, participants will indicate their consent to participate on a written form that will be securely stored for the duration of the study.

## Interview guide

### Introduction to interview

Good day! My name is \_\_\_\_\_. I am a researcher working on the World Diabetes Foundation and RTI International project entitled, "The Diabetes Compass". The Diabetes Compass is an initiative with the aim to strengthen services for diabetes care for people with type 2 diabetes like you. It will be designed to help with the challenges that health practitioners and people with diabetes have in the process of providing or receiving diabetes care. Thank you for agreeing to participate in this interview and for taking the time to speak with us today.

Please note that your name will not be included in the data we record or in any reports. You may refuse to answer any question or choose to stop the interview at any time. However, we hope you will answer all of the questions, which will help us gain information to help strengthen diabetes care in your country.

It is important for us that we get your perspectives and your experiences. There are no right or wrong answers. Because we are working on finding solutions to the problems there might be, it is also really important that we understand the real challenges that people live with.

### Demographics

No.	QUESTIONS	ANSWERS
1	Age in years	1. Please specify:_____ 2. Prefer not to say
2	Sex	1. Male 2. Female 3. Prefer not to say
3	Educational level	1. Primary education (grade 1- 5) 2. Secondary education (grade 6-13) 3. Diploma or certificate 4. BSc or other university degree 5. Postgraduate (master's) degree 6. PhD 7. Other, specify:_____ 8. Prefer not to say
5	What district or province do you live in?	-----
6	In what year were you diagnosed with diabetes?	-----



### Introduction to patient

Before we go into the questions, I would like to know a little bit about you. Where do you live? Who is in your family?

Thank you for sharing. Now, I would like to ask, can you tell me about how long you have had diabetes and how you found out? Additionally, it is called “diabetes” in the medical language, but what do you call it?

[Interviewers note: if participant prefers another term, please replace throughout interview]

### Diabetes care

1. Where do you receive healthcare? What kind of facility is it (e.g., a PMCI, a hospital, a private dispensary)?
2. Who provides your diabetes care (e.g., Specialist, doctor (non-specialist), nurse, public health nurse, or midwife)?
3. What kind of advice regarding treatment for diabetes or lifestyle changes is given to you on how to manage your diabetes?
  - a. Who gives you this advice and what did you think about it?
  - b. Did you receive any materials? If yes, in what form (e.g., paper, electronic)?
4. Where or from who have you found the most useful information on diabetes?
5. do you seek for care when you have questions about your diabetes or when you are experiencing symptoms or problems?
  - a. If yes, where do you access this practitioner/s?
  - b. How easy or difficult is it to get in to see them?
  - c. What would you do in cases where you are not able to see a practitioner?
6. What do you feel is the most important information you receive from a healthcare worker during a visit about your diabetes care?

### Technology access, comfort, and use

7. Now I would like to turn the conversation a little bit and talk about things you use in daily life. What sorts of communications technology do you use or have access to in daily life?
  - a. Probes: smartphone, button phone, tablet, laptop/computer
  - b. How do you access the technology? (e.g., wifi, mobile data, hotspot, dongle)
  - c. What do you use the technology for?
  - d. Probes: phone calls, SMS messaging, WhatsApp, watching videos, accessing websites, accessing apps, booking medical appointments via e-channeling, paying bills, purchasing goods
8. How comfortable do you feel with different types of communications technology in your day-to-day life? By communications technology, I mean devices such as a smartphone, button phone, tablet, or laptop/computer.
  - a. Which technologies do you use more/less?
  - b. What do you like / dislike about these technologies?
9. If you don't have access to these technologies (*provide examples in previous question*), what is the main reason?

- a. Probes: lack of comfort with or knowledge on how to use technology, lack of cost-free or low-cost technology options, lack of internet access, not having reliable access to power, not having ownership of a device, language barrier, lack of trust in technology?
10. Do you feel that technology makes your life easier or harder? Please say how / why.
11. Do you use apps or websites to manage your health? Which ones? What do you like about them? What do you not like about them?
12. Do you currently or have you in the past ever used mobile phone apps for diabetes care?
  - a. What is the name of the app(s) and what features do you like most and which do you like least?
  - b. If no longer using, why did you stop using this app?
13. Are you ever in contact with a practitioner between the clinic visits (e.g., by phone or email)? How do you get in contact (e.g., online patient portal, email, SMS/text messaging) and what types of things do you communicate through that method?
14. Would you like to be able to communicate with a healthcare worker between clinic visits? What would you like to communicate about?
15. Do you get any messages from your healthcare worker or clinic?
  - a. If yes, in what format do you receive them? And how often do you receive them?
  - b. If no, could you imagine getting messages? What would be an important message to receive?
16. Do you have any concerns about how well protected your personal or health data is when using online technologies, such as websites or smart phone apps? If so, please elaborate.
17. Can you imagine something digital that can help you with diabetes? What would that "something" look like or do for you?
18. Thank you for all the information you have shared with us. It is really important and informative. As we finish, my final question is: what is the greatest wish/hope you would have when it comes to diabetes care?

## In-Depth Interview Guide: Practitioners

### Instructions to the researcher

#### Purpose

To gain insight into practitioner experiences and expectations towards digital health solutions to improve diabetes care, the social and technical impacts of past and current digital health initiatives, and the acceptability and usability of digital health solutions.

#### Interview overview

Eight practitioners from the participating sites will be purposively identified and invited to participate, as per the recruitment procedure. Interviews will take place at the clinic location in a private space and be audio recorded for later transcription and thematic analysis. Interviews will be pre-scheduled with clinic managers and practitioners to minimize disruption to clinic operations. The interviews will be 60 minutes in duration.

#### Session formalities

Consent for practitioners and clinic managers will occur at the health facility where they practice or coordinate activities. In-depth interviews with practitioners will be undertaken on the same date, following the consent process, in a space on the clinic premises where the interview may be conducted with privacy.

The interviewer will provide a complete overview of the study, requirements for participation, the participant's data privacy rights, the confidentiality procedures, and the compensation given for their participation in the study (payment of LKR 2500 for time spent participating in any data collection activities. Additionally, travel expenses will be reimbursed if any participant travelled to attend). Following discussion of the consent materials, participants will indicate their consent to participate on a written form that will be securely stored for the duration of the study.

## Interview guide

### Introduction to interview

Good day! My name is \_\_\_\_\_. I am a researcher working on the World Diabetes Foundation and RTI International project entitled, "The Diabetes Compass". The Diabetes Compass is an initiative with the aim to strengthen services for diabetes care for people with type 2 diabetes. It is centered around a digital solution which will be designed to help with the challenges that health practitioners like you and people with diabetes have in the process of providing or receiving diabetes care. Thank you for agreeing to participate in this interview and for taking the time to speak with us today.

Please note that your name will not be included in the data we record or in any reports. You may refuse to answer any question or choose to stop the interview at any time. However, we hope that you will answer all of the questions, which will help us gain knowledge that can help strengthen diabetes care in your country.

It is important for us that we get your perspectives and your experiences. There are no right or wrong answers. Because we are working on finding solutions to the problems there might be, it is also really important that we understand the real challenges that you as a practitioner face in your daily practice.

### Demographics

No.	QUESTIONS	ANSWERS
1	Age in years	3. Please specify: _____ 4. Prefer not to say
2	Sex	4. Male 5. Female 6. Prefer not to say
3	Educational level	9. Primary education (year 1-5) 10. Secondary education (year 6-13) 11. Diploma or certificate 12. BSc or other university degree 13. Postgraduate (master's) degree 14. PhD 15. Other, specify: _____ 16. Prefer not to say
4	Job role [to be tailored by country]	1. Physician 2. Medical officer (non-physician) 3. Nurse 4. Midwife 5. Community health worker 6. Public health worker 7. Other (please specify)



5	What kind of health care facility/facilities do you work in? Please mark all that apply	<ol style="list-style-type: none"> <li>1. Community health centers (including home visits)</li> <li>2. Private dispensary</li> <li>3. PMCU</li> <li>4. PMCI</li> <li>5. Hospital (Teaching hospital, provincial general hospital, district general hospital, base hospital, divisional hospital)</li> <li>6. Specialist treatment center (secondary or tertiary care)</li> <li>7. Clinic</li> </ol>
7	Which district/province is your health care facility based in?	-----
8	Experience in service years	<ol style="list-style-type: none"> <li>1. Please specify: -----</li> <li>2. Prefer not to say</li> </ol>
9	To which degree do you feel that you can deliver the quality of care that you would prefer in your daily work? Please assess on a scale from 1 to 5, with 1 being "not at all" to 5 "completely".	<ol style="list-style-type: none"> <li>1. Not at all</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5. Completely</li> <li>6. Prefer not to say</li> </ol>

### Introduction to practitioner

1. Before we go into the questions, I would like to know a little bit about you, and can you just briefly tell us why you chose to become a healthcare professional?

[Interviewers note: please be cautious of time here. This is intended to establish rapport and provide context on the practitioner to set up further questions.]

### Diabetes Care

1. Can you tell me about the services you provide at the health facility where you work?
  - a. How are you involved in providing treatment or care to patients with diabetes?
  - b. What kinds of services do you provide to patients with diabetes?
2. Can you talk me through a visit at your place seen from the patient's perspective: What do the patient encounter when they come to you? What kind of tests do you perform, and what kind of treatment do you provide?
3. How do you make decisions about the treatment that you provide for diabetes? What is difficult about making these decisions? What helps you?
4. Are there services you would like to provide, but which are not possible. If yes, which and why?
  - For non-diabetes providers: Do you feel that there are services for diabetes care that you are able to provide to diabetes patients that you are not currently providing? If so, please describe what those services are.

5. What opportunities for continuing professional development are available or required for your position? What do you find helpful about these opportunities? What do you find challenging?
6. Are there any areas of your knowledge or skills in relation to diabetes care that you would like to strengthen if training or resources were available? If yes, what are they?
  - For non-diabetes providers: Are there any areas of knowledge or skills in relation to diabetes care that you would like to know more about or receive training in if resources were available? If yes, what are they?

### ICT Infrastructure and Support

7. Can you tell me about the infrastructure for information and communications technology at your health facility?
  - a. How often do you lose power at work? Does your health facility use a generator during power outages?
  - b. How reliable is the internet connection at the health facility where you work?
  - c. Do you have access to your own computer at work or do you share your computer with other staff?
8. Who do you go to when you have a technical issue or technology question?
9. Who provides information and communications technology (ICT) support for your clinic?
  - a. Probes: How available /useful is this support? Who determines which service, program, and/or hardware is used?

### Technology Access, Comfort, and Use

10. What types of technologies do you use in your day-to-day?
  - a. Probes: laptop or desktop computer, mobile phone, mobile phone apps, internet surfing
  - b. How do you use computers, laptops, mobile phones, or other devices in your workplace? (e.g., wifi, mobile data, hotspot, or dongle)
  - c. Which of these are you most comfortable using and why?
11. How is patient data captured and stored during a patient visit?
  - a. Do you use an electronic patient management system (e.g., EHR or case management system) or paper-based patient registers?
    - i. What is your experience of using this – i.e., does it work well, or do you have issues / why?
  - b. If paper records are used, are the records kept at your facility or do patients need to bring them to their appointments?
    - i. What is your experience of using this – i.e., does it work well, or do you have issues / why?
  - c. If both are used, when are paper records used and when is the electronic system used?
    - i. What is your experience of this – i.e., does it work well, or do you have issues / why?
12. What software applications do you use at work?

- a. Are they helpful? Why or why not? Please share if any of them cause more challenges than help, and why (e.g., operates too slowly, requires too many clicks, complicated user interface, never received training, unreliable, difficulty accessing)?
13. How are staff trained in using the systems?
    - a. How often does this training occur (e.g., only at the start of a job or anytime a new feature is introduced)?
  14. Have you ever used a mobile phone apps for diabetes or general patient care? How did you use them and what did you think about these tools?
  15. Is there any communication between patient and healthcare provider outside the clinical encounter?
    - a. If yes, in what format (SMS, email, WhatsApp, etc.) and for what purpose?
    - b. If no, do you think this would be helpful?

### Diabetes Data and Reporting

[Interviewer note: this section is not applicable to non-diabetes providers]

16. Can you talk me through the flow of patient data in your clinic? Where is it collected? Where and how is it used?
17. What types of diabetes data (e.g., HbA1c or blood glucose test results, weight, smoking, blood pressure) are you encouraged or required to collect?
  - a. Who encourages you to do this?
    - i. Probes: facility director, direct supervisor, government incentive program, part of standard facility workflow, etc.
  - b. How do you capture the data? Paper, EHR or both? If you enter the data in an electronic record, who is responsible for doing it?
  - c. Do you experience any challenges with this task? If so, what are these challenges? (e.g., lack of time, inconvenient workflow, etc.).
  - d. How do patients react to giving this information?
  - e. Are there staff that perform data collection who are different from those that perform data entry (e.g., one staff runs a capillary blood glucose test, but a different staff enters the result into the EHR)? If so, which staff performs which task?
    - i. What is your experience of this – i.e., does it work well or do you have issues / why?
18. What other data do you believe are relevant for diabetes care that are not documented consistently?
  - a. Probes: blood pressure, patient weight, smoking status
19. How is diabetes data used for clinical decision support during patient consultations?
  - a. Do you have any resources or applications that you use to make decisions about clinical care for your patients? If so, please elaborate.
20. Do you routinely generate reports that include diabetes data either for individual patients or a group of patients as part of your clinical practice?
  - a. If yes, which software applications do you use to generate the reports? *[Of note, in some cases, clinicians may receive reports from an administrator but not generate them themselves]*

- i. What is your experience of using this – i.e., does it work well, or do you have issues / why?
- b. If not, would it be helpful for your clinic to be able to generate reports at a patient or group (of diabetes patients) level? Please indicate what types of data you would like to see in such reports and how you think it would help to provide diabetes care.

### Use of Data

21. Seen from your perspective as a practitioner, why is data important? What can aggregation of data from diabetes patients be used for?
22. If we look at data as a flow from the first entry of information about a patient until the interpretation and use of aggregated patient data, where do you see the greatest roadblocks/obstacles in the system you are part of?
23. Do you have any suggestions what can be done to ensure the flow of data?

### Conclusion

Thank you so much for taking the time to speak with me today. I am grateful for your insights on how practitioners interact with information systems and digital applications in the process of providing care. Your perspectives will be shared in aggregate with the Diabetes Compass team, who will then develop new digital solutions to support practitioners in delivering diabetes care.



## Workshop on Motivating and Supporting use of the Diabetes Compass Products 1 & 2

### Instructions to researcher

#### Purpose of workshop

To identify and assess methods and approaches to motivate and support use of the new digital Diabetes Compass solutions' among either practitioners (practitioner workshop) or patients (patient / family member workshop).

#### Workshop overview

Facilitated, structured workshops will be held with 1) practitioners from primary health care facilities, and 2) patients and family members of people living with diabetes who receive some or all of their diabetes care in primary health care settings. These participants will all have previously participated in a formative research activity. A total of two Workshops on Motivating and Supporting Diabetes product use will be conducted – one with health care practitioners / clinic managers and one with people living with diabetes / family members. Each incentive workshop will include approximately 10 participants. The workshop discussions will be facilitated by trained researchers and will be conducted in the [local language of Kiswahili for Tanzania / Sinhala or Tamil for Sri Lanka] as the language preferred by the participants. Participant feedback will be recorded during the workshop and subsequently translated into English.

Each session will have a lead facilitator and a supporting facilitator. The lead facilitator will be responsible for moderating the session, managing the timing and agenda, and asking follow-up questions to participants. The supporting facilitator will be responsible for managing the recording, note-taking, and assisting the lead facilitator as needed (including moderating small group discussions when the group is divided).

The practitioner workshop will be 130 minutes in duration, including a 10-minute break. The patient and family member workshop will be 110 minutes in duration, including a 10-minute break.

#### Session formalities

At the time of recruitment, the participant will sign a consent form explaining the purpose of the workshop, the participant's data privacy rights, and their confidentiality obligations. Before proceeding the interviewer will start off with reading through the adverse event/safety information and remind all participants of the need for confidentiality of the issues discussed during the session and safeguarding the identity of other participants.

## Workshop on motivating and supporting use of the diabetes compass – practitioners

### Introduction to the workshop

[Allow 5 minutes for introduction]

[Moderator]: Welcome – thank you for being here today. My name is [name] and I will be leading this workshop as part of the Diabetes Compass initiative. The Diabetes Compass aims to build the capacity of practitioners to strengthen services for diabetes care. The Diabetes Compass will be centered upon digital solutions to help address challenges of practitioners and patients related to diabetes care.

Our aim today is to capture your ideas about how to motivate and support use of the new digital Diabetes Compass solutions into your workplace.

We understand that you may have more experience with the part of the health system where you work than others. In this discussion, there are no wrong answers, and you are the experts - we welcome your contributions based on your specific experiences.

As part of our session today, we will be discussing your experiences as practitioners. We know that these may be personal, so we ask that you please be respectful of the privacy of other group participants and not repeat anything you hear with people outside of this group.

### Introductions to practitioners

Duration: 5 minutes

Outcome: Brief group introductions and initial sharing of practitioner experiences with diabetes care.

[Moderator]: As we begin the session, let's first get to know each other a bit. We will go around the room and ask each of you to very briefly introduce yourselves. For this round, please share:

- Your name
- Your job title
- Where you practice and the type of facility where you work

### Introduction to the Diabetes Compass solution on Screening and Diagnosis

Duration: 5 minutes

Today we will be discussing two new solutions to motivate and support you to improve diabetes services. The first is about screening and diagnosis for diabetes. I will walk through a short overview of what the solution will do, and how it will fit into the care pathway.

[Moderator to present hero journey from experience vision presentation for given country, emphasizing the elements most relevant to the practitioner perspective. These include explaining what functions it will perform and how.]

## Activity 1: Screening and Diagnosis

Duration: 45 minutes

Outcome: Listing of the top 2 potential challenges related to the screening and diagnosis solution from the practitioner perspective, and top 2 facilitators to motivate and support use.

[Moderator]: For our first activity, we will split up into 2 small groups to talk about how to motivate and support use of this new system for screening and diagnosis. In each group, we will brainstorm potential barriers and challenges that you as a practitioner might face in using this solution. We will then pick as a group the 2 most important potential challenges. Next, we will similarly brainstorm about what resources might help practitioners overcome these challenges. These are the factors that could help motivate and support use of the system overtime.

You will have about 30 minutes in your small group, which will be led by myself or my co-facilitator. After you discuss, we will come back together to hear what each group decided were the top 2 facilitators. Out of the ideas, we will then as a group decide on which 2 are most important overall .

Questions for small group discussion:

1. Barriers and challenges
  - a. What are the potential barriers that practitioners might face when using this solution?
  - b. What makes adopting or using a new digital system challenging?
  - c. [Moderator] Probe: Possible challenges include
    - i. technology challenges (ex. inconsistent power support or network connectivity, shortage of devices, availability of hardware such as computers and routers etc.)
    - ii. organizational challenges (ex. facility supervisors are not receptive to digital systems, or the facility does not have community volunteers who are motivated to serve as trained screeners)
    - iii. time or resource challenges (ex. not enough time to learn how to use a new solution, CHWs do not have access to needed device and data packages)
    - iv. environmental challenges (ex. digital devices are only present in one part of the clinic, which might be different from where patient data are collected)
    - v. personal preferences (ex. practitioners do not like using digital solutions)
    - vi. See Key Assumptions document for additional examples.
2. Motivators and supportive resources
  - a. What do you as practitioners need to help overcome these challenges?
  - b. What motivates you to use digital systems?
  - c. [Moderator] Probe: possible motivators and supportive resources could include:
    - i. Resources could be things like readily available ICT support for trouble shooting when problems occur with the HIS or screening tool.
    - ii. Motivators could be recognition in the form of a certificate and announcement to the facility staff for the screener or practitioner who is using the solution most consistently.

[Moderator to record ideas shared by the group. Monitor time closely to ensure the group identifies a top 2 for both barriers/challenges and motivators/supportive resources in 30 minutes. Please designate 1 participant in each group to share the top 2 the group decides on.]

[Moderator]: Now that we are all back together, let's hear from both groups. What were the top 2 challenges and potential resources you discussed?

[Moderator to allow each group representative to share, and to record the top 4 on the flipchart.]

[Moderator]: Thank you for these ideas. Now, let's vote on which are the top 2 most important challenges and potential resources. You will each receive 2 sticky notes that you can use to vote for the challenge and resource you think are most important. We will total the votes at the end.

[Moderator to allow participants to vote on their top challenge and top resource.]

[Moderator]: Great, thank you for your votes. The top 2 challenges were [to read from votes] and the top 2 resources were [to read from votes]. With our remaining time, would anyone like to share why they voted for the option they did?

[Moderator to monitor time closely to ensure finish on time for break.]

[Break 10 min]

### Introduction to the Diabetes Compass solution on Health Information

Duration: 10 minutes

The second solution we will be discussing is about health information for diabetes patients. [Note scope of the solution and which existing EHR it links to (either Cloud HMIS or GoT-HoMIS)]. I will walk through a short overview of what the solution will do, and how it will fit into the health information system.

[Moderator to present hero journey from experience vision presentation for given country, emphasizing the elements most relevant to the practitioner perspective. These include explaining what functions it will perform and how, and how it will interface with the current HIS.]

### Activity 2: Health Information

Duration: 45 minutes

Outcome: Listing of the top 2 potential challenges related to the health information product from the practitioner perspective, and top 2 facilitators to motivate and support use.

[Moderator]: For our first activity, we will split up into 2 small groups to talk about how to motivate and support use of this new system for collecting, storing, and reporting patient health information. In each group, we will brainstorm potential barriers and challenges that you as a practitioner might face in using this solution. We will then pick as a group the 2 most important potential challenges. Next, we will similarly brainstorm about what resources might help practitioners overcome these challenges. These are the factors that could help motivate and support use of the system overtime.

You will have about 30 minutes in your small group, which will be led by myself or my co-facilitator. After you discuss, we will come back together to hear what each group decided were the top 2 facilitators. Out of the ideas, we will then as a group decide on which 2 are most important overall.

Questions for small group discussion:

1. Barriers and challenges
  - a. What are the potential barriers that practitioners might face when using this solution?
  - b. What makes adopting or using a new digital system challenging?
  - c. [Moderator] Probe: Possible challenges include
    - i. technology challenges (ex. inconsistent power support or network connectivity, shortage of devices, etc.)
    - ii. organizational challenges (ex. facility supervisors are not receptive to digital systems, or the facility does not have community volunteers who are motivated to serve as trained screeners)
    - iii. time or resource challenges (ex. not enough time to learn how to use a new solution, CHWs do not have access to needed device and data packages)
    - iv. environmental challenges (ex. digital devices are only present in one part of the clinic, which might be different from where patient data are collected)
    - v. personal preferences (ex. practitioners do not like using digital solutions)
    - vi. See Key Assumptions document for additional examples.
2. Motivators and supportive resources
  - a. What do you as practitioners need to help overcome these challenges?
  - b. What motivates practitioners to use digital systems?
  - c. [Moderator] Probe: possible motivators and supportive resources could include:
    - i. Resources could be things like readily available ICT support for trouble shooting when problems occur with the HIS or screening tool.
    - ii. Motivators could be recognition in the form of a certificate and announcement to the facility staff practitioner who is using the solution most consistently.

[Moderator to record ideas shared by the group. Monitor time closely to ensure the group identifies a top 2 for both barriers/challenges and motivators/supportive resources in 30 minutes. Please designate 1 participant in each group to share the top 2 the group decides on.]

[Moderator]: Now that we are all back together, let's hear from both groups. What were the top 2 challenges and potential resources you discussed?

[Moderator to allow each group representative to share, and to record the top 4 on the flipchart.]

[Moderator]: Thank you for these ideas. Now, let's vote on which are the top 2 most important challenges and potential resources. You will each receive 2 sticky notes that you can use to vote for the challenge and resource you think are most important. We will total the votes at the end.

[Moderator to allow participants to vote on their top challenge and top resource.]

[Moderator]: Great, thank you for your votes. The top 2 challenges were [to read from votes] and the top 2 resources were [to read from votes]. With our remaining time, would anyone like to share why they voted for the option they did?

[Moderator to monitor time closely to ensure finish on time for break.]

### Conclusion/Wrap Up

Duration: 10 minutes

[Moderator]: We have now spent a couple of hours together reflecting on the diabetes care and your practice. As a final question, if you could have 1 wish which could be fulfilled to support you in using these solutions to create better diabetes care for patients in your area, what would that be? Let's go around the room to hear from everyone.

Thank you very much for taking time to participate in our discussion today. We are grateful for your thoughts and insights and appreciate your contributions to the study. As I mentioned at the start, please respect the privacy of the other participants and hold confidential anything that was shared within the group.



## Workshop on motivating and supporting use of the diabetes compass – patients

### Introduction to the workshop

[Allow 5 minutes for introduction]

[Moderator]: Welcome – thank you for being here today. My name is [name] and I will be leading this workshop as part of an initiative called Diabetes Compass. The Diabetes Compass aims to strengthen services for diabetes care.

Our aim today is to capture your ideas about the potential challenges to introducing the Diabetes Compass tools to patients in [ Sri Lanka / Tanzania ], and then to discuss and prioritize potential resources that could support its uptake and continued use.

As part of our session today, we will be discussing your experiences as patients and people living with diabetes. We know that these may be personal, so we ask that you please be respectful of the privacy of other group participants and not repeat anything you hear with people outside of this group.

### Introduction to the participants

Duration: 5 minutes

Outcome: Brief group introductions and initial sharing of patient experiences with diabetes care.

[Moderator]: As we begin the session, let's first get to know each other a bit. We will go around the room and ask each of you to very briefly introduce yourselves. We are here to talk about diabetes, but for a start we just want to get to know each other.

- Your name
- Where you are from?
- If you are a person living with diabetes, how long have you had diabetes?
- If you are a family member, who in your family has diabetes?

### Introduction to the Diabetes Compass solutions

Duration: 10 minutes

Today we will be discussing two new solutions to improve diabetes services. The first is about how people are checked for diabetes and diagnosed. The second is about how clinics collect and store patient health information. I will start by showing you an overview of how patients will interact with these solutions along the care pathway.

[Moderator to present hero journey from experience vision presentation for given country, emphasizing the elements most relevant to the patient experience. Present both the screening and diagnosis and health information slides together, touching only briefly on the health information slides past the “Capture” step.]

### Activity: Barriers and challenges

Duration: 45 minutes

Outcome: Listing of the top 2 potential challenges related to the screening and diagnosis and health information product from the patient perspective, .

[Moderator]: Our first activity will be to identify what you as patients see as potential challenges related to these new digital solutions. For this exercise, we will split into 2 groups, led by myself and my co-facilitator and discuss the barriers and challenges to using this solution. At the end, we will ask the group to decide on the 2 biggest challenges.

Questions for discussion:

1. What are the potential barriers that you as patients might face when using these solutions? Let's consider each phase in the patient journey that we just saw, one by one:
  - a. Participating in a diabetes screening in your community
    - i. Probes:
      1. Are there locations or times of day when you would have trouble attending a screening?
      2. How do you feel about attending a screening in your community rather than at a health facility?
  - b. Making an appointment to visit a clinic
    - i. Probes:
      1. Do you usually make appointments to visit the clinic in advance?
      2. Do you know your schedule and work or family obligations in advance?
  - c. Receiving SMS reminders about your appointment
    - i. Probes:
      1. Do you have access to a phone regularly? Do you share this phone or own it yourself?
      2. How would you feel about receiving these reminders on a shared phone?
  - d. Receiving a house visit from a community health worker
    - i. Probes:
      1. How would you feel about having a CHW visit you at your house?
      2. Are you worried about anyone in your family knowing information about your health?
  - e. Attending the clinic to receive a medical assessment
    - i. Probes:
      1. How do you typically travel to the clinic?
      2. Do you ever have difficulty attending the clinic when you have an appointment? Why?
  - f. Sharing information with a clinic staff member about you and your health
    - i. Probes:
      1. How do you feel about sharing your health information with clinic staff?
      2. How do you feel about your health information being stored in the clinic records on paper? What about in a digital system?

[Moderator to see Key Assumptions document for additional examples.]

[Moderator or co-facilitator to record ideas shared by each group for each phase, and to ask one participant to report out to the wider group. Small group discussions should last up to 30 minutes.]

[Moderator]: Now that we are all back together, let's hear from both groups. What were the top 2 challenges you discussed?

[Moderator to allow each group representative to share, and to record the top 4 on the flipchart.]

[Moderator]: Thank you for these ideas. Now, let's vote on which are the top 2 most important challenges. You will each receive 2 sticky notes that you can use to vote for the challenge and resource you think are most important. We will total the votes at the end.

[Moderator to allow participants to vote on their top challenge]

[Moderator]: Great, thank you for your votes. The top 2 challenges were [to read from votes]. With our remaining time, would anyone like to share why they voted for the option they did?

[Break – 10 min]

## Activity 2: Resources and motivators

Duration: 35 minutes

Outcome: Listing of top 2 facilitators to motivate and support use

[Moderator]: Now that we have a list of some of the things that might make it difficult to use these solutions, we will next think about how to help patients like you in using these solutions to access screenings, receive reminders for appointments, and share information with clinic staff. These resources should be ways to address the challenges, or to help motivate use of the Diabetes Compass solutions. For example, a resource might be easily available tech support for trouble shooting when problems occur. Motivators could be a raffle for community members who participate in a health screening.

Back in your small group, please discuss your ideas for what could encourage or make it easier for patients and community members to use these solutions.

What would help encourage people to...

1. participate in a health screening?
2. make an appointment to visit a clinic?
3. receive follow up messages about attending clinic appointment?
4. receive a house visit from a community health worker?
5. attend a clinic appointment?
6. share information about themselves and their health for entry into a digital patient record?

Once you discuss, we will ask that you decide as a group what the top 2 ideas are for sharing with the full group. After you discuss in your group for about 20 minutes, we will come back together as a group.

[Allow up to 20 min for group discussion]

[Moderator]: Now that we are back together, I will ask that you designate someone in your group to read out your top 2 ideas, and I will write them all up on this list.

[Moderator to record top 4 supporting measures.]

[Moderator]: Thank you for these ideas. Now, let's vote on which are the top 2 most important challenges. You will each receive 2 sticky notes that you can use to vote for the challenge and resource you think are most important. We will total the votes at the end.

[Moderator to allow participants to vote on their top challenge]

[Moderator]: Great, thank you for your votes. The top 2 challenges were [to read from votes]. With our remaining time, would anyone like to share why they voted for the option they did?

### Conclusion/Wrap Up

Duration: 10 minutes

[Moderator]: We have now spent a couple of hours together reflecting on how to best motivate and support use of the Diabetes Compass solutions. . As a final question, if you could have 1 wish which could be fulfilled to support you and your community in using these solutions to create better diabetes care for patients in your area, what would that be? Let's go around the room to hear from everyone.

[Moderator]: Thank you very much for taking time to participate in our discussion today. We are grateful for your thoughts and insights and appreciate your contributions to the study. As I mentioned at the start, please respect the privacy of the other participants and hold confidential anything that was shared within the group.

## Workshop on Perspectives on the Diabetes Care Pathway: Practitioners & Patients

### Instructions to researcher

#### Purpose of workshop

To hear practitioner, patient, and family member perspectives on the needs and experiences of providing or receiving care, how services are organized, what is working well, what challenges participants face in delivering or accessing diabetes care, and what is needed to improve diabetes care in Sri Lanka.

#### Workshop overview

Facilitated, structured workshops will be held with 1) practitioners from primary health care facilities, and 2) patients and family members of people living with diabetes who receive some or all of their diabetes care in primary health care settings. A total of six pathway workshops will be conducted – three each with health care practitioners / clinic managers and people living with diabetes / family members. Each pathway workshop will include 6-7 participants. The workshop discussions will be facilitated by trained researchers and will be conducted in the local language (Sinhala or Tamil for Sri Lanka, Kiswahili for Tanzania) based on the language preference of the participants. Participant feedback will be recorded during the workshop and subsequently translated into English.

Each session will have a lead facilitator and a supporting facilitator. The lead facilitator will be responsible for moderating the session, managing the timing and agenda, and asking follow-up questions to participants. The supporting facilitator will be responsible for managing the recording, note-taking, and assisting the lead facilitator as needed (including moderating small group discussions when the group is divided).

The practitioner workshop will be 120 minutes in duration, including a 10-minute break. The patient and family member workshop will be 120 minutes in duration, including a 10-minute break.

#### Session formalities

At the time of recruitment, the participant will sign a consent form explaining the purpose of the workshop, the participant's data privacy rights, their confidentiality obligations, and the compensation given for their participation in the study. Before proceeding the interviewer will start off with reading through the adverse event/safety information and remind all participants of the need for confidentiality of the issues discussed during the session and safeguarding the identity of other participants.

### Workshop on Perspectives on the Diabetes Care Pathway: Practitioners

#### Introduction to the workshop

[Allow 5 minutes for introduction]

[Moderator]: Welcome – thank you for being here today. My name is [name] and I will be leading this workshop as part of the Diabetes Compass initiative. The Diabetes Compass aims to build the capacity of practitioners to strengthen services for diabetes care. The Diabetes Compass will be centered upon digital solutions to help address challenges of practitioners and patients related to

diabetes care. This project is conducted in collaboration with Ministry of Health in Sri Lanka. These solutions may for example include tools to support practitioner decision-making, learning, and care management. The session duration will be 2 hours, with a break of 10 minutes.

To inform development of these solutions, RTI International is gathering information from practitioners and patients in Sri Lanka to learn more about how diabetes care is currently delivered, what the challenges are, and how the Diabetes Compass might be designed to help alleviate these challenges.

Our aim today is to capture your experiences as practitioners who are dealing with diabetes in your clinical work. Our focus throughout the session will be on type 2 diabetes. We would like to hear your perspectives on the diabetes care pathway in terms of how services are delivered, what is working well, what challenges you face as practitioners, and what is needed to strengthen diabetes care. Throughout the workshop, we will be discussing the pathway of care, including services across the health system (from community level and primary care to secondary and tertiary care) as well as where care delivery moves between public and private sector delivery. We understand that you may have more experience with the part of the system where you work than others. In this discussion, there are no wrong answers, and you are the experts - we welcome your contributions based on your specific experiences.

As part of our session today, we will be discussing your experiences as practitioners. We know that these may be personal experience of your professional career in this District/Province, so we ask that you please be respectful of the privacy of other group participants and not repeat anything you hear with people outside of this group.

### Activity 1: Introductions

Duration: 5 minutes

Outcome: Group introductions and initial sharing of practitioner experiences with diabetes care.

[Moderator]: As we begin the session, let's first get to know each other a bit. We will go around the room and ask each of you to briefly introduce yourselves. For this round, please share:

- Your name
- Your job title
- Where you practice and the type of facility where you work

### Activity 2: Mapping and describing the current pathway of care for diabetes

Duration: 60 minutes

Outcome: Two diabetes pathway diagrams populated with stick notes explaining what service provision looks like currently and a summary and discussion of the diabetes pathway in terms of where and how services are currently delivered, and a list of challenges practitioners and patients face at each point for further discussion

[Moderator]: Our first activity will be to reflect on the pathway of care for diabetes in Sri Lanka / Tanzania. Different services for diabetes prevention, diagnosis, and management occur at different facilities and at different levels of the health system. We will talk about the pathway of care that is defined in the Guideline for Management of NCDs in Primary Health Care, Ministry of Health and then discuss how your experiences compare to the guidelines. We want to understand the extent to which this ideal pathway does or does not reflect how services are currently being delivered. This will include understanding why certain steps in the pathway do not occur or may not follow recommended procedures. Based on this understanding, we will then move on to discuss what resources or solutions could help address these gaps in the pathway to make providing diabetes care easier and better for practitioners and accessing care easier and better for patients.



For this activity we will be using this diagram, which outlines the broad steps in the diabetes care pathway.

[Moderator to refer to WDF Diabetes Dialogue tool]

- For this activity I will divide you into 2 groups. Each group will each have a copy of the pathway diagram, and sticky notes. Using these sticky notes, you will map the different steps of the diabetes care pathway as you experience it as a practitioner. You should choose which color to use based on your own experiences, and in discussion with your group. You will have 20 minutes to discuss with your group, and we will then come back together. Within your group, you may have different experiences, so please talk about how your experiences are similar and different for each step as you are mapping. We will come back to talk as a full group about each stage in the pathway in more detail.

[Allow 20 minutes in groups for discussion. Lead and supporting facilitator to divide between groups to answer questions and listen to discussion.]

[Moderator]: We next come back together as a full group to discuss each step in more detail. For each stage, we will talk about “Where” these services are provided (what level or public / private), “Who” provides them, “What” and “How” services are provided, and “When” services are provided. We also particularly want to know what the challenges are with delivering services for the stage, or if there are services or stages that are not happening or not happening well at present.

[Allow up to 40 minutes for this discussion.]

Category	Questions
1. Where	<ul style="list-style-type: none"> <li>• Where do patients receive these services? (e.g., hospitals, private dispensaries, PMCI,)</li> </ul>
2. Who	<ul style="list-style-type: none"> <li>• Who provides services at this point in the pathway? If services are not available, who should be providing services?</li> </ul>
3. What	<ul style="list-style-type: none"> <li>• What are the services provided? What services are not provided?</li> <li>• What supplies or equipment are required for this step? Are the supplies/equipment usually available? Which are not available?</li> <li>• Are there digital devices or systems in use at this step? Are they widely used? Could they be?</li> <li>• What training have practitioners received to deliver this service? Are practitioners receptive to this training?</li> </ul>
4. How	<ul style="list-style-type: none"> <li>• How do patients access care?</li> <li>• How do staff work together to provide diabetes care?</li> <li>• How do practitioners feel about delivering these services (and any gaps)?</li> </ul>
5. When	<ul style="list-style-type: none"> <li>• When is this service currently provided in the course of diabetes compared to when it is needed (early, on-time, or late)?</li> </ul>

[Break – 10 minutes]

### Activity 3: Challenges and solutions

Duration: 25 minutes

Outcome: Extended discussion of identified challenges for practitioners and patients, and suggested solutions and resources required to address them.

[Moderator]: We have been discussing how you as practitioners experience the diabetes care pathway and the factors which influences how patients move or don't move towards receiving the right care for their type 2 diabetes. We will next discuss some of the challenges and barriers we identified in more detail. For the purposes of this session, we will think about 3 types of challenges practitioners might experience: motivation challenges (which relate to individual desire or motivation to do something), capability challenges (which relate to having skill or knowledge to do something), and opportunity challenges (which relate to having time, supplies, or scope to do something).

[Moderator]: To start, let's go around the room and have each person suggest the challenge they feel is most important for practitioners related to diabetes care. I will make note of these on the flipchart.

[Moderator to note all challenges named and identify the 2-3 that were most common to be explored in more depth]

Questions for discussion:

1. What is the impact of this challenge for you and your colleagues?
2. What is the source of the challenge? (As defined above, these could include example, lack of staff capacity, lack of skills, access to medicines, access to supplies or equipment, etc.)
3. What should change to address this challenge? What resources would be required?

### Conclusion/Wrap Up

Duration: 15 minutes

Outcome: List of priority changes for practitioners related to improving diabetes care.

[Moderator]: We have now spent a couple of hours together reflecting on the diabetes care and your practice. As a final question, if you had 1 wish which could be fulfilled to create better diabetes care for patients in your area, what would that be? Let's go around the room to hear from everyone.

Thank you very much for taking time to participate in our discussion today. We are grateful for your thoughts and insights and appreciate your contributions to the study. As I mentioned at the start, please respect the privacy of the other participants and hold confidential anything that was shared within the group.

## Workshop on Perspectives on the Diabetes Care Pathway: Patients and Supportive Family Members

### Introduction to the workshop

[Allow 5 minutes for overview of the session]

[Moderator]: Welcome – thank you for being here today. My name is [name] and I will be leading this workshop as part of an initiative called Diabetes Compass. The Diabetes Compass aims to strengthen services for diabetes care.

To inform development of the Diabetes Compass, RTI International is gathering information from patients and family members of patients in Sri Lanka to learn more about how diabetes care is currently delivered, what the challenges are for people living with type 2 (high blood sugar) diabetes in accessing and receiving diabetes care, and how the Diabetes Compass might be designed to help alleviate these challenges.

Our aim today is to capture your perspectives and experiences on the process of living with type 2 diabetes and receiving care in terms of how services are organized, what is working well or not so well, what challenges you face as patients (or as family members of patients), and what is needed to give you a better experience of diabetes care. Throughout the workshop, we will be discussing services for diabetes across the health system. We know that you may have more experience with certain parts of the system than others. In this discussion, there are no wrong answers, and you are the experts - we welcome your input based on your specific experiences. As part of our session today, we will be discussing your experiences. We know that these can be personal, so we ask that you please be respectful of the privacy of other group participants and not repeat anything you hear with people outside of this group. The workshop will be conducted for 2 hours and there will be breaks in between.

### Activity 1: Introductions

Duration: 20 minutes

Outcome: Group introductions and initial sharing of patient experiences with diabetes care.

[Moderator]: As we begin the session, let's first get to know each other a bit. We will go around the room and ask each of you to briefly introduce yourselves. We are here to talk about diabetes, but for a start we just want to get to know each other.

- Your name
- Where you are from
- If you are a person living with diabetes, how long have you had diabetes?
- If you are a family member, who in your family has diabetes?
- In just a brief initial couple of minutes (you will have more time later!) can you say how you feel about your or your family member's diabetes?

### Activity 2: Experiences of diabetes care

Duration: 60 minutes

Outcome: Experiences of patients and family members of patients with diabetes regarding key stages of the diabetes care pathway.

[Moderator]: As a patient or family member of a patient with diabetes, you may have had different experiences accessing and receiving care. In this activity, we would like to hear your stories about diabetes in relation to several key timepoints. For each timepoint, we will go around the group to hear your experiences.

[Moderator to facilitate an open discussion on each stage of the pathway and ask probing questions about the individuals' experiences. Every participant does not need to answer every individual question in this section. Moderator will ask for example, if anyone had a similar or different experience to the person who just spoke.]

The first is about finding out how you had diabetes.

- How did you or your family member first learn that you or they had diabetes? Did you have symptoms that led you to see a practitioner? Were you screened as part of another appointment?
- Did you know anything about diabetes before you were diagnosed?
- How did the diagnosis take place - what kind of test did you go through?
- What kind of health facility were you at when you were diagnosed?
- What kind of practitioner did you see?
- How did you feel when you were diagnosed?
- What was helpful to you when you were diagnosed?
- Was there anything about the experience that could have been better?

The second time point is about the treatment you received after you or your family members were diagnosed.

- What kind of facility do you attend for your diabetes treatment?
- Do you always go to the same facility for care, or do you sometimes go to more than one facility for your diabetes? For what reason?
  - Probes: are any of these facilities that are not government-run / private sector?
- What kinds of practitioners do you see for your diabetes treatment?
  - Probes: Diabetic Specialist, Nephrologist (kidney), Eye Specialist (Glaucoma), Cardiologist (Heart), General Physician (wounds)
- What treatment do you receive? Has this treatment changed since you were diagnosed?
  - Probes: medication (specify type), insulin use, guidance on diet/physical activity
- Do you receive information about your diet and physical activity as part of your treatment? What kinds of information and from whom?
- How often do you go to a clinic to see a health care practitioner because of your diabetes?
- What happens when you go to the clinic?
  - Probes: how do you get there? What time do you arrive and how long does the visit take? What practitioners do you see?
- Do you bring any health records or documents with you to your visit? Does the clinic have any information on file about you and your health history?
  - If yes, is this information on paper or on a computer?
- How much money do you spent on diabetes treatment, including medicines and appointments?
- Have you or your family member ever been told by a practitioner that you should go to another facility to receive care (i.e., referral)? For what reason?
  - Probes: Did you follow up on the referral? Why or why not? How was the experience?
- How do you feel about the care you or your family member are receiving for diabetes?
- What is most helpful to you in treating your diabetes?
- What is challenging about your treatment/care? What could make the care you receive for diabetes better?

[Break – 10 minutes]

The third timepoint is treatment for complications related to your diabetes. By complications, I mean problems that happen as a result of your diabetes, such as damage to your eyes, kidneys, foot or other issues.

- Have you or your family member experienced any complications?
- How did you learn about these complications? How did you feel when you learned that you / your family member had them?
- What information did your practitioner provide about these complications?
- What treatment did you receive for these complications?
- What is challenging about your treatment/care? What could make the care you receive for diabetes complications better?

[Moderator] Thank you for sharing these experiences.

**Conclusion/Wrap Up**

Duration: 25 minutes

Outcome: List of priority changes for patients and family members related to improving diabetes care.

[Moderator]: We have now spent a couple of hours together reflecting on the diabetes care and your practice. As a final question, if you had 1 wish which could be fulfilled to create better diabetes care for patients in your area, what would that be? Let's go around the room to hear from everyone.

[Moderator to call on participants individually to share their wish and ask to follow up probes as appropriate to clarify how and why that wish would improve diabetes care.]

Thank you very much for taking time to participate in our discussion today. We are grateful for your thoughts and insights and appreciate your contributions to the study. As I mentioned at the start, please respect the privacy of the other participants and hold confidential anything that was shared within the group.