

EDITORIAL

## Achieving Large-Scale Remission in Type 2 Diabetes Mellitus: The Role of Diet and Lifestyle Interventions

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Type 2 diabetes mellitus (T2DM) is a major global public health challenge, with over 382 million adults affected in 2013, a figure projected to rise to 592 million by 2035.<sup>1</sup> Pakistan ranks third globally in diabetes prevalence, with 33 million adults currently living with T2DM, a number expected to nearly double by 2045.<sup>2</sup> This rapid increase places immense financial pressure on the healthcare system, with complications like dialysis and cardiovascular diseases consuming substantial resources.<sup>3</sup> Urban areas in Pakistan show a higher prevalence of diabetes compared to rural areas. For instance, the prevalence of diabetes in urban areas is reported to be 28.3% compared to 25.3% in rural areas, highlighting the role of lifestyle, socioeconomic factors, and healthcare access.<sup>4</sup>

This editorial explores the drivers of T2DM in Pakistan, its challenges, and the potential for large-scale remission through culturally tailored diet and lifestyle interventions.

### Type 2 Diabetes: Aetiology, Prevalence, and Incidence

T2DM is marked by chronic hyperglycaemia due to insulin resistance and beta-cell dysfunction, influenced by genetic predisposition, epigenetics, and environmental factors.<sup>5</sup> In Pakistan, the trend of younger age at diagnosis—often under 40 years—has led to higher complication rates.<sup>6</sup> Additionally, gestational diabetes mellitus (GDM) affects approximately 14% of pregnancies, increasing the lifetime risk of T2DM for both mothers and their children.<sup>7</sup> Rising complication rates such as nephropathy, cardiovascular disease, and amputations further strain the healthcare system.<sup>5</sup>

### Theories on Insulin Resistance

Insulin resistance arises from interactions involving adipose tissue, skeletal muscle, and the liver.<sup>5</sup> South Asians, including Pakistanis, are particularly vulnerable due to unique physiological traits like reduced muscle mass and lower VO<sub>2</sub> max, which predispose them to early-onset insulin resistance.<sup>8</sup> These factors, coupled with dietary and physical activity patterns, exacerbate the epidemic.<sup>5</sup> A concise focus on these mechanisms is crucial to understanding effective interventions.

### Modifiable and Non-Modifiable Risk Factors

Non-modifiable risk factors include genetic predisposition, age, and ethnicity, compounded by high consanguinity rates in Pakistan.<sup>6</sup> Urbanization has amplified modifiable risk factors, including obesity, physical inactivity, and unhealthy dietary habits.<sup>4</sup> A shift from traditional diets rich in whole grains and lentils to processed foods and refined carbohydrates is significant.<sup>9</sup> Women in urban areas, for instance, have an obesity prevalence of 38%.<sup>4</sup>

Addressing these modifiable risks through public health campaigns, promoting physical activity, and improving access to preventive healthcare can help reverse the diabetes trend.

### Healthcare Infrastructure and Barriers to Implementation

Pakistan's healthcare infrastructure struggles with limited resources—just 1.1 physicians per 1,000 people and \$43 per capita healthcare spending.<sup>10,11</sup> Public funding focuses primarily on managing acute complications rather than preventive measures or remission programs. Barriers to implementation include:

- **Economic Constraints:** Limited funding for dietary counselling and structured weight loss programs.
- **Policy Gaps:** Lack of integration of remission strategies into national health policies.
- **Societal Resistance:** Cultural stigma around dietary changes and limited awareness of lifestyle interventions.

Addressing these barriers requires leveraging resources like the Lady Health Workers (LHW) program and creating community-driven initiatives.

### Lessons from Global Success Stories

Bangladesh has demonstrated success through low-cost, community-based interventions using health workers to improve diabetes care delivery.<sup>12</sup> Programs emphasizing patient education and affordable medications provide a model for Pakistan to replicate. Similarly, the DiRECT trial highlighted that a sustained weight loss of 10–15% through a very low-calorie diet can

achieve remission in 50% of patients.<sup>13</sup> While meal replacements used in the trial may be unaffordable in Pakistan, similar principles can be adapted using culturally appropriate and affordable foods.

### Culturally Adapted Dietary Strategies

Adapting dietary recommendations to Pakistan's socio-economic diversity is essential. For instance:

- **For Low-Income Groups:** Lentil soups, vegetable curries, and small portions of whole grains.
- **For Urban Populations:** Brown rice, chickpeas, and salads with low-calorie dressings.
- **For Pregnant Women:** Low-glycaemic diets reduce gestational diabetes risks.

Healthcare providers should emphasize portion control and sugar reduction, leveraging community networks like mosques to disseminate culturally appropriate materials.

In short, T2DM remission is not only possible but achievable through focused strategies. By adapting lessons from global studies like the DiRECT trial, implementing community-based interventions, and addressing systemic barriers, Pakistan can build a cost-effective and scalable model for diabetes remission. Specific policy recommendations include:

- Integrating remission strategies into national health programs.
- Leveraging the LHW program to promote lifestyle interventions.
- Ensuring affordable access to dietary counseling and preventive care.

A targeted approach can reduce complications, improve patient outcomes, and alleviate the financial burden on the healthcare system, creating a healthier future for millions.

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