

## 8 The Bangladesh D-Magic trial – Action through groups or information for better control of diabetes

### Summary

Owing to the high burden of diabetes in Bangladesh, effective strategies to prevent and control diabetes are urgently needed, especially in rural areas.<sup>154</sup> The Bangladesh D-Magic Trial project involved the use of mHealth and participatory learning and action (PLA) community mobilisation interventions as tools to inform rural communities about diabetes and encourage actions to prevent and manage diabetes.

The study was funded by the UK Medical Research Council from 2014 to 2017 and was conducted by researchers from University College London and the Diabetic Association of Bangladesh.

The project found that both interventions were successful in raising awareness of diabetes and the PLA community mobilisation intervention also led to an **absolute reduction of 20% in diabetes and intermediate hyperglycaemia prevalence**.<sup>155</sup>

The project team showed **PLA community mobilisation to be a cost-effective approach with further scale-up work being conducted** to see how to improve stakeholder involvement and subsequent uptake of PLA, replicating the project approach and results on a larger scale and piloting the deployment of the PLA method in an urban context. The hope is that the project can be translated into a successful and cost-effective intervention that is applicable across Bangladesh and other countries.

### 8.1 Background

An estimated 75% of people with diabetes live in low- and middle-income countries (LMICs).<sup>156</sup> The disease has significant impacts on the quality of life and prosperity of individuals, households and communities. Increasing rates of diabetes and its complications are a growing concern for overstretched health care services and people living with the disease or at risk of developing it. Diabetes can lead to premature death, greatly increase the risk of cardiovascular disease and if not managed well can lead to serious morbidities.<sup>157</sup> Underlying the increasing prevalence of diabetes are complex changes in diet, lifestyles and increases in other risk factors such as smoking and lack of exercise. Owing to the high burden of diabetes in Bangladesh, effective strategies to prevent and control diabetes are urgently needed, especially in rural areas.<sup>158</sup>

Individual targeted strategies such as mobile phone technology (mHealth) have been shown to reduce the incidence of diabetes in India, however this approach has yet to be tested in a rural setting.<sup>159</sup> Participatory learning and action (PLA) is an approach that engages

<sup>154</sup> Fottrell E, Ahmed N, Shaha SK, et al., Diabetes knowledge and care practices among adults in rural Bangladesh: a cross-sectional survey. *BMJ Global Health* 2018;3:e000891

<sup>155</sup> Sathish T. Diabetes prevention and lifestyle intervention in resource-limited settings. 2019. Available at: [https://www.thelancet.com/journals/landia/article/PIIS2213-8587\(19\)30027-0/fulltext](https://www.thelancet.com/journals/landia/article/PIIS2213-8587(19)30027-0/fulltext)

<sup>156</sup> International Diabetes Federation. *Diabetes atlas*. Seventh Edition. Brussels: Belgium, 2015.

<sup>157</sup> International Diabetes Federation (IDF). *Global guideline for type 2 diabetes*. Brussels: IDF; 2012.

<sup>158</sup> Fottrell E, Ahmed N, Shaha SK, et al., Diabetes knowledge and care practices among adults in rural Bangladesh: a cross-sectional survey. *BMJ Global Health* 2018;3:e000891

<sup>159</sup> Ramachandran A, et al. Effectiveness of mobile phone messaging in prevention of type 2 diabetes by lifestyle modification in men in India: a prospective, parallel-group, randomised controlled trial. *Lancet Diabetes Endocrinol*. 2013 Nov;1(3):191-8.

communities to identify and address their own problems. PLA has been shown to improve maternal and new-born survival in LMICs and could potentially be adapted to help prevent and control diabetes in rural communities.<sup>160</sup> mHealth and PLA interventions hence have the potential to be effective for prevention and control of diabetes in rural Bangladesh.

## 8.2 The award

The Bangladesh D-Magic Trial (Diabetes Mellitus: Action Through Groups or Information for Better Control) project was funded by the UK Medical Research Council from 2014 to 2017. The project aimed to develop and test mHealth and PLA community mobilisation interventions as a means to prevent and control diabetes in rural Bangladesh.<sup>161</sup>

The D-Magic trial team involved organisations from the UK and Bangladesh, including University College London (project lead) and the Diabetic Association of Bangladesh. The project team had prior collaboration experience in implementing PLA for maternal and child health in Bangladesh, which the project benefitted from.

In the mHealth intervention, mobile phones were used to send health promotion information and targeted diabetes prevention and management messages to the population.<sup>162</sup> One minute voice messages were sent to registered users twice per week for a 14-month period. The messages were developed in collaboration with community advisory groups and script writers and included both a medically focussed presentation as well as acted scenes and songs.

The other intervention involved community mobilisation through PLA to inform communities about the risk of diabetes and empower them to take action to reduce their risk of diabetes.<sup>163</sup> Community engagement involved participatory groups (separate groups for men and women to ensure a safe space for participants to talk freely) where people were not only presented with relevant information about diabetes but were also encouraged, within the group environment, to find how they could use the knowledge and apply it to their socio-cultural and socio-economic environment. The approach empowers participants both by providing knowledge but also by encouraging critical reflection and group action on how to use the knowledge. The PLA method assumes that behavioural change is possible if it is enabled through actions creating a shared context for a community.<sup>164</sup>

Data on intermediate hyperglycaemia, diabetes, and associated risk factors for people living in rural Bangladesh was collected using surveys. This was complemented with medical data of the respondents (including capillary blood glucose levels and blood pressure). The key point of the surveys was not only to describe the burden of disease and risk factors, but also to evaluate intervention impacts in a classic cluster randomised controlled trial design.<sup>165</sup>

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<sup>160</sup> Prost A, et al., Women's groups practising participatory learning and action to improve maternal and newborn health in low-resource settings: a systematic review and meta-analysis. *Lancet*. 2013 May 18;381(9879):1736-46. 10.1016/S0140-6736(13)60685-6.

<sup>161</sup> UKRI. The Bangladesh D-Magic Trial. Diabetes Mellitus: Action Through Groups or Information for Better Control? 2020.

<sup>162</sup> Sathish T. Diabetes prevention and lifestyle intervention in resource-limited settings. 2019.

<sup>163</sup> UKRI. The Bangladesh D-Magic Trial. Diabetes Mellitus: Action Through Groups or Information for Better Control? 2020.

<sup>164</sup> Morrison et al. Participatory learning and action to address type 2 diabetes in rural Bangladesh: a qualitative process evaluation. 2019.

<sup>165</sup> Sathish T. Diabetes prevention and lifestyle intervention in resource-limited settings. 2019.

The successful deployment of the PLA and mHealth interventions in D-Magic relied on stakeholder involvement through community advisory groups – community representatives (teachers, religious leaders, local policy makers, healthcare workers) – who were consulted on the design of the interventions.

The project took place across 96 villages (or clusters) in rural regions of Bangladesh which were randomised into: 32 clusters where only existing health services for diabetes detection, management and prevention were available (control group); 32 clusters where the mHealth solution was introduced; and 32 clusters where the PLA intervention was introduced.<sup>166</sup> The study team delivered basic health systems strengthening (e.g. training of community-based health workers to screen for and refer individuals with raised blood glucose) in each of the 96 clusters. Prior to the randomisation, community leaders from each village were invited to an event where the project methodology was fully explained. When the community leaders gave their consent to participate in the project, randomisation was done with full transparency, ensuring that each community leader knew what role their communities would have in the project and what benefits they would receive and why.

The project encountered implementation challenges. Deployment of the mHealth intervention was hampered by the limited availability of mobile phones: on average there was only one mobile phone per household, usually owned by men which could limit participation of the women in the household. This meant that generalised messages had to be used instead of targeted content. The project team tried to encourage broadcast of the messages on speakers instead, akin to radio broadcasts, to address the issue of possible limited participation of women. The team also had to ensure that the messages continued to reach the participants, especially if they changed their phone numbers or SIM card.

### 8.3 Outputs, outcomes, impacts

Comparison of the mHealth and PLA interventions showed mixed results. While both interventions were able to increase knowledge and awareness of diabetes, **the PLA community mobilisation intervention also resulted in a 20% absolute reduction (64% relative reduction) in the burden of intermediate hyperglycaemia and type 2 diabetes** compared to the control clusters.<sup>167</sup>

The principal investigator Dr Edward Fottrell remarks: *“We are really excited by our findings. By the end of both interventions, communities had a much better understanding of how to prevent and control diabetes. And in communities where we implemented PLA community groups, we saw this knowledge turn into action leading to a huge reduction in diabetes and intermediate hyperglycaemia. Rather than focusing on high-risk individuals or those living with diabetes, our general population approach that emphasised community awareness raising and empowerment is novel and we look forward to exploring scale-up in Bangladesh and elsewhere.”*

Beyond reaching out to citizens, the project team also engaged with local health care providers (doctors, pharmacy employees and lay community health workers) across all 96 villages that were part of the project.<sup>168</sup> The team provided PLA-based training about

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<sup>166</sup> UKRI. The Bangladesh D-Magic Trial. Diabetes Mellitus: Action Through Groups or Information for Better Control? 2020.

<sup>167</sup> Sathish T. Diabetes prevention and lifestyle intervention in resource-limited settings. 2019. Available at: [https://www.thelancet.com/journals/landia/article/PIIS2213-8587\(19\)30027-0/fulltext](https://www.thelancet.com/journals/landia/article/PIIS2213-8587(19)30027-0/fulltext)

<sup>168</sup> Project report from GACD annual scientific meeting: 2020 ASM Projects updates. 2020

hyperglycaemia and diabetes prevention and management for healthcare workers, while pharmacy and community health workers received training for diagnosis and referral. A post-training survey indicated positive impacts on the participants' knowledge about diabetes detection and management.

Part of the communication activities included events at the end of the project. Study findings were presented to the Ministry of Health and Family Welfare of Bangladesh as well as representatives of the South Asian Association for Regional Cooperation (SAARC). The project has resulted in 16 publications with 3 publications under review. Findings from the study have also contributed towards the GACD Process Evaluation Guidelines and GACD Metadata Index.

The project team see GACD as an important contributor in establishing a common approach towards NCD research which translates to more efficient research processes. GACD was also appreciated because of the networking opportunities it offered and the opportunities younger researchers in the team got in terms of experiencing a high-level research environment (including result presentation), which boosted their academic confidence.

#### 8.4 Potential for future impact

Overall, the study team showed that the **PLA-based intervention is a cost-effective way to approach behavioural changes on the community level**. It is estimated that scale-up of the approach could reach up to 240,000 people in rural Bangladesh and prevent intermediate hyperglycaemia and type 2 diabetes among them (after accounting for loss of effectiveness due to scale-up).<sup>169</sup>

To support wider adoption of the PLA approach, the project team has successfully applied for a GACD scale-up grant. The scale-up has been split into four separate work packages that concentrate on different aspects of the D-Magic project. The first work package will expand community engagement, particularly working with NGOs to understand their needs and what would motivate them to adopt the PLA approach to help diabetics. The second work package is a direct scale-up of the D-Magic project in a larger area to validate the findings of D-Magic and understand whether the project implementation and results can be replicated on a bigger scale. For the third work package, the project study team will return to the communities they worked with in D-Magic to assess whether the project continues to have an impact. The final work package, involves piloting PLA deployment in an urban environment to understand what the challenges in urban versus rural communities are. Unfortunately, the COVID-19 pandemic has impacted the scale-up efforts. While the project team is overall optimistic about achieving the scale-up objectives, changes to the project plan are likely to make up for the time lost due to COVID-19 restrictions in Bangladesh during 2020-2021.

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<sup>169</sup> Project report from GACD annual scientific meeting: 2020 ASM Projects updates. 2020