LESSONS LEARNT ON TYPE 1 DIABETES PATIENT EDUCATION IN LOW-AND-MIDDLE INCOME COUNTRIES

A review of projects funded by the World Diabetes Foundation

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Authors: Louise Stanton and Jessica Hanae Zafra-Tanaka

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Executive Summary

Introduction

Type 1 diabetes affects over 9 million people worldwide, many of whom live in low- and middle-income countries (LMICs) where health systems are fragile and access to insulin, supplies and structured education is limited. The World Diabetes Foundation (WDF) has supported several projects to "enhance equity in access to diabetes care and prevention" in LMICs. To better understand how patient education for type 1 diabetes is being delivered in these settings, the WDF and the Lancet Diabetes & Endocrinology Commission on type 1 diabetes reviewed WDF-funded projects that included a patient education component. This report documents the lessons learnt from a unique set of experiences from WDF-funded projects.

Methods

A documentary review identified 50 projects implemented between 2002 and 2025 in 37 countries across all seven International Diabetes Federation (IDF) regions. Data from project proposals, technical assessments and reports were extracted using standardized frameworks: COMPAR-EU for self-management interventions for chronic diseases and the WHO Health System Building Blocks. Quantitative analysis described project and intervention characteristics; case studies illustrated key approaches and lessons.

Key findings

Most projects focused solely on type 1 diabetes, while around a third combined type 1 diabetes with other forms of diabetes. The projects spanned in the seven IDF regions, but they were most frequently located in Africa and the Middle East & North Africa regions.

Most projects involved multiple partners—particularly diabetes associations and Ministries of Health—working with NGOs, hospitals and universities. Although projects were selected based on the inclusion of a patient education component, most of them simultaneously strengthened different building blocks such as health workforce, service delivery and health information systems; health financing was rarely targeted.

Regarding the educational content, clinical management content (e.g., insulin use, glucose monitoring, complication prevention) was present in all the projects. Psychological and lifestyle management were addressed in around three-quarters of projects, social management and patient–provider interaction were less consistently covered, indicating gaps in addressing social roles, work and communication skills.

Healthcare professionals were the main providers of education, often supported by diabetes educators and peers. Education often flowed through intermediary recipients—especially caregivers, peers and teachers—who were trained to support children's and adolescents' self-management. Only a few projects explicitly addressed caregivers' own wellbeing.

Over half of projects included training or refresher courses for providers. Final recipients were predominantly children and adolescents with type 1 diabetes; adults, older adults, pregnant women and people with disabilities were infrequent primary targets.

As for the delivery methods, most projects combined several methods: clinical counselling and peer-based group sessions were most common, complemented by self-guided materials and, in some cases, digital tools such as apps and online platforms. Education was delivered in both clinical and community settings. Diabetes camps and schools were key venues for peer support, practical skills and psychosocial activities.

Finally, when assessing the outcomes of the patient education, most projects measured individual-level outcomes (e.g., clinical markers or knowledge) rather than organizational outcomes. Disentangling the effect of the patient education itself versus all the project activities is challenging.

Main lessons and implications

- **Patient education for type 1 diabetes in LMICs should be embedded in broader health-system strengthening and supported by strong multi-partner collaborations.**
- **Comprehensive education should extend beyond clinical skills to include psychological, social and relational aspects tailored to life stage and context.**
- **Children and adolescents are well covered; there is a need to develop and test education models for adults, older adults, caregivers, and other subgroups such as pregnant women or people with comorbidities or disabilities.**
- **Combining clinical and community platforms—including schools, camps and digital tools—enhances reach, relevance and peer support.**
- **Future WDF and partner efforts should promote co-creation of education interventions, integrate education into pre-service and in-service training for healthcare professionals, develop materials for structured education for intermediary recipients such as peers, and use implementation science and mixed-methods evaluation to better understand impact and sustainability.**

These lessons provide a foundation for strengthening type 1 diabetes education in LMICs and will feed into the Lancet Diabetes & Endocrinology Commission's global roadmap to improve care and quality of life for people with type 1 diabetes.


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Introduction

The International Diabetes Federation (IDF) estimates that in 2024 there were 9.15 million people with type 1 diabetes globally.[1] Although 2022 marked the Centenary of insulin's first clinical use, this essential component in guaranteeing the survival of people with type 1 diabetes is lacking in many settings.[2] Beyond access to insulin, people with type 1 diabetes also require health systems to provide a range of services and tools. However, in many contexts fragile health systems, lack of access to diabetes management tools (e.g., routine metabolic testing, educational materials), geographic constraints (e.g., travel-related difficulties), and social determinants preclude the adequate management of type 1 diabetes.[3-7] These barriers result in poor glucose control, earlier onset and higher rates of complications and premature mortality than in high-income countries.[8-11] In describing what needs to be done to address these issues many studies highlight the need for better education of people with type 1 diabetes.

The International Society of Adolescent and Pediatric Diabetes (ISPAD) guidelines[12] state that diabetes education is an essential element of diabetes care and that this should be provided in a continuous and structured way tailored to the needs and age of the individual. Beyond the actual education, ISPAD also highlights that education has a role in empowering people with diabetes and their caregivers to enable them to manage their diabetes daily. With regards to how education should be delivered, there is a focus on multidisciplinary teams, with a personalized approach taking into consideration such factors as age, maturity, culture, literacy, and family circumstances.

Both ISPAD guidelines and the Standards of Care for the American Diabetes Association (ADA)[13] focus their guidance on education for people with type 1 diabetes within the health system, although ISPAD does mention other settings, such as diabetes camps and peer groups, as ways of providing education for people with type 1 diabetes. As described by the ISPAD guidelines education is a means to ensure that people with type 1 diabetes and their caregivers have the tools to perform the full range of daily self-management activities.[12]

A Cochrane Review of models of care for children and adolescents with type 1 diabetes shows the centrality of education as well as the different means of delivering this education.[14] This education can be delivered by specialists, at camps, through group education sessions, booklets and other written materials, peer support and tele-support. Different approaches to education programs are described in the literature,[15] but there are few studies from low- and middle-income countries (LMIC) as well as practical examples.

The World Diabetes Foundation (WDF) established in 2002 is a leading source of funding for implementation of projects on diabetes in LMICs, including on different areas of type 1 diabetes.[16] It has its goal to "enhance equity in access to diabetes care and prevention" in LMICs. To date, the WDF has funded 629 projects in 120 countries, providing a total of € 223.5 million. An ongoing project supported by the WDF is the Lancet Diabetes & Endocrinology Commission on type 1 diabetes.[17]

This Commission being led by a group of experts in collaboration with over 30 colleagues representing different expertise, from different regions, and including a strong presence of people with lived experience, has as its goal to develop a comprehensive pragmatic global plan to improve quality of life and care, considering the life course of people with type 1 diabetes in the contexts where they live and the health systems that are designed to meet their needs. The final report from the Commission will provide a roadmap for policymakers, health systems, healthcare workers, funders, diabetes advocates, and researchers to improve the outcomes for people with type 1 diabetes. Education and training for people with type 1 diabetes, their caregivers and health professionals are an essential component of the services needed for ensuring the best outcomes in type 1 diabetes and thus will be explored in depth within the Commission Report.

In trying to fill the gap in identifying practical solutions for improving education of people with type 1 diabetes the WDF and Lancet Diabetes & Endocrinology Commission on type 1 decided to explore the projects funded by the WDF which included a component of education for people with type 1 diabetes. Using the COMPAR-EU framework which has as its aim to develop a list of key components for patient self-management for chronic diseases to assist in the development and evaluation of such interventions,[18] this report has as its aim to document the lessons learnt from a unique set of experiences from WDF-funded projects. Using this framework will enable the examples of the WDF-funded projects to be integrated into the findings and recommendations of the Lancet Diabetes & Endocrinology Commission on type 1 diabetes.

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Methods and Approach

Study design

A documentary review was conducted with the aim to describe WDF-funded projects that had an education component focused on people with type 1 diabetes.

Sources

Data was extracted from project documents accessed through the WDF's Case Management System database, including applications (project proposals), technical assessments and project reports. In some cases, technical assessments were not available (n = 8), whereby only applications (project proposals) and reports were reviewed.

For completed projects data was collected through project completion reports, whereas the most recent progress report was used for ongoing projects.

Inclusion criteria

The scope of this report was to review WDF's entire portfolio of patient education projects which had a focus on type 1 diabetes. Therefore, no time limits were set as inclusion criteria, and both ongoing and completed projects were included for review. Projects that had a dedicated education component targeting people with type 1 diabetes and individuals of immediate importance to their self-management behaviours (e.g. family, teachers, Healthcare Professionals: HCPs, etc.) were included for review. Meanwhile, projects that focused on people with type 2 diabetes as their main target group were excluded. Projects that solely focused on awareness raising activities among the general public without a specific focus on patient education and self-management behaviours were excluded. Projects aiming to promote diagnostics and access to care without an educational component were further exluded from review.

Selection of projects

An initial pool of projects was identified for review through a three-step process.

An internal WDF report of all Type 1 diabetes projects between 2002 and 2020 was initially used to identify relevant projects from 2002-2020[19]

Additional projects were subsequently identified by applying filters via tags in the WDF Case Management System database. Tags applied included 'T1DM', 'type1', 'type 1' and 'children'. This enabled the identification of projects from 2020-2025. Projects identified in step one were further compared with the results that appeared from the database, ensuring that all relevant projects from 2002-2020 had been identified

Lastly, WDF Programme Managers were consulted and presented with all identified projects from step one and two to ensure that all relevant projects were accounted for

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Data charting

Data charting from project documents was guided by a datasheet in Excel, which was developed using several frameworks. Overall, the datasheet was structured according to five overall domains: project background, intervention characteristics, target self-management behaviour, project components other than patient education and lastly outcome measurement of patient education intervention (table 2).

Table 2.

Datasheet domains

1. Project background	2. Intervention characteristics	3. Target self-management behavior	4. Project components (other than patient education)	5. Outcome measurement of patient education intervention
Project initiation; Project status; Region; Country; Partner type; Project Aim; Target population	Support technique; Delivery method; Provider type; Location; Recipient	Lifestyle related behaviours; Clinical Management; Psychological Management; Social Management; Working with care providers	Service delivery; Health workforce; Health information systems; Access to essential medicines; Financing and leadership / governance	Care perceptions / satisfaction; Adherence to self-management behaviour; Basic empowerment and patient/caregiver quality of life; Clinical outcomes; Healthcare use; Costs; Health workers' service delivery; Availability / delivery of diabetes services

The ***project background*** domain included data such as the year of project initiation, project status (e.g. completed or ongoing), region, country, partner type (e.g., university, diabetes association, Ministry of Health (MoH), etc.), project aim and target population.

The domains ***intervention characteristics*** and ***target self-management behaviour*** were structured in accordance with the COMPAR-EU taxonomy[18] and described how each project approached the provision of patient education. Hence, data was extracted covering the following sub-domains of intervention characteristics: self-management support technique, support delivery method, provider type, location and recipient. Target self-management behaviour was further captured across the sub-domains: lifestyle related behaviours, clinical management, psychological management, social management and working with healthcare / social care providers.

The ***project components other than patient education domain*** were included to reflect that projects often addressed their aim through several different and complementary components. The WHO Health System Building Blocks[20] were used to describe the additional intervention areas that were addressed by projects in conjunction with a patient education component. This included service delivery, health workforce, health information systems, access to essential medicines, financing and leadership / governance.

Finally, the ***outcome measurement of the patient education intervention domain*** was included to reflect approaches to measuring outcomes of patient education at both an individual and organisational level. The domain was structured into sub-domains, by using and comparing indicators from the COMPAR-EU taxonomy[18] as well as WDF's indicator framework.

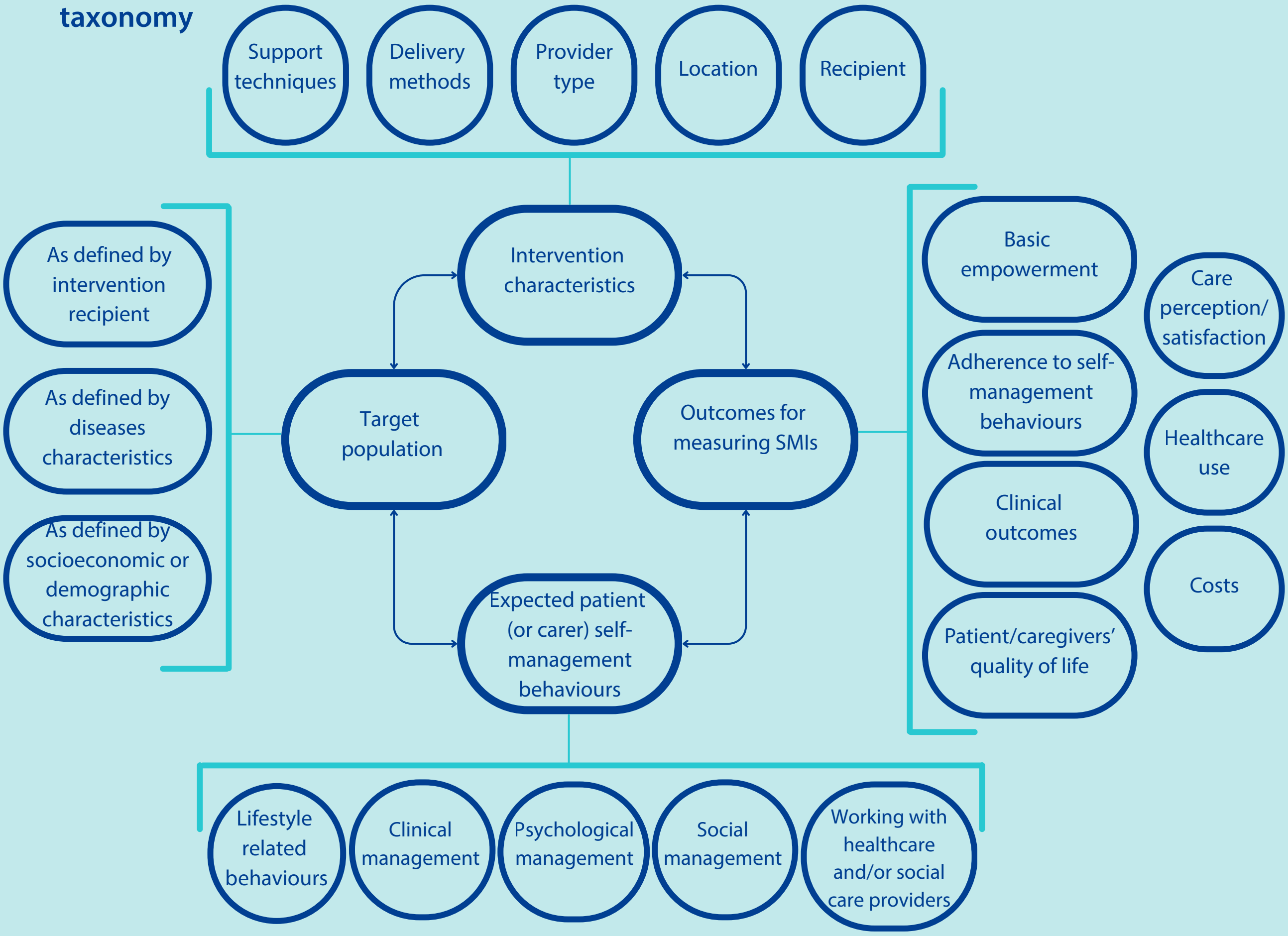
Individual-oriented sub-domains included:

- care perceptions / satisfaction (change in patient's experience of health services), adherence to
- self-management behaviour (as defined by COMPAREU; behaviours related to clinical self-management or lifestyle related),
- basic empowerment (as defined by COMPAREU; level of knowledge or health literacy, self-efficacy skills) and
- patient/caregiver quality of life (understood in the COMPAREU framework as general measures of physical, psychological, emotional, social and sexual functioning) and lastly clinical
- outcomes (according to COMPAREU, clinical outcomes include clinical markers, symptoms, complications, adverse events and mortality)

Organisational-oriented sub-domains included:

- healthcare use (change in the type and number of hospital visits, (re)admissions, etc.),
- costs (change in healthcare costs, costs for patients and societal costs),
- health workers' service delivery (change in ability to deliver diabetes services) and
- lastly availability / delivery of diabetes services (change in the availability / delivery)

Figure 1. Main components and conceptual relationships of the definitive self-management intervention taxonomy



Taken from: Orrego, C., Ballester, M., Heymans, M., Camus, E., Groene, O., Nino de Guzman, E. & COMPAR-EU Group. (2021). Talking the same language on patient empowerment: development and content validation of a taxonomy of self-management interventions for chronic conditions. Health Expectations, 24(5), 1626-1638.

Analysis

A **quantitative analysis** was conducted with the aim of investigating each sub-domain to describe the projects and determine cross-cutting elements. Project characteristics (geographic distribution of projects, starting year, project partners, and the scope using the Health System Building blocks), characteristics of the education component (content, providers, recipients, delivery methods and location) and methods for measuring outcomes were initially summarised using frequencies.

Due to the complexity and multi-faceted nature of the projects, **network graphs** were created to show the presence of more than one characteristic from the same sub-domain in a project (e.g., both lifestyle management and psychological management being addressed through a project's patient education activities). Such an analysis was conducted for the project partner and health system building block sub-domains as well as the sub-domains delivery method, educational content, providers and recipients related to the education component.

To visualize the flow of training from providers to the different recipients and the association of the different delivery methods to the locations, **alluvial graphs** were additionally created. Overall tendencies across the various domains were described. **Case studies** were additionally included to contextualise and elaborate on quantitative findings that were deemed important lessons learned.

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Results

General description of the projects

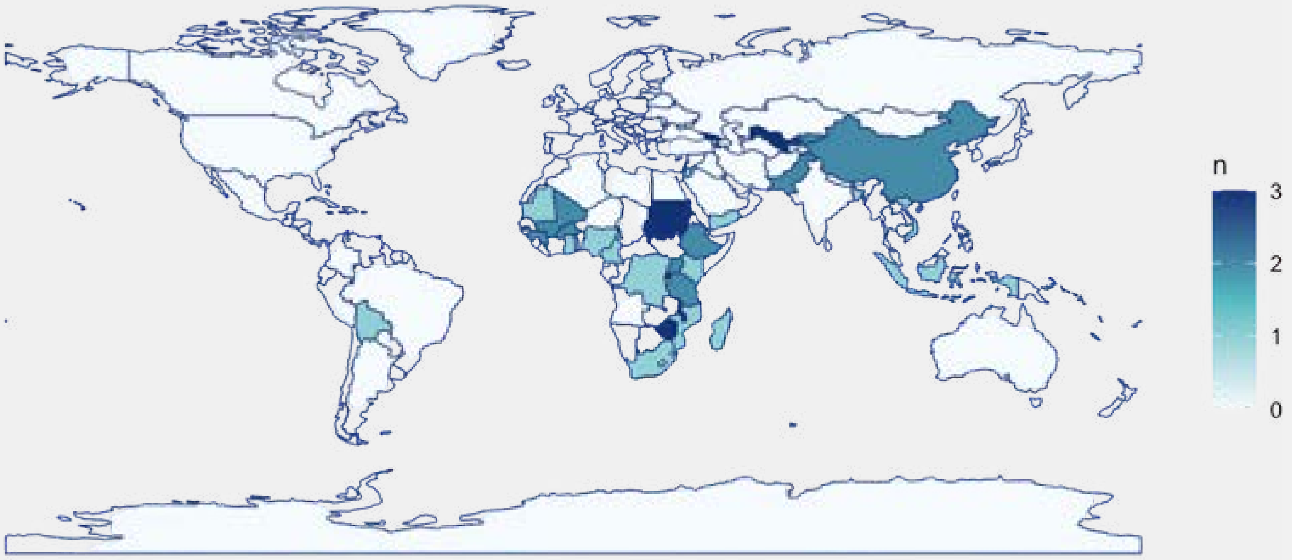
The review of the projects between August and October 2025 resulted in the identification of a total of **50 projects**[a], of which **80%** (n = 40) were completed, and **20%** (n = 10) projects were ongoing. For one of the completed projects, the project completion report was not yet available and hence the latest progress report was used instead.

Some projects had a strict focus on **type 1 diabetes**, whereas other projects delivered activities benefiting both **people living with type 1 diabetes** and **other forms of diabetes** (e.g. type 2 diabetes or gestational diabetes). Overall, **68%** of the projects (n = 34) in total focused solely on type 1 diabetes, while **34%** (n = 16) were wider in scope, allocating funding to activities benefitting multiple groups of people with diabetes.

Number of projects per country and region

The projects were implemented in **37 different countries** countries spanning over the seven IDF regions. Most projects took place in Africa (40%, n = 20 projects), followed by Middle East & North Africa (18%, n = 9 projects), Europe (16%, n = 8 projects), Western Pacific (8%, n = 4 projects), North America & Caribbean (2%, n = 1 project), South & Central America (2%, n = 1 project), and South-East Asia (1 project). (See figure 2)

Figure 2. Geographical distribution of WDF projects with a component on patient education



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[a] Covering both projects approved by the WDF Board and through fundraisers.

In the past 20 years, the number of projects funded by WDF with a component on education for people with type 1 diabetes has remained steady with minimum one project initiated yearly since 2006. (See figure 3)

Figure 3. Distribution by starting year of WDF projects with a patient education component in the past 20 years

**The size of the circles represents the number of projects that started each year.*

Project partners

The different WDF projects have had a variety of partners, with diabetes associations and governments (mainly Ministries of Health) being the most common, followed by non-profit organizations.

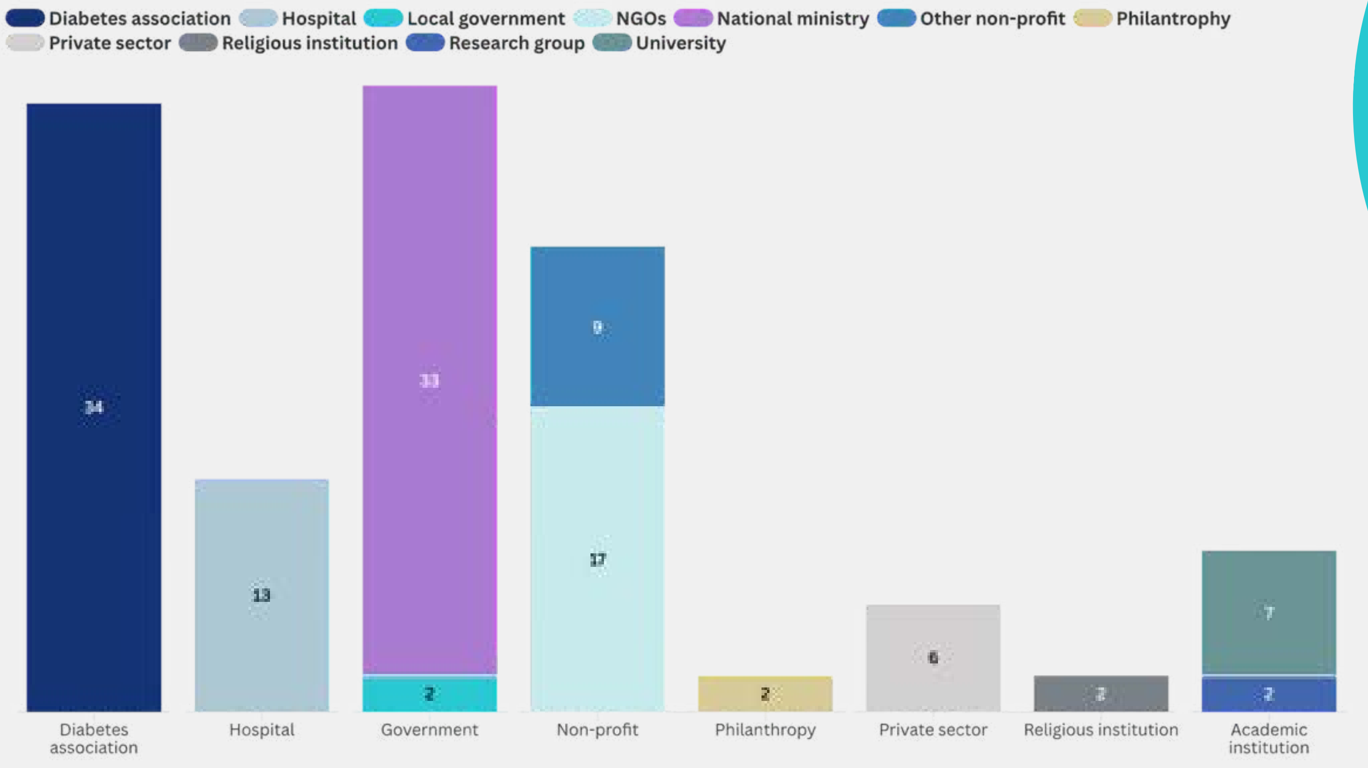
- **Diabetes associations** were classified as a separate category due to their distinct focus on diabetes compared to other non-profit partners and because they emerged as the second most frequent type of partner (n = 34 diabetes associations) that WDF engaged with on patient education projects. Meanwhile, differences were still evident between organisations in the diabetes associations category in terms of membership structure and their respective roles and responsibilities. For instance, some associations had a strong membership base of patients and caregivers, whereas others predominantly had a representation of Healthcare Professionals (HCPs). Relatedly, in some projects patient associations primarily focused on community engagement and peer-based education, whereas in other cases they engaged with healthcare system actors on service delivery and integration of patient education into clinical care.

- As for **non-profit**, the different institutions comprised NGOs, but also other non-profit organizations such as healthcare professionals' societies or international collaborations (e.g., NCD Alliance).

- **Philanthropy**, which represents private foundations, and religious institutions were the least frequent type of partner.

Figure 4 illustrates the landscape of different project partners across the various projects.

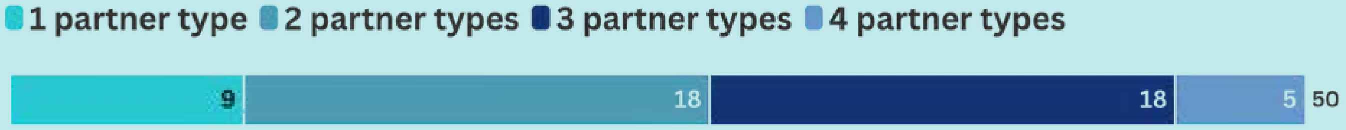
Figure 4. Project partners



**The counts do not add up to 50 because some projects have more than one partner*

Most projects involved at least two different types of partners (82%, n = 41), whereas only 18% of the projects (n = 9) were led by one partner alone. Figure 5 shows the number of partners per project.

Figure 5. Number of partner types per project



**The bar adds up to the 50 projects included in this report*

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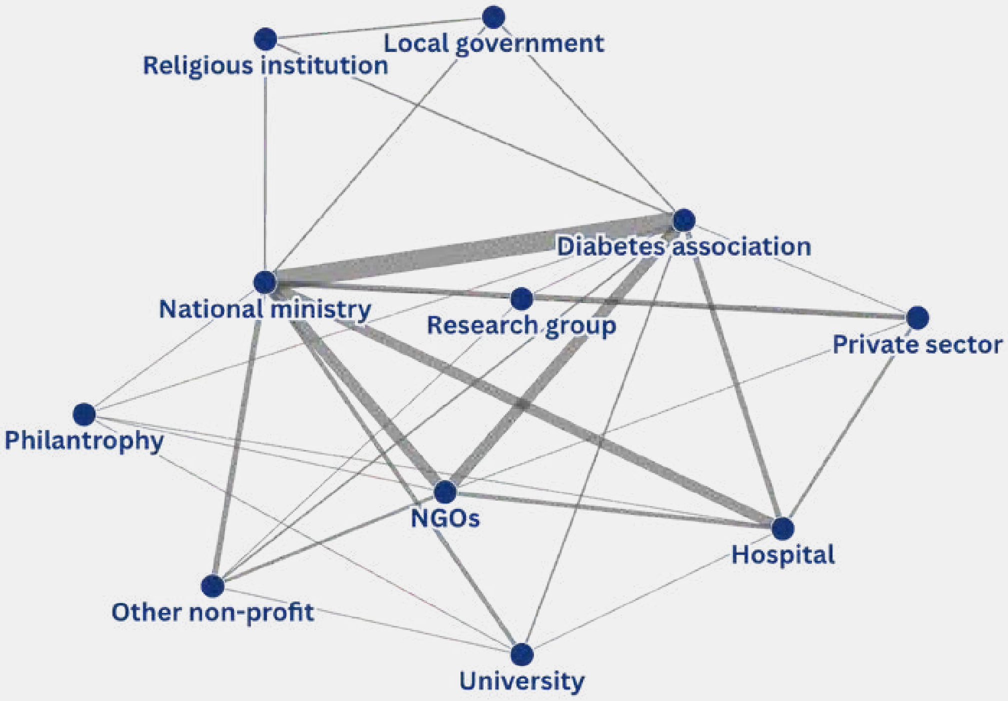
Overall, partnership constellations were centred on diabetes associations and Ministries of Health. These partners engaged a variety of actors, of which the main collaborators were NGOs and hospitals. Partners implementing projects on their own mainly included **diabetes associations** (12%, n = 6) and in single instances a **Ministry of Health (MoH)** (2%, n = 1), a **hospital** (2%, n = 1), and a **university** (2%, n = 1).

Figure 6 presents a network of the various partnership constellations seen across projects. The graph shows pairs of partners and the frequency of collaborations between them. For projects with more than two partners, the analysis was conducted by pairs of partners. For example, a project with three partners; A, B and C, would be counted three times (AB, BC and AC).

Figure 6. Network of partners in WDF-funded projects



**Each node represents a partner and the links between them represent the number of projects in which those two partners have worked together*

As exemplified in case study 1, involving a variety of partners can strengthen a project, by enabling the delivery of multiple components at various levels, while ensuring adaptation to local contexts. The constellation of the partners and division of responsibilities were further project specific, reflecting the activities and priorities within each project.

CASE STUDY 1

Country: Burkina Faso **Year of project initiation: 2019**

This national diabetes/NCD response project delivered multi-level workforce strengthening and improvements to service delivery and health information systems to enhance specialised care for people with type 1 diabetes. Patient education for children and adolescents was delivered through care pathways at hospitals as well as educational diabetes camps in local communities. Integration of diabetes/NCDs and maternal/childcare was further piloted through the development of protocols for management of hyperglycemia in pregnancy (HIP), screening and referral pathways for post-partum diabetes and a registry.

The partnership model built on co-ownership between the Ministry of Health (MoH) and a leading National University Hospital and further included an NGO, two Professional Associations (gynaecology/obstetrics and internal medicine/diabetes) and the National Diabetes Association. This constellation of partners and a clear division of responsibilities enabled adaptable, system-wide improvements in care, education and community-based support for people – especially children and adolescents – living with type 1 diabetes.

The Ministry of Health (MoH) and University Hospital jointly led the overall coordination and monitoring efforts, while advocacy, outreach and community mobilisation was driven by the NGO and National Diabetes Association. At policy-level, standards, protocols and guidelines were developed and updated by the Ministry of Health (MoH) with technical support from the University Hospital, the Professional Associations and the NGO. Across levels, Healthcare Professionals (HCPs) managing diabetes and HIP were trained in specialist diabetes care by the University Hospital and the Professional Associations. The National University Hospital further trained paediatricians and paediatric nurses in therapeutic patient education at hospital level and selected paediatricians were offered specialist training trips to a French University Hospital organised through the project.

The organisational capacity of local diabetes associations and civil society organisations was further strengthened to increase the reach and support for people with diabetes in their communities. These capacity building efforts were led by the NGO (project partner) and included training on diabetes management, advocacy, community engagement, and communication skills.

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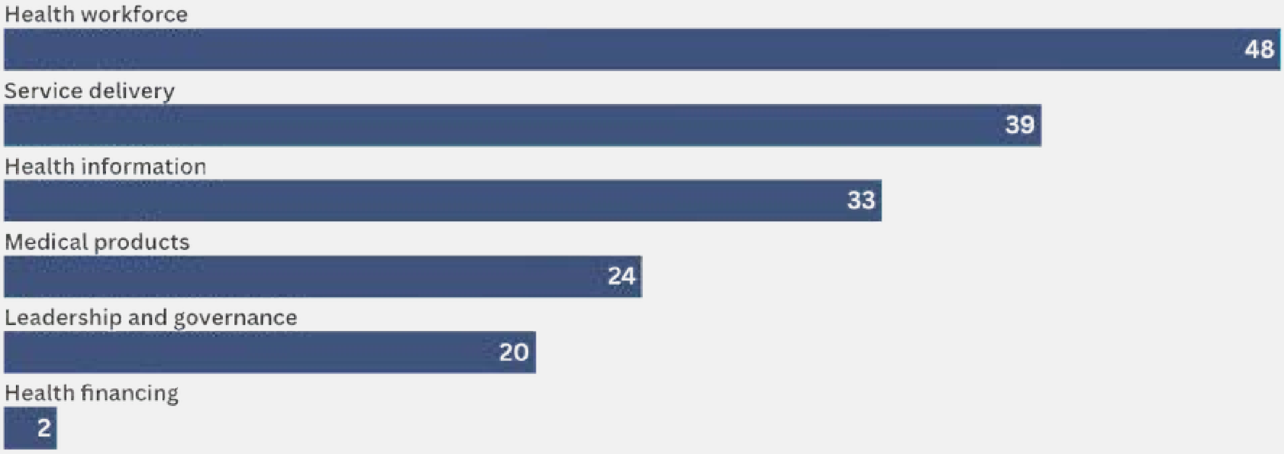
The next section will describe the scope of the projects included in this report.

Scope of the projects – WHO building blocks

Overall, WDF-funded projects with patient education activities had a broader scope, addressing different building blocks of the healthcare system[20] within the respective project countries. Across projects, the **Health Workforce** (**96%**, n = 48), Service Delivery (78%, n = 39), and **Health Information Systems** (66%, n = 33) building blocks were most frequently targeted. Meanwhile, **Health Financing** was only included in the aim of **4%** of the projects (n = 2). Figure 7 presents the different WHO Health System Building Blocks addressed within the reviewed projects.

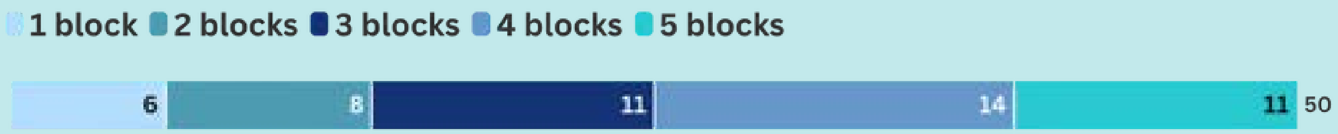
Figure 7. WHO Health System Building Blocks addressed by the projects



**The bars represent the number of projects addressing the different Health System Building Blocks out of the 50 projects included in this report*

Most projects addressed more than two of the **WHO Health System Building Blocks** (**72%,** n = 36). See figure 8 for the number of WHO Health System Building Blocks addressed by each WDF project. This shows how the different partners coordinated activities to improve the healthcare system in addition to providing patient education.

Figure 8. Number of WHO Health System Building Blocks addressed by each project

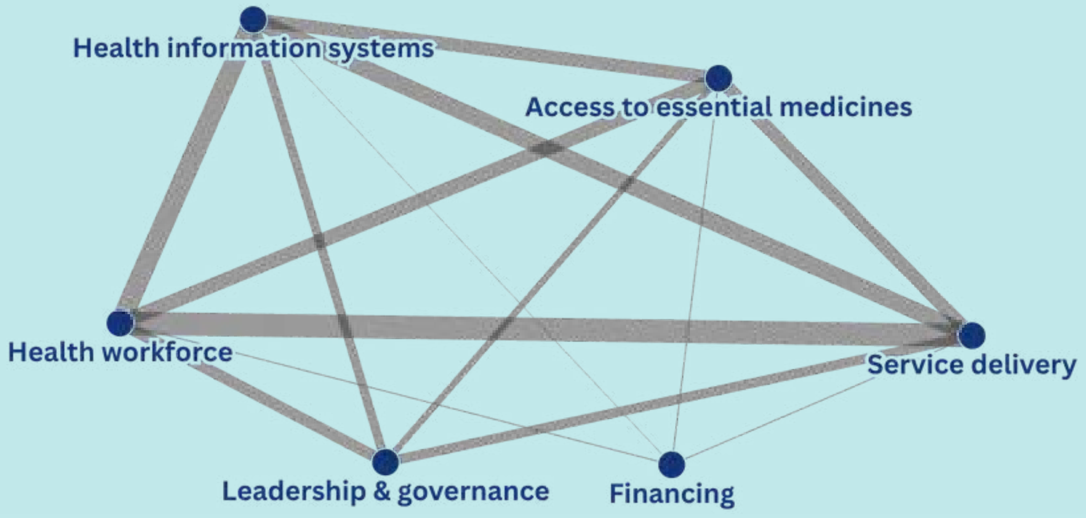


**The bar adds up to the 50 projects included in this report*

Projects primarily delivered a combination of activities, addressing either the Health Workforce or Service Delivery, and often both. Several projects (**20%**, n = 10) focused on **all building blocks except for Health Financing**. Meanwhile, other projects (**18%**, n = 9) tackled issues across **four building blocks**, namely Health Workforce, Service Delivery, Health Information Systems and Access to Essential Medicines. An additional **12%** of the projects (n = 6) focused on **three building blocks**: Health Workforce, Service Delivery, and Health Information Systems.

Refer to figure 9 for the network of WHO Health Systems Building Blocks being addressed in the different projects. The graph shows pairs of building blocks and the frequency in which the blocks are addressed together. For projects with more than two blocks, the analysis was conducted by pairs of blocks. For example, a project with three blocks; A, B and C, would be counted three times (AB, BC and AC). (See Figure 8)

Figure 9. Network of WHO Health Systems Building Blocks addressed jointly in WDF-funded projects



**Each node represents a Building Block and the links between them represent the number of projects in which those two blocks have been addressed jointly*

Hence, while all projects included an **educational component for people with type 1 diabetes**, their aims were often wider in scope, seeking the strengthening of the healthcare systems by acting on different building blocks. To achieve this, the projects encompassed different activities led by various partners. Furthermore, patient education was often delivered in conjunction with and through components such as Health Workforce and Service Delivery.

The following sections will describe in more detail how activities related to patient education were carried out across the projects as well as what and who they addressed.

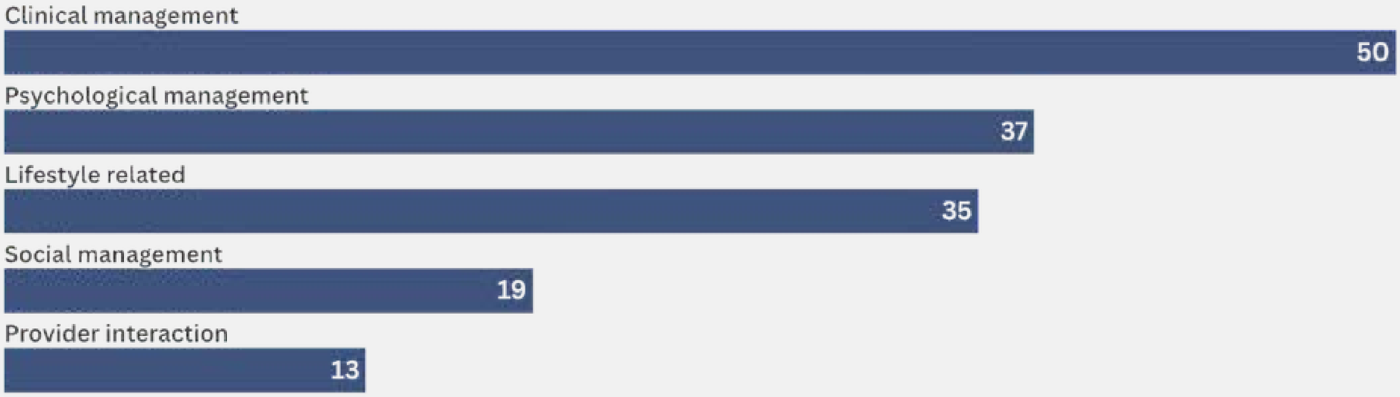
Description of the patient education component

Education component

The **COMPAR-EU framework** proposes 5 content areas to be covered when empowering people with diabetes for self-management. These content areas include clinical management, psychological management, lifestyle related, social management and provider interaction. When assessing the projects funded by WDF, clinical management was found to be addressed in all projects. Furthermore, content on **psychological management** was included in patient education across **74%** of the projects (n = 37), while **70%** (n = 35) covered **lifestyle management**. Meanwhile, **38%** (n = 19) developed content related to **social management** in their patient education activities, while only **26%** of the projects (n = 13) covered **provider interaction**. (See Figure 10).

According to the COMPAR-EU framework, **provider interaction** refers to the ability to communicate and work with healthcare and social providers to manage the condition.

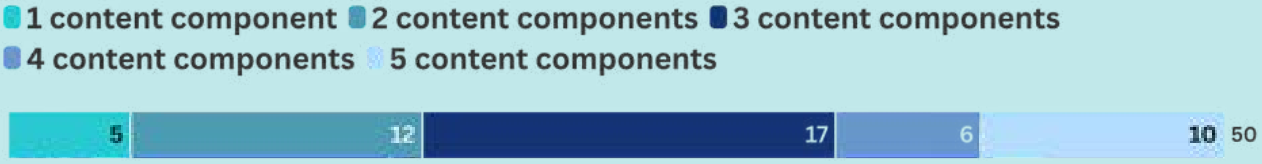
Figure 10. Educational content areas addressed in the projects



**The bars represent the number of projects addressing the different educational content areas out of the 50 projects included in this report*

As presented in Figure 11, most projects provided education on several content areas jointly; ten projects covered all five content areas (clinical, psychological, lifestyle and social management as well as provider interaction). Meanwhile, only five projects solely addressed one content area, being clinical management.

Figure 11. Number of educational content areas addressed by each project.



**The bar adds up to the 50 projects included in this report*

Most projects (**90%**, n = 45) combined **clinical management** with either **psychological management** or **lifestyle management** in their educational content, while some (**26%**, n = 13) even addressed **all three**. See graph 12 for the network analysis.

The graph shows pairs of educational content areas and the frequency in which these are addressed together. For projects with more than two content areas, the analysis was conducted by pairs of content areas. For example, a project with three types of content; A, B and C, would be counted three times (AB, BC and AC).

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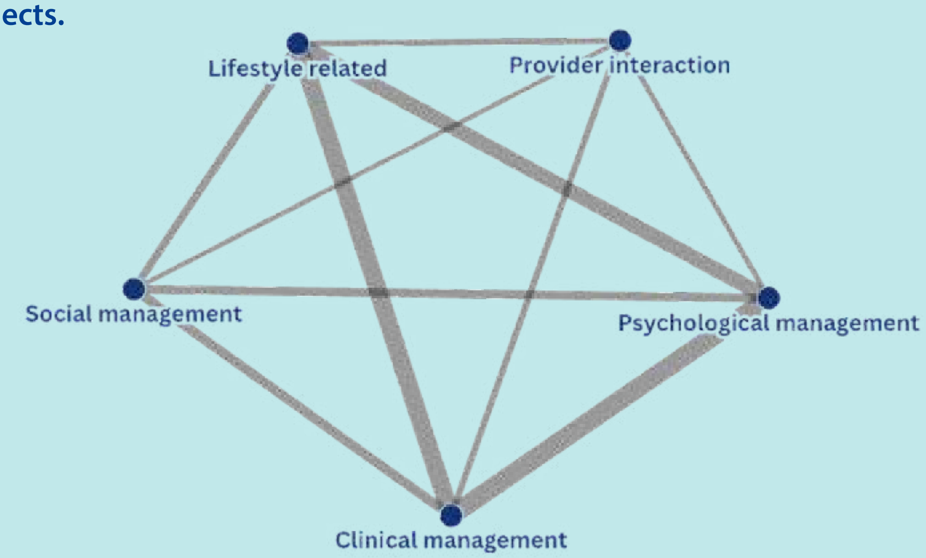
Figure 12. Network of educational content areas being addressed jointly in WDF-funded projects.



**Each node represents a content area and the links between them represent the number of projects in which those two content areas have been addressed jointly*

The specific content areas covered varied from project to project and overall aligned with the definitions proposed by COMPAR-EU[18], albeit some variance was seen.

Lifestyle management, according to the COMPAR-EU framework[18], refers not only to eating behaviours and physical activity, but also other habits such as smoking, alcohol drinking or sleeping. The projects assessed in this report did not address the later three habits, focusing mainly on education on dietary habits (e.g. carb counting, nutrition and meal planning) and physical activity (sports).

The **COMPAR-EU framework**[18] further refers to psychological management as handling and managing emotions. Relatedly, projects in this report focused on themes related to mental health, such as preventing mental health issues (e.g., depression, adjustment issues, eating disorders, etc.) as well as improving empowerment and the wellbeing and confidence among people with type 1 diabetes.

As for **social management**, COMPAR-EU[18] proposes for such content to address work-related/professional and social roles. This was evident across projects with peer-support activities that touched upon topics related to engaging in social situations or managing family relations. Additionally, some projects focused on equipping and preparing people with type 1 diabetes for working and engaging in professional work.

Across projects, content on **clinical management** included various topics such as blood glucose measurement, insulin administration and injection techniques as well as prevention of complications (e.g., retinopathy, diabetic foot).

Often projects would leverage various settings to conduct numerous activities, covering the different educational content areas. For instance, case study 2 describes a project with a strong clinical management component, which was mainly provided in a clinical setting, while content on psychological and social management was addressed with the support of peers in diabetes camps.

CASE STUDY 2

Country: Rwanda

Year of project initiation: 2020

This project supported children and adolescents living with type 1 diabetes as well as their caregivers, by strengthening self-management. The project further piloted a program to support young adults with type 1 diabetes transition from adolescence to adult life.

The project was led by the national Diabetes Association in collaboration with the Ministry of Health (MoH). Overall, the project was comprised of two components that jointly delivered comprehensive patient education, covering aspects of both clinical, lifestyle, psychological and social management as well as patient-HCP interaction.

The first component entailed specialised diabetes care services delivered at NCD clinics across district hospitals in conjunction with diabetes education. Education focused on active collaboration between healthcare teams, patients and their caregivers and self-care behaviour.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Educational topics for instance included;

- treatment options and safe use of medication
- nutritional management and physical activity
- blood glucose monitoring
- interpretation and use of results for self-management decision making
- prevention, detection, and treatment of acute and chronic complications

The second component encompassed educational diabetes camps, which particularly focused on vulnerable individuals within the target group. Hence, educational sessions were especially focused on psychological aspects of self-management, including building self-esteem and hope as well as confidence in relation to future goals. This was supplemented by interactive activities related to management of blood sugar levels, administering insulin, physical activity and nutrition.

Providers and Recipients

Across projects, patient education was delivered by **people of different background** and **qualification**, who are defined as providers in this report. Providers include both diabetes educators, healthcare professionals (HCPs) and peers / diabetes advocates, while in a few instances, project partners delivered patient education directly to recipients. The professional background and level of specialisation of healthcare professionals (HCPs) providing education varied across projects, encompassing endocrinologists, paediatricians, nurses, psychologists, dieticians/nutritionists, physiotherapists and health surveillance assistants among others.

In **56%** of the projects (n = 28) providers were offered **training and/or refresher courses**, which were predominantly facilitated by project partners and in some cases experienced healthcare professionals (HCPs) or staff from the project country's MoH.

This report further distinguishes between two types of recipients, namely **intermediary recipients** and **final recipients**. Intermediary recipients such as teachers and caregivers were trained and empowered by providers to support the education of a project's final recipients and their self-management competences. Final recipients encompass a project's target population for whom the benefits of patient education are intended.

Figure 13 presents the numerous interactions between providers, intermediary recipients and final recipients in the projects. Overall, **Healthcare Professionals (HCPs)** were the largest group of providers and delivered patient education through intermediary recipients as well as directly to final recipients. Healthcare Professionals (HCPs) mainly engaged caregivers and peers as intermediary recipients, but also enabled patient education via other Healthcare Professionals (HCPs), in addition to diabetes educators and teachers/school staff. Meanwhile, diabetes educators also provided education via peers, teachers/school staff and, most frequently, caregivers as well as directly to final recipients. As for **peers / diabetes advocates** they mainly provided education directly to final recipients, but in some instances caregivers and peers were trained to facilitate education. **Project partners** were the smallest group of providers, and they delivered education via teachers / school staff or caregivers and never directly to final recipients. Peers refer to people with type 1 diabetes who can provide education or support based on their experiences living with the condition.

Caregivers were the largest group of intermediary recipients and were primarily addressed by projects, supporting education and improved self-management among children and adolescents. Examples include caregivers receiving one-to-one counselling from doctors and diabetes educators in Pakistan, while in China caregivers attended monthly educational sessions on lifestyle management and prevention of psychosocial challenges among children and adolescents adjusting to living with diabetes. A project in Georgia further provided caregivers with access to a digital educational platform with videos, webinars and other resources. Several projects leveraged peer support with inclusion of caregivers, including in Malawi where paediatric officers led monthly patient-parent support groups combined with practical trainings using test strips and glucometers. Meanwhile, in Zimbabwe, nurses and peer diabetes educators led joint family workshops leveraging games, persuasive communication techniques and peer support. Peer-based education was also delivered through annual diabetes camps in Rwanda, bringing together children, adolescents and caregivers from vulnerable families to build self-management skills through fun and family-inclusive learning.

Caregivers were also mobilised in one project supporting education for pregnant women, bearing in mind that this group of final recipients was only targeted by a few projects. Furthermore, peers were often mobilised to facilitate education for children and adolescents but also acted as intermediaries in projects targeting caregivers as final recipients.

As could be expected, **teachers / school staff** were addressed to help educate and support children and adolescents in schools. As such, many projects did so through short trainings, seminars and presentations. In Sudan, MoH-led courses and intensive one-day sessions were delivered, while a project in Mali combined teacher presentations with the provision of classroom posters and visuals.

In Yemen, morning-assembly talks for students and courses for teachers were delivered during school visits. Most training emphasized student safety and clinical management, including blood-glucose monitoring and insulin injection techniques, although a project in Jordan specifically focused on equipping teachers to counter stigma. In Uzbekistan, trainings were extended to school nurses for hypo- and hyperglycaemic first aid and blood glucose monitoring before and after physical activity. Projects in Georgia and Pakistan further mobilised digital solutions for teachers / school staff, establishing a digital education platform (with online training videos, guidelines and webinars) and a website with educational material, respectively.

Albeit only in a few projects, both **diabetes educators** and **Healthcare Professionals (HCPs)** acted as intermediary recipients, when receiving training to facilitate patient education. Interestingly, these projects focused on building capacity among Healthcare Professionals (HCPs) and diabetes educators to improve patient education for pregnant women (please refer to case study 3) and people with disabilities, respectively – groups which were otherwise seldomly targeted by the projects included in this report.

Figure 13. Education delivery flow from providers and intermediary recipients to final recipients

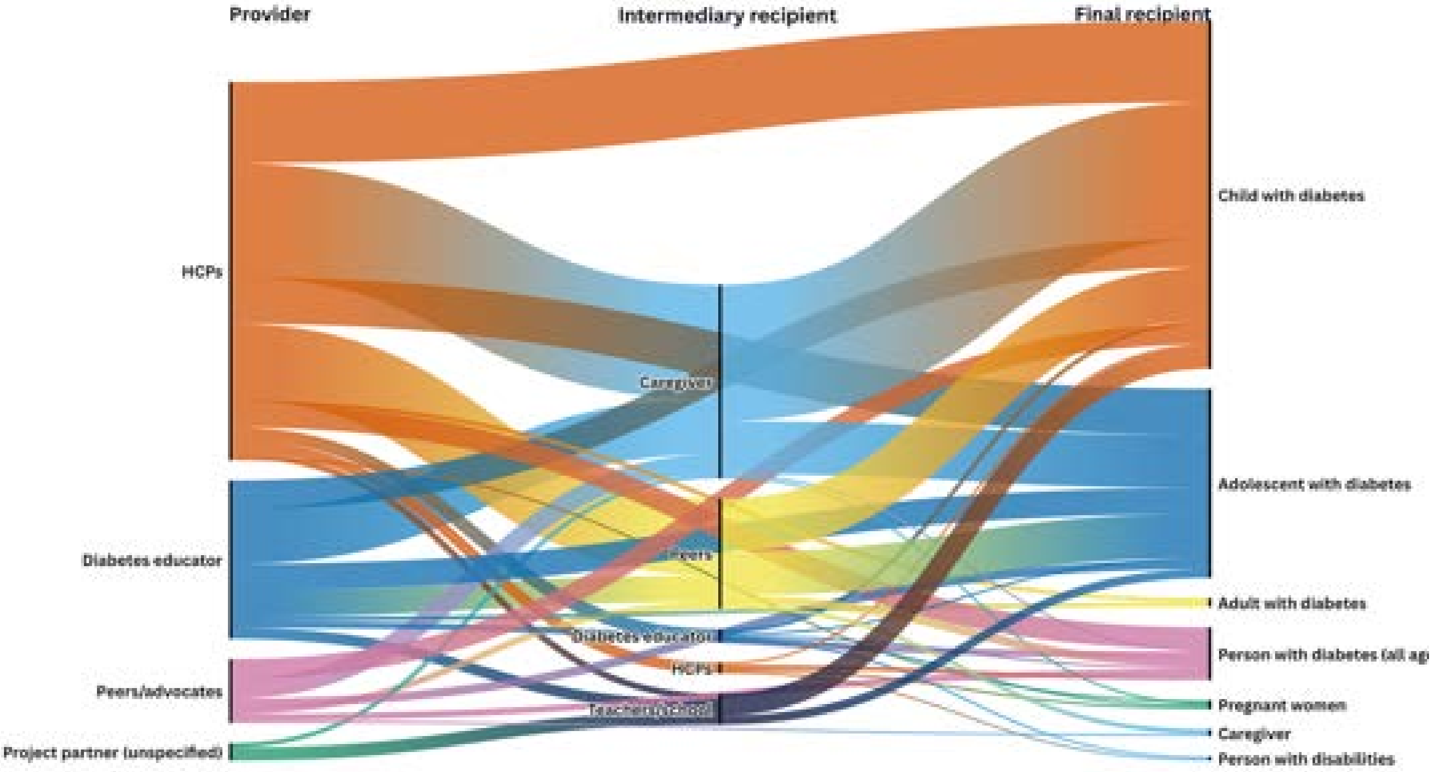


Figure 13 presents an **alluvial diagram** illustrating the relation between groups of providers, intermediary recipients, and final recipients. As described above, some providers deliver education directly to final recipients (with *no intermediary recipient*), whereas in other cases final recipients are educated via intermediary recipients.

The following section will further elaborate on the various groups of final recipients, intermediary recipients, and providers as well as their combination within projects.

Final recipients

Most projects (**90%**, n =45) had either **one or two groups as their final recipients**, of which 42% of the projects (n = 21) had only one final recipient and 48% (n = 24) had two groups as final recipients. In addition, 8% (n = 4) had three groups as final recipients, while a single project had four groups as final recipients.

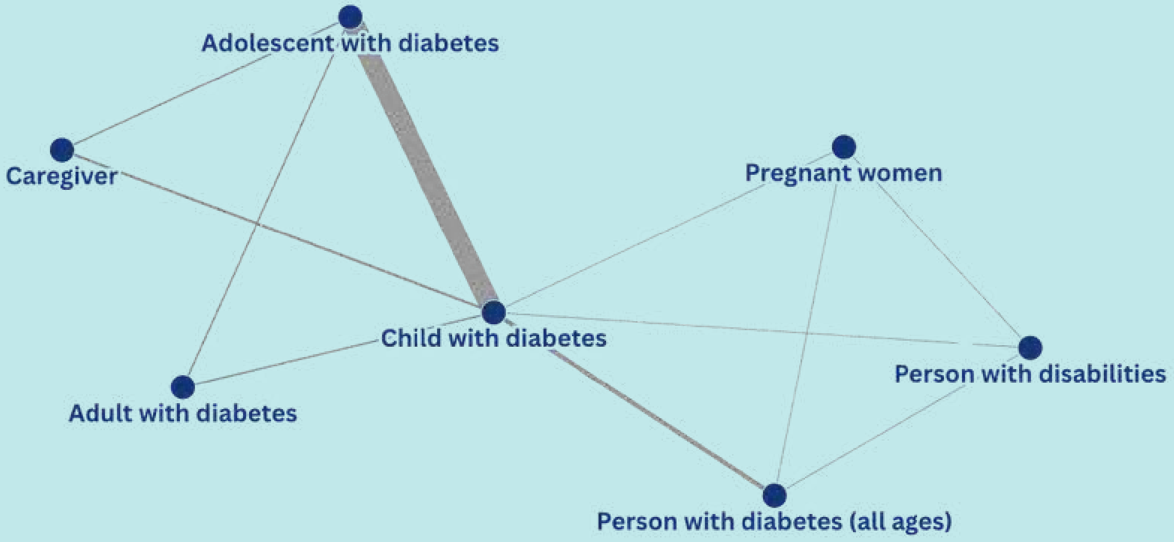
Projects with **one final recipient** mostly had **children** (**24%**, n = 12) as their sole target group, whereas only **4%** (n = 2) had **adolescents** as their sole target group. One project focused solely on pregnant women as their final recipient (please refer to case study 3). Furthermore, 12% of the projects (n = 6) addressed people with type 1 diabetes as a collective group, delivering education to all recipients without distinction based on age.

For projects with **two groups** as final recipients (48%, n =24) the most common combination was **adolescents and children** with **38%** of the projects (n = 19) targeting these groups through various interventions. Also, **8%** of the projects (n = 4) had a combination of **children and patient of all ages** as final recipients, delivering both dedicated interventions to children as well as interventions of broader relevance to patients of all ages. Finally, one project had children and caregivers as their final recipient.

Projects with **three groups** of final recipients (**8%**, n = 4) encompassed two projects that distinctly targeted **children, adolescents and adults** as well as two projects targeting **adolescents, children and caregivers**. One project additionally focusing on both pregnant women, children, patients of all ages and people with both type 1 diabetes and disabilities as their final recipients.

The combinations of final recipients are further shown in Figure 14. The graph shows pairs of **final recipient types** and the **frequency** in which these are targeted together. For projects with more than two types of final recipients, the analysis was conducted by pairs of types of final recipients. For example, a project with three types of final recipients; A, B and C, would be counted three times (AB, BC and AC).

Figure 14. Network of final recipients in WDF-funded projects.



**Each node represents a final recipient and the links between them represent the number of projects in which those two final recipients have been targeted jointly*

CASE STUDY 3

Country: China **Year of project initiation: 2015**

The project was led by a University Hospital and national Diabetes Association with an aim to prevent adverse diabetes-related pregnancy outcomes in women with T1DM by training Healthcare Professionals (HCPs) and patients in the management of T1DM before and during pregnancy in China. Patient education was central to the project, with content carefully tailored to the unique needs of women of childbearing age and those already pregnant.

Education was delivered through a multi-layered approach. First, a nationwide network of 20 pregnancy centers was established across 16 regions, ensuring that women could access specialized care locally. These centers provided structured training sessions where pregnant women and their families learned about blood glucose monitoring, insulin management, nutrition, and the importance of preconception care.

To reach a wider audience, the project developed high-quality education materials, including an app, establishing multidisciplinary lecture groups and conducting needs assessments of patients and health care providers, and micro-courses specifically focused on pregnancy in T1DM. These resources were distributed both in print and digitally, ensuring accessibility regardless of location. The Tangtangquan smartphone app was a key innovation, offering continuous access to professional guidance, interactive modules, and reminders. This digital platform allowed women scattered across China to receive consistent education and support, bridging gaps caused by geography and limited face-to-face opportunities.

The capacity building in T1DM management during pregnancy cascaded impact from top level hospitals to lower-level hospitals through a Trainer-of-trainers approach and the distribution of live broadcast education sessions. More importantly, the project recognized the role of family support. Parents and partners were included in training sessions, reflecting cultural values and ensuring that women had a supportive environment for managing their condition during pregnancy.

Through this tailored education model, more than 1,000 women of childbearing age gained awareness of planned pregnancy and diabetes management, while 315 pregnant women were effectively managed during gestation, with no adverse diabetes-related pregnancy outcomes reported. The program demonstrated that combining in-person training, family involvement, and digital tools can significantly improve pregnancy outcomes for women with T1DM.

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Intermediary recipient

Most projects (**80%**, n = 40) had either one or two intermediary recipients, of which **28%** of the projects (n = 14) had only **one intermediary recipient** and **52%** (n = 26) had **two groups of intermediary recipients**. In addition, **12%** (n = 6) had **three intermediary recipients**, while the remaining **8% (**n = 4) **did not address intermediary recipients** to deliver patient education to their final recipients. Overall, this signifies the importance of considering and including the social networks and relations held by people with diabetes, when delivering patient education.

Caregivers appeared most frequently as intermediary recipients in the various projects (**80%**, n = 40) both as the **only intermediary recipients** in projects (**20%**, n = 10) as well as in **combination** with other intermediaries. Of such combinations, projects commonly addressed both **peers** and **caregivers** (**42%**, n = 21) as well as peers, caregivers and teachers/school staff (10%, n = 5). Overall, caregivers were considered important for facilitating the delivery of patient education across projects – especially in the many projects that had children and adolescents as their final recipients. However, as described above, caregivers were seldomly addressed as the final recipient. As such, only **6%** of the projects (n = 3) delivered **educational interventions** with the distinct purpose of benefiting **caregivers** and improving their **well-being** (please refer to case study 4 for more details about these projects).

CASE STUDY 4

Countries: Bangladesh and Kyrgyzstan

Years of project initiation: 2009 (Bangladesh) and 2016 & 2020 (Kyrgyzstan)


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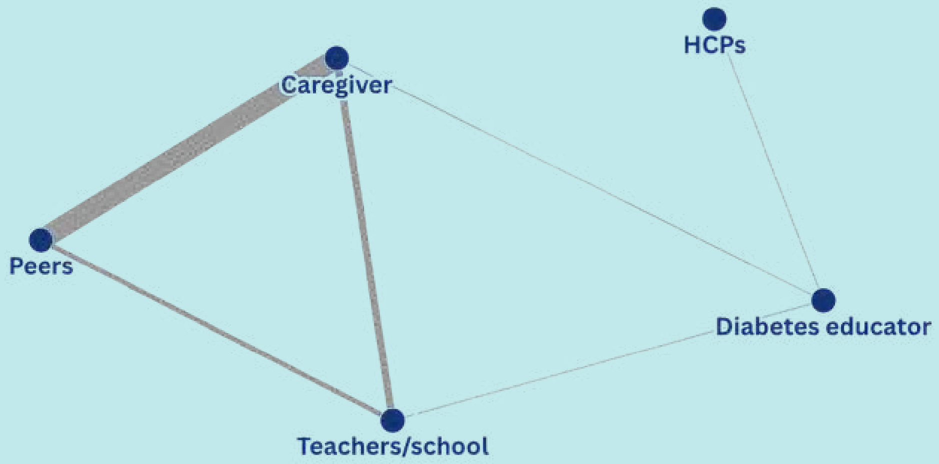
Three projects - one in Bangladesh and two in Kyrgyzstan - combined education for children and adolescents with explicit support and empowerment for caregivers, addressing their well-being through peer-based activities.

In Bangladesh a national diabetes association helped strengthen the infrastructure for detecting, diagnosing and managing children with type 1 diabetes, while delivering joint patient-and-caregiver education through local-language materials, audiovisual sessions, practical demonstrations and group discussions. Annual diabetes camps additionally combined learning with fun and engaging activities for children, while caregivers were offered counselling and peer-support forums were arranged to enhance psychological management among caregivers through sharing of experiences and coping strategies. In Kyrgyzstan two sequential projects, both led by a national diabetes association and a parent-led NGO, focused on capacity-building and empowerment of caregivers. The first project established diabetes schools for children and adolescents, while community resource centres hosted parent clubs offering peer support as well as information and seminars on the care and rights of their children. Selected parents were trained as peer-trainers to lead support groups, which in addition to being a space for sharing experiences also included activities such as income generation, fundraising and tender participations. Relatedly, a self-activation survey showed increased empowerment and confidence among caregivers, who helped other caregivers through peer-groups. Building on the first project, the subsequent project in Kyrgyzstan continued efforts to create a supportive environment for caregivers, while facilitating peer-based education on diabetes at the resource support centers. The project further extended the educational offering through a digital mobile application, providing information on clinical management, while enabling monitoring and online consultations for caregivers.

In addition to caregivers, projects often included **peers** as intermediary recipients (**60%**, n = 30). Most commonly, **peers** were addressed as intermediaries in combination with **caregivers** (**42%**, n = 21), while figuring as the sole intermediary recipient in only three projects. The remaining **12%** of the projects (n = 6) had **peers** as an intermediary recipient in combination with teachers/school staff (2%, n = 1), and **caregivers** and **teachers/school staff** (**10%**, n = 5). Overall, **teachers/school staff** appeared as intermediary recipients in **ten projects**, facilitating patient education for children and adolescents, while always featuring in combination with other intermediaries. Lastly, **Healthcare Professionals (HCPs) and diabetes educators** featured as intermediary recipients in three and two projects respectively. The combinations of intermediary recipients are additionally visualised in Figure 15.

Figure 15. Network of intermediary recipients in WDF funded projects



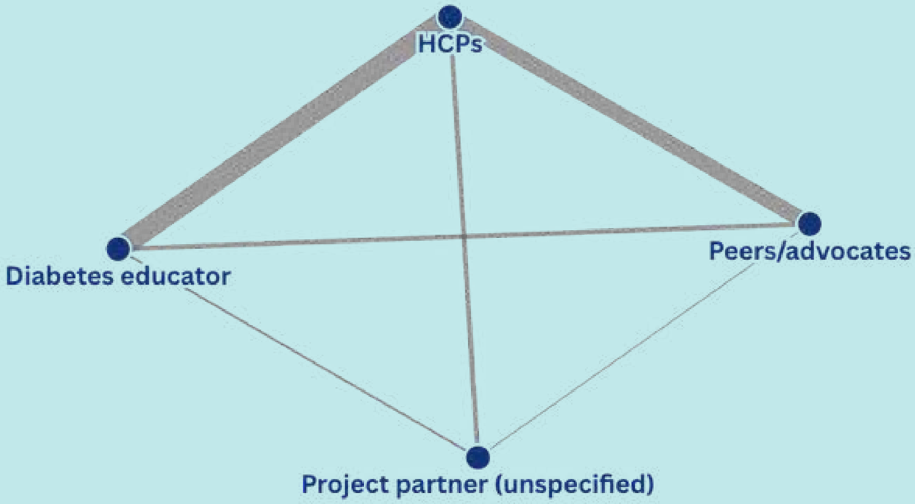
**Each node represents an intermediary recipient and the links between them represent the number of projects in which those two intermediary recipients have been targeted jointly*

Providers

Regarding providers, most projects (**86%**, n =43) had either one (**44%**, n = 22) or two providers (42%, n = 21). In addition, seven projects had three providers.

Overall, Healthcare Professionals (HCPs) acted as providers of patient education in all projects except for two (96%, n = 48). **40%** of the projects (n = 20) had **Healthcare Professionals (HCPs)** as the sole provider of patient education, while **24%** (n = 12) mobilised both **Healthcare Professionals (HCPs) and diabetes educators** in the delivery of patient education and **16%** (n = 8) mobilised **Healthcare Professionals (HCPs) and peers/advocates**. Additional constellations of providers with Healthcare Professionals (HCPs) included **HCPs, peers/advocates** and **diabetes educators** (**8%**, n = 4), **HCPs, diabetes educators and project partners** (**4%**, n = 2), **HCPs, peers/advocates** and **project partners** (**2%**, n = 1) as well as **HCPs and project partners** (**2%**, n = 1). Moreover, **diabetes educators** served as providers in **40%** of the projects (n = 20), most frequently in combination with other providers (e.g., Healthcare Professionals (HCPs) and peers/advocates) and in the instance of two projects as the sole provider of patient education. Lastly, **peers/advocates** supported educational efforts as providers in **26%** of the projects (n = 13), yet always in combination with other providers. The combinations of providers are displayed in Figure 16.

Figure 16. Network of providers in WDF funded projects



**Each node represents a provider, and the links between them represent the number of projects in which those two providers have worked together to provide education to the different recipients*

Delivery methods and location

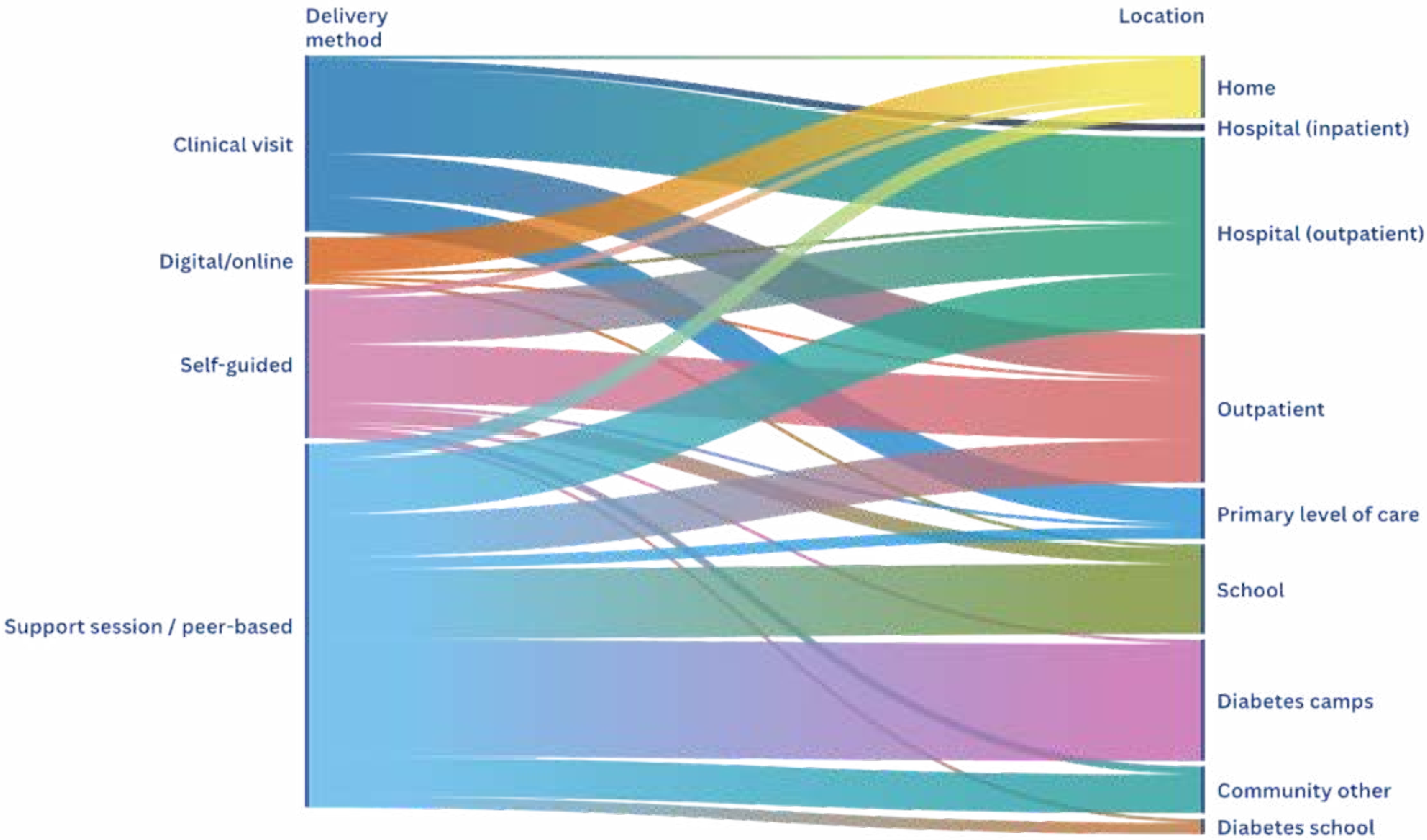
Delivery method refers to the way the patient education was delivered to the final recipients. The different delivery methods include **in-person methods** such as clinical visits or support session/peer-based, as well as **digital/online** and **self-guided methods**.

For this report, **clinical visits** are defined as counselling or education sessions provided to people with diabetes in a clinical setting (e.g., hospital, outpatient clinic, primary care facility, etc.). **Support session / peer-based** entail group sessions, which are either led by a peer educator or where participants can exchange and share experiences with peers. Self-guided delivery method refers to the provision of educational materials to be reviewed by recipients by themselves. As will be elaborated on in this section, **in-person delivery methods** were most frequently used across projects included in this report.

Location refers to the place where educational interventions were delivered. For this report, the locations were overall classified as clinical settings, community settings and homes – these will be discussed further in this section.

When analysing both delivery methods and locations, the most frequent mode of delivery was **support sessions / peer-based education**. Taking place in both clinical and community settings, it was found that diabetes camps and schools figured as the primary community-based locations for delivering support sessions / peer-based education. As for projects leveraging clinical visits to deliver education, **outpatient settings** (hospital and other outpatient settings) and **primary level facilities** appeared to be the most frequent locations. Projects with a self-guided delivery method often provided materials in clinical settings, while some also disseminated materials in community settings.
Please refer to Figure 17 for more information on how delivery methods and locations are related.

Figure 17. Mapping of delivery methods to intervention locations



Alluvial diagram showing the relation between **delivery methods and the **location** where the intervention is provided. Delivery methods appear on the right and locations on the left*

The following sections will present more details on delivery methods and locations across the various projects.

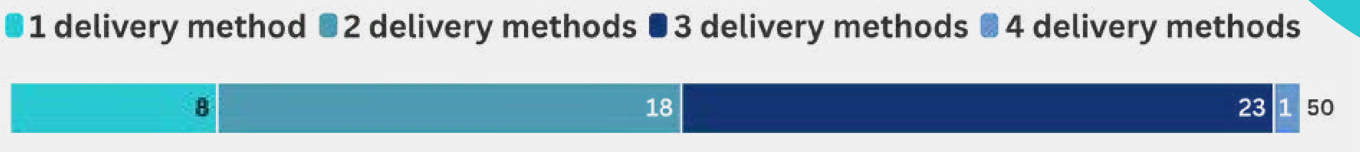
Delivery methods

Patient education was delivered in different ways, namely through support **sessions / peer-based education** (**90%**, n = 45) and **clinical visits** (**76%**, n = 38) as well as **self-guided** (**50%**, n = 25) and **digital/online** (**18%**, n = 9) methods.

Self-guided delivery methods included physical paper-based material such as booklets or information pamphlets about diabetes management that were tailored to different age groups and translated to local languages. Meanwhile, **digital/online methods** were more interactive in nature, including webinars, training videos as well as apps and web portals facilitating communication with Healthcare Professionals (HCPs) and peers. Examples were also seen where digital tools were used at diabetes camps and during peer-support sessions.

As shown in Figure 18, most projects (**84%**, n = 42) drew upon at **least two different delivery methods**.

Figure 18. Number of delivery methods used by each project



**The bar adds up to the 50 projects included in this report*

The main delivery methods were **clinical visit** and s**upport session / peer-based education**, which were frequently leveraged in combination across projects (**66%**, n = 33).

The content and structure of support sessions varied widely with some including activities focused on acquiring diabetes management skills, whereas others allowed people with type 1 diabetes to explore their relationship with the condition. For example, a project conducted in Madagascar included painting workshops to allow participants to express their needs, emotions, and challenges. Please refer to case study 5 for more details.

CASE STUDY 5

Country: Madagascar

Year of project initiation: 2014

As part of strengthening access to diagnosis and treatment, the Madagascan Diabetes Association improved the social and psychological support for children and adolescents living with diabetes through art therapy. This innovative approach to therapeutic patient education was delivered in the form of both painting and theatre workshops and were led jointly by medical teams and theatre directors and professional painters respectively. Monthly workshop themes were selected with an emphasis on the lived experience of the participants with workshops spanning over two days. Painting workshops for instance included themes on painting something that makes my diabetes balanced' and 'painting my fear of diabetes and complications', while theatre workshops focused on expressing needs, feelings, challenges and hope. Art therapy not only contributed to improving the self-confidence and autonomy among children and adolescents living with diabetes but was also shown to strengthen the relationship between patients and their family members as well as improve treatment acceptance and patient/HCP collaboration.

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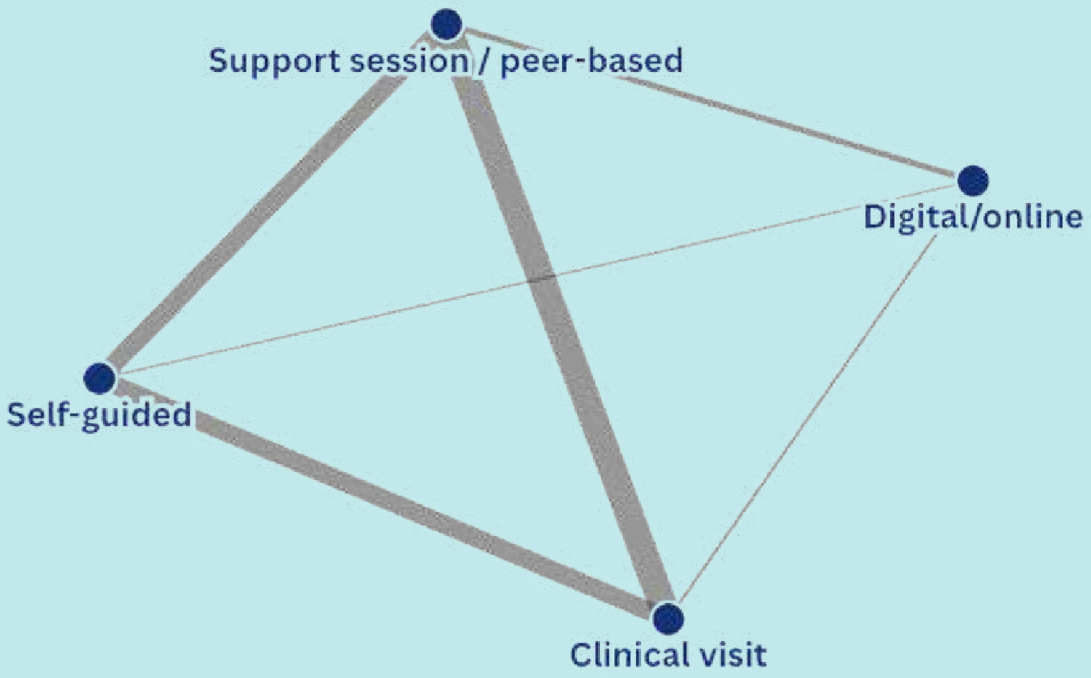
Self-guided and **digital/online methods** were always provided in combination with another delivery method and were never stand-alone.

Figure 19 illustrates how the different delivery methods were used jointly. The graph shows pairs of delivery methods and the frequency in which these were used together. For projects with more than two types of delivery methods, the analysis was conducted by pairs of types of delivery methods. For example, a project with three types of delivery methods; A, B and C, would be counted three times (AB, BC and AC).

As for **digital/online delivery methods**, projects proposed video conferences for training sessions, webinars, mobile applications for monitoring and on-distance consultations, web portals facilitating communication with providers and an educational platform, amongst others. The content of online education was always tailored to the needs of the specific recipients and their context. For instance, a project in Pakistan co-created educational material together with people with type 1 diabetes and healthcare professionals. Please refer to case study 6.

Figure 19. Network of delivery methods used jointly in WDF-funded projects



**Each node represents a delivery method and the links between them represent the number of projects in which those two delivery methods have been used jointly*

CASE STUDY 6

Country: Pakistan

Year of project initiation: 2022

This project is developing and rolling out a culturally tailored digital education platform to support self-management, improve quality of life and empower Pakistani children and adolescents living with type 1 diabetes as well as their families/caregivers. With an aim of providing inclusive and culturally appropriate educational resources, the partners – a local NGO and a not-for-profit digital education provider – are collaborating closely with local communities and various Healthcare Professionals (HCPs) through co-design consultations and user testing. Examples of digital diabetes management resources include;

- culturally specific carb counting videos,
- a 'Carb and Cals' app with images of cultural foods and portions,
- cooking videos in local languages,
- videos demonstrating testing and monitoring of blood glucose,
- diabetes stories from peers, and
- digital exercise management tools.

In addition to being accessible at home, digital resources are rolled out through different pathways, including peer support groups, diabetes camps, schools and digital diabetes education centers to reach intended users in their local communities and ensure equitable access for underprivileged families without internet in their homes.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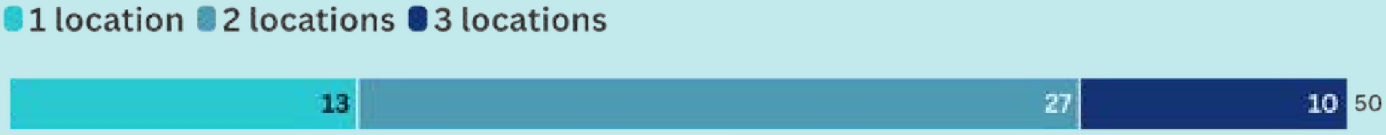
Location

Most projects (**86%**, n = 43) delivered patient education interventions in **clinical settings**, followed by **community settings** (**78%**, n = 39), and **homes** (**30%**, n = 15).
Clinical settings included hospitals and specialised centers, both inpatient and outpatient, as well as other outpatient settings and primary level facilities.
Meanwhile, community settings involved diabetes camps, schools and other community settings such as resource centres and other facilities belonging to diabetes associations, in which support sessions and peer-based education would often take place.
Please refer to Figure 20 for details on the locations included in the projects.

Figure 20. Locations intervened in the WDF projects

Most projects conducted their education activities in at least **two settings** (**74%**, n = 37), of which the combination of a **clinical and community setting** was evident in **64%** of the projects (n = 32). Meanwhile, only **nine projects** solely delivered education in a **clinical setting** and four projects only engaged in a **community setting**. (Figure 21)

Figure 21. Number of locations intervened by each project



**The bar adds up to the 50 projects included in this report*

The most common community locations were **diabetes camps** and **schools**, with **56%** (n = 28) and **38%** of the projects (n = 19) carrying out activities in these settings, respectively.

Diabetes camps varied from project to project, yet some characteristics were present across the different projects: the opportunity to exchange and share experiences with peers and the pragmatic content related to daily-life situations including sports or having a meal. The exchange with peers was central in the diabetes camps and aimed to motivate participants through role models or discussions on life goals, and to provide social support and sharing experiences around type 1 diabetes (e.g., challenges or coping strategies).

The organisers and providers of educational activities at the camps varied, often including diverse teams of healthcare professionals and/or diabetes educators. In some cases, camps were co-led by young leaders living with type 1 diabetes. One project conducted camps that also involved parents of children with type 1 diabetes. This project focused on support networks, self-management, and psychological management.

Case study 7 provides lessons for diabetes camps organized in Jamaica, Belize and St. Lucia.

CASE STUDY 7

Countries: Jamaica, Belize and St. Lucia

Year of project initiation: 2011

During this three-year project, annual community-based diabetes camps were led by the Diabetes Associations in Jamaica, Belize, and St. Lucia targeting adolescents living with type 1 diabetes. These camps were organised for a week during the summer months, focusing on providing a safe and engaging environment for young people to gain independence in diabetes self-management practices.

Camp activities were centred around peer support and counselling as well as normalising life with diabetes. Adolescents participated in physical games and fun activities such as swimming, talent shows, and sessions on nutrition tailored to local diets while learning how to monitor their blood glucose levels. By operating as an extension of community support groups, which were also facilitated by the project, the camps empowered adolescents to take ownership of their health without the presence of their parents or caregivers. The combination of peer support and engaging activities related to diabetes management contributed to improved self-confidence and attitudes towards clinical management.

A unique aspect of the camps was additionally various income-generating activities, such as arts and crafts workshops where creative armbands were produced and later sold through the Diabetes Associations. The proceeds were used to subsidize camp fees and transportation for campers from vulnerable and less privileged households, ensuring inclusivity.

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Outcomes to measure the impact of patient education

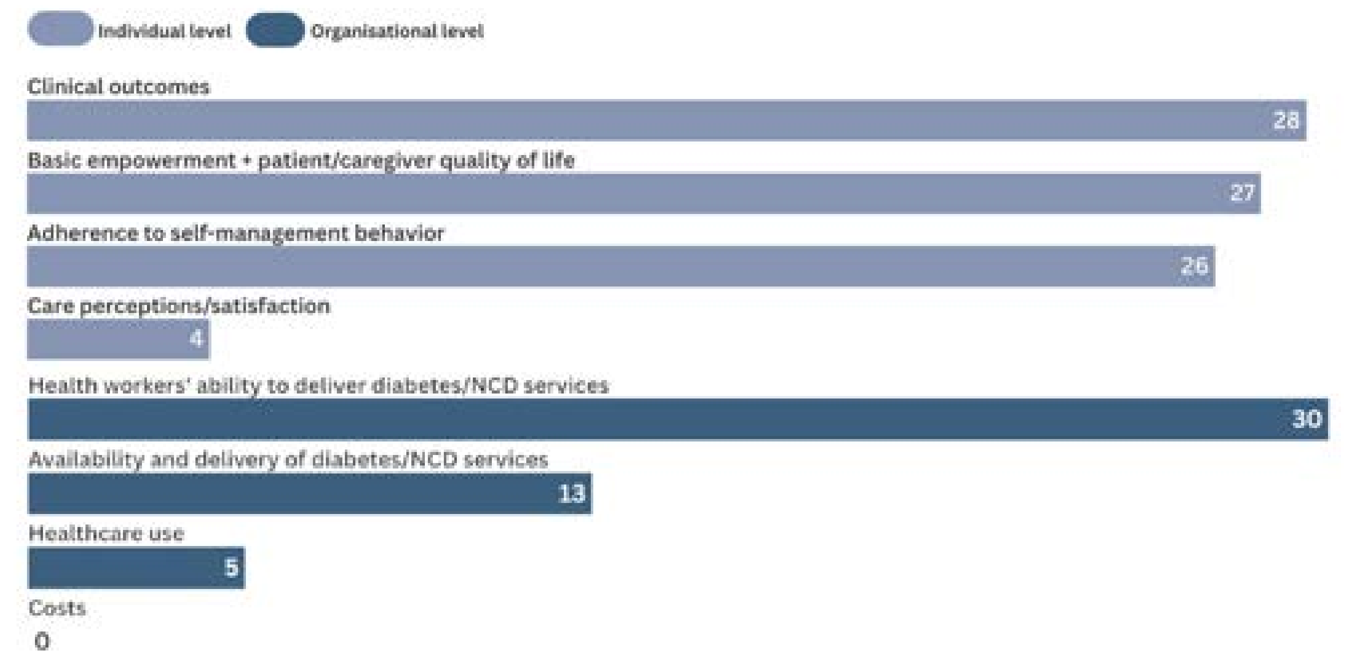
This section presents the outcomes that the projects proposed to use to measure the impact of the patient education component. Some projects (**12%**, n = 6) did not carry out an evaluation of patient education activities but instead focused on the impact of other components of the project.

The projects proposed to measure a mixture of **individual** and **organisational level outcomes**, prioritising the individual-level outcomes were most frequently used for evaluation. Please see figure 22 for details on the outcomes.

At the **individual level**, clinical outcomes (56%, n = 28), basic empowerment (54%, n = 27), and adherence to self-management behaviours (53%, n = 26) were most frequently used for evaluation.

As for **organisational-level outcomes**, health workers' training (60%, n = 30) was the most common, whereas outcome measures of costs were not used by any of the included projects.

Figure 22. Outcomes proposed to assess the WDF projects



**The bars represent the number of projects that proposed to measure the different outcomes out of the 50 projects included in this report*

The projects included in this report, assessed a variety of indicators related to **structure**, **process**, and **outcome indicators**.

In the case of structure, the establishment of spaces to either provide education (e.g., resource canters, diabetes schools, or community support groups) or care for people with type 1 diabetes were measured together with training of healthcare professionals (e.g., physicians and nurses).

In terms of **process**, the projects measured the number of diabetes camps conducted, the number of diagnosis / outpatient consultations for people with type 1 diabetes and decentralization of care.

As for the **outcomes**, most of the projects proposed to measure either immediate (e.g., improving education, knowledge, self-management skills) or short-term outcomes. The short-term outcomes included HbA1C levels, acute complications and other clinical outcomes such as BMI, waist circumference, or blood pressure. Additionally, quality of life and diabetes distress were also proposed as outcome measures. Only a few projects assessed long-term outcomes such as complications (e.g., cardiovascular or amputations) or mortality.

Only one project conducted a **cost benefit analysis** to assess the impact of the project in terms of Quality Adjusted Life Years (QALY).

The different projects used various methods to measure outcomes including **secondary and primary data**.

Primary data was either collected through validated questionnaires (e.g., quality of life or diabetes distress), through focus groups or by conducting interviews (e.g., awareness, empowerment or attitudes such as willingness to disclose diabetes at schools). Secondary data came from routine data collected by the healthcare system or patient registries.

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Discussion

The aim of this report is to extract **key lessons** on how education for people with type 1 diabetes is delivered using the experience of the different projects implemented by the WDF. This report, in using the experience of **50 projects implemented across 37 different countries** in seven IDF regions, adds to existing knowledge in providing unique insight into the delivery of education of people for type 1 diabetes.

The present report focuses on projects with a component on **education for people with type 1 diabetes**. The activities related to patient education were conducted in conjunction with interventions on Service Delivery and Health Workforce. However, it was found that several Health Systems Building Blocks were being simultaneously targeted in the different projects. As an example, 10 projects addressed all blocks but financing. This suggests that education is viewed as one among different activities that need to be conducted to improve care for people with type 1 diabetes in these settings. The decision on which blocks to address and what activities to conduct should be based on a needs assessment and decided by the different project partners.

Collaborations between different partners is important when implementing these projects. A variety of partners are included in the process in delivering the multiple components at various levels, while ensuring adaptation to local contexts. The **constellation of partners** and **division of responsibilities** were project specific, reflecting the activities and priorities within each project, and the overall environment.

Case study 1 provides an example on how different partners work together to deliver a multi-component intervention in Burkina Faso. For this project, there was co-ownership of the activities by the Ministry of Health (MoH) and the National University Hospital who led the project. This configuration of partners allowed for changes at the policy level (e.g., development of standards, protocols and guidelines) and implementation of the documents at the clinical level (e.g., training of Healthcare Professionals (HCPs) on management of type 1 diabetes and patient education). In addition, an NGO and the diabetes associations worked at the community level to improve reach and support to people with type 1 diabetes.

The most common constellations of partners included the **Ministry of Health (MoH) and Diabetes Associations**. Even when out of the scope of this report, it could be interesting to assess the role of the Ministry of Health (MoH) in the different projects and how its involvement has impacted policy and sustainability of the activities in the different settings. This is particularly relevant when considering that the projects are limited in time and that integration within ongoing NCD programs could ensure sustainability of the type 1 diabetes activities.

The next section will describe the analysis using the **COMPAR-EU framework components**: expected self-management behaviors or educational content, target population, intervention characteristics, and outcomes.

Educational content

Regarding the topics covered in the education interventions, **clinical management** was present in all the projects, followed by two thirds of the projects that included **psychological management** and **lifestyle related topics**. While less than half of the projects addressed social management and provider interactions.

Across projects, content on clinical management was rich and included various topics such as blood glucose measurement, insulin administration and injection techniques as well as prevention of complications (e.g. retinopathy, diabetic foot). Even when **clinical management** is key for type 1 diabetes care, to empower people with type 1 diabetes, patient education should also address other dimensions, such as **psychosocial** and **relational**, corresponding to the needs, life-stages, resources and contexts of its recipients. Hence, educational content for a person with type 1 diabetes should have a strong **clinical management** component, coupled with lifestyle, psychological and social management.

The **COMPAR-EU framework**[18] refers to **psychological management** as handling and managing emotions. Relatedly, projects in this report focused on themes related to **mental health**, such as preventing mental health issues (e.g., depression, adjustment issues, eating disorders, etc.) as well as improving empowerment and the **wellbeing and confidence** among people with type 1 diabetes. Seeing as type 1 diabetes impacts people across the life course **tailored education** is needed to address the social management of type 1 diabetes and the COMPAR-EU[18] proposes for such content to address work-related/professional and social roles.

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Social aspects were tackled across some projects with **peer-support activities.** These activities touched upon topics related to engaging in social situations or managing family relations. Additionally, some projects focused on equipping and preparing people with type 1 diabetes for working and engaging in **professional work**.

Case study 2 presents a project conducted in Rwanda where two components: 1) clinical setting activities focused mainly on clinical management, and 2) diabetes camps focused on practical examples on clinical management, lifestyle-related aspects including physical activity and nutrition, and psychological support was provided to the participants. This case shows the importance of intervening in different settings and using different methods to adequately provide educational content oriented to the need of the people with type 1 diabetes. To tailor the educational content, clearly identifying the target population is the first step.

Education delivery flow: how education reaches the target population?

The **COMPAR-EU framework** explicitly details the target population in terms of who is the **intervention recipient** (e.g., patients or caregivers), but this population is also described in terms of **disease characteristics** (e.g., time of diagnosis, disease severity, comorbidity and multimorbidity) and **socioeconomic characteristics** (e.g., socioeconomic status, cultural group, health literacy, digital literacy, sex or gender, age and living situation).

To identify the different **educational needs**, some studies have taken a life course approach,[21] and some have delivered differentiated educational offerings according to the stage of a person's diabetes pathway focusing on initial versus ongoing educational needs[22,23]. It appears that, in the WDF projects, the approach was mainly based on **life stages**, with most of the projects focusing on children and adolescents. Thus, there is a gap in terms of diabetes education in other life stages, namely adults and older adults. Moreover, we could not identify a clear distinction between the content provided at different disease stages (e.g., just after diagnosis, follow-up, when complications appear, etc.). Developing an initial list of topics to cover and manuals for diabetes education considering both life stages and moment of the disease could be promoted by WDF to provide a framework for future projects.

Additionally, this assessment identified an **education delivery flow** with different moments of education from providers to intermediary and final recipients. This means that, to reach the final recipients who are often children and adolescents, the WDF projects go mainly through **caregivers, peers,** and **teachers and schools**. It is interesting to note that, COMPAR-EU does consider caregivers as target populations, but in the WDF projects, they were approached as intermediaries recipients to be able to provide care for children and adolescents. However, caregivers are subjects who need education and support for themselves to be empowered and to better care for their patients. In case study 4, we present an example of how caregivers could be approached as final recipients. The project in Bangladesh proposed training for parents of children with diabetes to provide support to other parents. This model could be used in other settings to help wellbeing of caregivers too.

Finally, with **aging populations** in the countries where WDF is active, the development of educational models tailored to adults and older adults becomes an imperative. Different aspects would need to be considered such as what events will these populations face and what needs will arise (e.g., work-related/professional roles, pregnancy or multimorbidity), and the increasing level of dependency that comes with aging. Thus, future WDF projects should identify who takes the role of caregivers in these settings and develop **educational interventions** for both people with diabetes and their caregivers.
Other intermediary recipients were **peers**. Working with patient associations and peers to provide education was important in the WDF-funded projects. These projects leveraged on peers' experiences to provide education and support for people with type 1 diabetes including both clinical and community settings.

In the next section, the settings and delivery methods used in the WDF projects will be discussed.

Intervention characteristics: delivery methods and location

A variety of **delivery methods** and **settings** were present in the different projects, with support sessions / peer-based education being the most frequent mode of delivery in both clinical and community settings. As previously mentioned, intervening in different settings (clinical and community) gave the opportunity to touch on different topics using diverse approaches. Amongst the **community-based activities**, diabetes camps and schools were the most common locations for delivering support sessions / peer-based education. These settings were selected in consideration of the projects' target population, which were mainly children and adolescents.

These findings reflect that the location and method for delivery of patient education should be tailored to the needs of the people with type 1 diabetes, including the settings they find themselves in daily. Hence, while projects included in this report could be taken as models for the development of future education programs for certain groups, these models would need to be adapted to accommodate other subgroups such as adults and older adults.


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The role of support sessions / peer-based education is relevant as they provide a safe environment that promotes exchange of experiences that can facilitate the understanding of concepts related to self-management and the building of a network for social support. In this sense, some studies have identified that those participating in peer-based interventions have better clinical outcomes (e.g., glycated hemoglobin) and psychosocial outcomes such as self-steem, social support, and knowledge.[24]

Complex interventions: how to create them and what components should they have?

To address the variable needs of this population, **co-creation approaches** have been used in high income countries for development of type 1 diabetes education interventions,[25] as well as complex interventions for LMICs[26].

In looking at education in different contexts it was found that tangible and intangible elements were needed.[22] Tangible aspects include the "what", "how", and "who". The "what" focuses on the skills that people with type 1 diabetes need to develop or the educational content, while the "how" or the process of the delivery of education combines the delivery methods and settings seen in the evaluation of the WDF projects.

Additionally, the “who” refers to who is providing the education. In this review we have identified that there are different actors who can deliver the education, such as **healthcare professionals, but also caregivers or peers.**

The **intangible element** is more focused on the person delivering the education and what could be termed soft or interpersonal skills. Such intangible elements could be seen as important in addressing **psychological elements** as a person-centered approach is needed. Within the WDF-funded projects, the intangible elements should have been integrated in the **training of Healthcare Professionals (HCPs)** or other intermediary recipients (e.g., caregivers or peers), however, those details were not identified when conducting the documentary review.

Given the relevance that both tangible and intangible elements have for an educational intervention, developing manuals and actively collecting information on how this is being achieved in the WDF projects is needed.

Outcomes: measuring the impact of the interventions

The projects proposed to measure a mixture of **individual** and **organisational level outcomes**, of which individual-level outcomes were most frequently used for evaluation.

At the **individual level**, clinical outcomes, basic empowerment, and adherence to self-management behaviours were most frequently used for evaluation.

As for **organisational-level outcomes**, health workers’ training was the most common, whereas outcome measures of costs were not used by any of the included projects. As for the outcomes, most of the projects proposed to measure either immediate (e.g., improving education, knowledge, self-management skills) or short-term outcomes.

The **short-term outcomes** included HbA1C levels, acute complications and other clinical outcomes such as BMI, waist circumference, or blood pressure. Additionally, quality of life and diabetes distress were also proposed as outcome measures. Only a few projects assessed long-term outcomes such as complications (e.g., cardiovascular or amputations) or mortality.

When assessing the projects as a whole, measuring different indicators including those of structure, process and outcomes is required[27]. Many standardized tools have been developed globally, but their adaptation is needed for LMICs.

Disentangling the impact of the education intervention within a multi-component project is complex. However, measuring outcome such as those proposed by COMPAR-EU framework, could help understand the impact of the educational intervention.

In the case of **self-management interventions**, empowerment and development of self-efficacy are key to improve adherence to self-management, which in turn improve clinical outcomes and quality of life. Measuring these outcomes using **mixed methods** can help disentangle the effect of the interventions.

Given the **complex environments** many of these projects are implemented in, **implementation science approaches** could both help develop lessons learnt as well as imbed assessment within the implementation of these programs. Monitoring and evaluation of the long-term impact of the projects is an activity for the countries to conduct. The role of WDF could be of guidance in terms of what/how to measure (to be identified with both local officials and funders) and on facilitating the development and implementation of information systems that can provide this information.

Recommendation

From the analysis of the WDF projects, a few **lessons and recommendations** can be extracted which are useful in the further development, implementation and evaluation of education programs in LMICs. In terms of development there is both the need to ensure **appropriate design** of such interventions with the use of **co-creation and co-design.** Models for children and adolescents may only need slight adaptation to new contexts before implementation. However, given the gap that exists on models for patient education for other subgroups, some projects would need to incorporate a component of formative research prior to implementing activities. This formative research could use co-creation and co-design to identify needs of these subgroups as well as the best settings and ways to address their needs.

As many projects use Healthcare Professionals (HCPs) to deliver education to people with type 1 diabetes there is the need to review **how Healthcare Professionals (HCPs) are trained** in patient education and how/if it is currently incorporated in the curriculum (pre-service training). In terms of implementation of training, it could be linked to WDF support to regional **Healthcare Professional (HCPs) training projects** (continuous education) for healthcare professionals. It could be interesting for future research to assess opportunities for increased integration of patient education for people with diabetes into pre-service and continuous education training for healthcare professionals.

Aligned with this is how the education is tailored to the individual and where they are with regards to their type 1 diabetes journey. Education for a 3-year-old is different than a 23-year-old, but the education for the 23-year-old might be different if they were diagnosed at the age of 3 or recently diagnosed. Beyond this the wider **psychosocial environment** the individual operates in needs to be considered. This has an impact on how and what is delivered and by who in terms of education. For example, the **role of caregivers**. Also, certain topics such as risky habits (smoking or alcohol drinking) need to be addressed at the appropriate age, in culturally sensitive ways and use the right people to deliver this education, for example peers versus Healthcare Professionals (HCPs). In using peers or non-professionals in any education topics there is the need for training and evaluation. An especially important lesson from the WDF projects is that projects often trained intermediary recipients to ultimately deliver the education to people with type 1 diabetes.

Education should not only be to improve **clinical outcomes** but also impact a wide range of **psychosocial outcomes**. As seen in a scoping review on outcomes measured in interventions for type 1 diabetes, most studies focus on clinical outcomes, especially HbA1c[28]. In evaluating such complex interventions using implementation science frameworks could enable the different mix of elements needed to deliver such interventions to be disentangled as well as appropriate measurement of impact.[29]

- **Conduct an initial needs assessment considering all the Health System Building Blocks to understand how the educational component fits within the system.**
- **Promote co-creation of complex interventions with the participation of different stakeholders: people with type 1 diabetes, caregivers, Healthcare Professionals (HCPs), diabetes associations, and Ministries of Health (MoH) during project design.**
- **Standardize the content of diabetes education considering the target population (person with type 1 diabetes versus caregiver), the disease characteristics (moment of diagnosis, presence of co-morbidities or multimorbidity), and socioeconomical characteristics. Allow for add-ons based on the local context.**
- **Incentivize the development of projects focusing on specific subgroups for which education models have not yet been developed. For example, adults and older adults or caregivers.**
- **Support projects that propose educational activities in both the clinical and community setting. Pay emphasis on developing models for other settings such as workplace.**
- **Use an implementation science approach for planning, monitoring and evaluating. This would allow for standardized sets of outcomes to measure across projects and to get a systematic evaluation.**
- **In the specific case of education interventions, align the outcomes to already existing frameworks such as COMPAR-EU.**
- **Create a platform to allow for projects and countries to exchange and learn from each other.**

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Conclusion

Lessons from the analysis of these projects highlights that to deliver education for people with type 1 diabetes there is the need for **multiple components** addressing different **building blocks** of the healthcare system. To deliver this education there are various **combinations of delivery methods**, **locations, provider** and **intermediary recipients** involved with the aim to reach the final recipient, usually children and adolescents with type 1 diabetes. Overall, the analysis of these projects highlights both the complexity and diversity of approaches needed to deliver education for people with type 1 diabetes.

Further actions from WDF could aim to fill some gaps in patient education that are present in LMICs such as developing models for subgroups other than children and adolescents, such as **adults and older adults** living with type 1 diabetes, identifying which stakeholders would need to be involved and which settings would need to be targeted. Additionally, an effort to assess integration of WDF projects on type 1 diabetes within the **NCDs strategies** is needed to better understand **sustainability of these projects**, while building **information systems** will allow for monitoring and evaluation of the programs.

References

1. International Diabetes Federation. IDF Diabetes Atlas 11th Edition. Brussels: International Diabetes Federation, 2025.
2. Beran D, Lazo-Porras M, Mba CM, Mbanya JC. A global perspective on the issue of access to insulin. Diabetologia 2021; 64(5): 954-62.
3. Abdraimova A, Besancon S, Portocarrero J, et al. Management of type 1 diabetes in low- and middle-income countries: Comparative health system assessments in Kyrgyzstan, Mali, Peru and Tanzania. Diabet Med 2022; 39(8): e14891.
4. Atun R, Davies JI, Gale EAM, et al. Diabetes in sub-Saharan Africa: from clinical care to health policy. Lancet Diabetes Endocrinol 2017.
5. Beran D, Yudkin JS, de Courten M. Assessing health systems for type 1 diabetes in sub-Saharan Africa: developing a 'Rapid Assessment Protocol for Insulin Access'. BMC Health Serv Res 2006; 6: 17.
6. Favez L, Jungo K, Beran D. Beyond Access to Insulin: A Health Systems Approach to Managing Type 1 Diabetes. Amsterdam: Health Action International, 2019.
7. Seiglie JA, Nambiar D, Beran D, Miranda JJ. To tackle diabetes, science and health systems must take into account social context. Nature medicine 2021; 27(2): 193-5.
8. Brennan AT, Lauren E, Bor J, et al. Gaps in the Type 1 Diabetes Mellitus care cascade: a national perspective using South Africa's National Health Laboratory Service (NHLS) database. medRxiv 2025.
9. Ali L, Alhassan M. Challenges in achieving adequate glycemic control among children with type 1 diabetes mellitus in a resource-limited setting: A cross-sectional study from Sudan. Diabetes Res Clin Pract 2024; 208: 111113.
10. Katte JC, Lemdjo G, Dehayem MY, et al. Mortality amongst children and adolescents with type 1 diabetes in sub-Saharan Africa: The case study of the Changing Diabetes in Children Programme in Cameroon. Pediatr Diabetes 2021.
11. Najem S, Majaliwa ES, Ramaiya K, Swai ABM, Jasem D, Ludvigsson J. Glycemic control and complications of type 1 diabetes among children in Tanzania. J Clin Transl Endocrinol 2021; 23: 100245.
12. Lindholm Olinder A, DeAbreu M, Greene S, et al. ISPAD Clinical Practice Consensus Guidelines 2022: Diabetes education in children and adolescents. Pediatr Diabetes 2022; 23(8): 1229-42.
13. American Diabetes Association Professional Practice C. 14. Children and Adolescents: Standards of Care in Diabetes—2024. Diabetes Care 2023; 47(Supplement_1): S258-S81.
14. Bongaerts B, Leuwer A, Sadiq F, et al. Models of care for children and adolescents with type 1 diabetes in low- and middle-income countries: a scoping review. Cochrane Database Syst Rev 2025; 9(9): CD016214.

15. O'Hara MC, Hynes L, O'Donnell M, et al. A systematic review of interventions to improve outcomes for young adults with Type 1 diabetes. Diabet Med 2017; 34(6): 753-69.
16. World Diabetes Foundation. Who we are. 2025. https://www.worlddiabetesfoundation.org/who-we-are/ (accessed 30 November 2025).
17. Beran D, Koch M, Ajmal S, et al. The Lancet Diabetes & Endocrinology Commission on type 1 diabetes: looking back to move forward. Lancet Diabetes Endocrinol 2024; 12(1): 9-11.
18. Orrego C, Ballester M, Heymans M, et al. Talking the same language on patient empowerment: Development and content validation of a taxonomy of self-management interventions for chronic conditions. Health Expect 2021; 24(5): 1626-38.
19. SBXO N. World Diabetes Foundation - Portfolio on T1DM: review and possible way(s) forward. Internal report., 2020.
20. World Health Organization (WHO), Noncommunicable Disease and Mental Health Cluster. Innovative care for chronic conditions: building blocks for action: global report: World Health Organization; 2002.
21. Rankin D, Heller S, Lawton J. Understanding information and education gaps among people with type 1 diabetes: a qualitative investigation. Patient Educ Couns 2011; 83(1): 87-91.
22. Beran D, Golay A. Initial versus ongoing education: Perspectives of people with type 1 diabetes in 13 countries. Patient Educ Couns 2017; 100(5): 1012-8.
23. Baretic M, Matovinovic Osvatic M, Pavic E, et al. Type 1 diabetes from adolescence to adulthood: is there a permanent need for nutrition education and re-education? Minerva Endocrinol 2018; 43(1): 27-33.
24. Kumoji Ayamsegna HN, Bally JMG, Spurr S, Peacock S. Effectiveness of peer-based interventions among adolescents with type 1 diabetes: A systematic review. Journal of Pediatric Nursing 2026; 86: 90-104.
25. Due-Christensen M, Joensen LE, Sarre S, et al. A co-design study to develop supportive interventions to improve psychological and social adaptation among adults with new-onset type 1 diabetes in Denmark and the UK. BMJ Open 2021; 11(11): e051430.
26. Lazo-Porras M, Perez-Leon S, Cardenas MK, et al. Lessons learned about co-creation: developing a complex intervention in rural Peru. Glob Health Action 2020; 13(1): 1754016.
27. Donabedian A. The Quality of Care: How Can It Be Assessed? JAMA 1988; 260(12): 1743-8.
28. Zafra-Tanaka JH, Del Valle A, Bernabé-Ortiz A, Miranda JJ, Beran D. Outcomes measured in studies assessing health systems interventions for type 1 diabetes management: A scoping review. Diabet Med 2024; 41(2): e15223.
29. Lazo-Porras M, Liu H, Ouyang M, et al. Process evaluation of complex interventions in non-communicable and neglected tropical diseases in low- and middle-income countries: a scoping review. BMJ Open 2022; 12(9): e057597.

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