

Invited Editorial

Key issues surrounding the management of non-communicable diseases including the management of diabetes post COVID-19 among developing countries with a specific focus on Bangladesh

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There continues to be a high and growing prevalence of non-communicable diseases (NCDs) across low- and middle-income countries (LMICs), which is a concern. Currently, over 41 million people globally die each year from NCDs, and growing, with the greatest shift in disease burden, including mortality, from communicable diseases to NCDs among African and South Asian countries (Khanam et al., 2019). For instance in Bangladesh, deaths due to NCDs increased from 43.4% of total deaths in 2000 to 66.9% in 2015 (Rawal et al., 2019). It has been estimated by 2025 that nearly 30% of adults globally will have hypertension estimated at 1.5 billion people (Khanam et al., 2019, Legido-Quigley et al., 2019), with these figures likely to be an under-estimate with the recent COVID-19 pandemic and associated lockdown measures (Ahmed et al., 2020, Kluge et al., 2020, Mistry et al., 2021), further increasing morbidity and mortality. There are similar concerns with patients with diabetes. Globally in 2019, there was an estimated 463 million people worldwide with diabetes mellitus (Chan et al., 2021, Liu et al., 2020), with these rates expected to grow unless addressed (Godman et al., 2021a). However, the International Diabetes Federation recorded higher rates globally at 537 million adults aged between 20 and 70 years, i.e., approximately one in ten adults, with this figure expected to rise of 643 million by 2030 unless addressed (IDF, 2021a).

The increase in morbidity and mortality due to NCDs, including diabetes and hypertension, among LMICs, including African and South Asian countries, has been exacerbated by a number of key factors. These include increasing urbanisation, concerns with access to diagnosis and treatment facilities exacerbated by high co-payment levels and resource issues, family history, ageing populations, dietary habits and limited education (Alam Miah and Yousuf, 2018, Bhuyan and Fardus, 2019, Fottrell et al., 2018, Godman et al., 2020, Kibria et al., 2018, Macquart de Terline et al., 2019). In addition, continued high tobacco consumption including among African and Asian countries (Rafique et al., 2018, Hango et al., 2021). This includes Bangladesh where up to 44.7% of men smoke (Burki, 2019, Rafique et al., 2018), highest in the slum population of Dhaka City (Khandker et al., 2017). However, this may start to change with new tobacco laws and the introduction of smoke-free places in Bangladesh as well as monitoring of the implementation of the Tobacco Control Act by local regions in Bangladesh (Tobacco Control Laws, 2021). Overall, NCDs including hypertension and diabetes are particularly prevalent in LMICs, which need urgently to be addressed to reduce future morbidity and mortality (Khanam et al., 2019).

Within Bangladesh, Rahman *et al.* (2018) estimated that 20% of the adult population have hypertension (Rahman et al., 2018). Fottrell *et al.* (2018), Khanan *et al.* (2019) and Chowdhury *et al.* (2020) in their systematic review and meta-analysis reported similar prevalence rates (Khanam et al., 2019, Chowdhury et al., 2020, Fottrell et al., 2018), with Hassan *et al.* (2021) recently reporting higher rates of hypertension among urban and rural areas of Dhaka (Hasan et al., 2021). Overall, prevalence rates for hypertension are likely to rise certainly in the short to medium term in Bangladesh unless addressed (Chowdhury et al., 2020). This is without taking into consideration the impact of COVID-19 on the diagnosis and management of hypertension through lockdown and other activities (Kluge et al., 2020).

In their study, Fottrell *et al.* (2018) also found that the combined prevalence of impaired fasting glucose and glucose intolerance alongside diabetes among the population in

Bangladesh was 34.9% among women and 26.1% among men, with both increasing with age (Fottrell et al., 2018). Mistry *et al.* (2021) estimated that nearly 60% of surveyed elderly in Bangladesh had at least one NCD with one-quarter having multimorbidities (Mistry et al., 2021). Overall, an estimated 8.4 million adults aged between 20 and 79 in Bangladesh have diabetes, with the number of patients with diabetes projected to rise (Afroz et al., 2019a). The International Diabetes Federation in their latest publication suggest this could be as high as 16.8 million adults in 2030 in Bangladesh and 22.3million by 2045 unless addressed, enhanced by an estimated 43.5% undiagnosed (IDF, 2021b). There are generally appreciable rates of misdiagnosis of diabetes in Southeast Asia, including Bangladesh, due to many people not being included in any coverage programme (Shariful Islam et al., 2017). COVID-19 itself can potentially increase the number of people who develop type 1 diabetes (T1DM) (Steenblock et al., 2021). Alongside this, impairment of islet function should be considered in patients with metabolic disorders following COVID-19 as this virus can increase the potential for these patients to develop T2DM (Maestre-Muñiz et al., 2021, Steenblock et al., 2021, Accili, 2021).

High prevalence rates for NCDs including diabetes and hypertension have appreciable economic consequences. In the case of patients with diabetes, the cost of associated complications has increased the global economic burden from US\$1.3 trillion in 2015 to an estimated US\$2.1 to US\$2.5 trillion by 2030 (Bommer et al., 2018, Mapa-Tassou et al., 2019). This includes both direct and indirect costs, and equates to an average of 2.2% of Gross Domestic Product (GDP), with most of these costs being indirect costs (Bommer et al., 2018, Mapa-Tassou et al., 2019). The cost of complications is enhanced by their high prevalence rates if inadequate preventative measures (Chan et al., 2021). In their recent study, Afroz *et al.* (2019a) found that among 1253 patients with type 2 diabetes (T2DM) surveyed in six hospitals in Bangladesh, the prevalence of strokes was 10.1%, coronary artery disease 30.5%, diabetic foot ulcerations 12.0%, nephropathy 34.2%, retinopathy 25.1% and neuropathy at 5.8% of patients (Afroz et al., 2019b).

The costs of care are particular concern in countries such as Bangladesh due to high rates of patient co-payments (Rahman et al., 2020, Khan et al., 2017, Haque et al., 2021). In their study, Shariful Islam *et al.* (2017) estimated that the total annual per capita expenditure on medical care among patients in Bangladesh was 6.1 times greater for those with diabetes versus those without diabetes (Shariful Islam et al., 2017). Afroz *et al.* (2019) calculated that the costs of medicines contributed the greatest amount to the overall direct costs of treating patients with diabetes in Bangladesh (60.7%) followed by the costs of hospitalisations (27.7%) (Afroz et al., 2019a). Greater proactivity in managing these patients in Bangladesh will bring considerable improvement in patient outcomes alongside net economic benefits given the current high costs of managing patients with including those with diabetes and hypertension (Nugent et al., 2017, Afroz et al., 2019a).

We are aware that whilst the Government in Bangladesh has launched many NCD-related programmes and policies in recent years to improve the management of patients with NCDs, including those with diabetes and hypertension (Nugent et al., 2017, Biswas et al., 2017), there are concerns. Concerns include the fact that despite these initiatives there appears a lack of effective planning, implementation and monitoring (Biswas et al., 2017). As a result, the burden of NCDs continues to grow in Bangladesh (Biswas et al., 2017).

Typically in Bangladesh, patients with NCDs in the public sector, including diabetes and hypertension, may visit health complexes before referred to more specialist clinics (Rawal et al., 2019). Whilst these services have improved in recent years, there are concerns generally with the lack of specific guidelines, trained personnel, laboratory facilities, and medicines including metformin and insulin for patients with diabetes, as well as typically poor recording of patients' treatments and reporting systems (Rawal et al., 2019). This was emphasised in the study of Biswas *et al.* (2018) among health facilities throughout Bangladesh providing care for patients with cardiovascular diseases (CVD) and diabetes (Biswas et al., 2018). The authors found a shortage of trained staff and a lack of adequate medicine supplies for patients with CVD (43.9%) and diabetes (23.5%). Overall, among the health facilities that offered care for patients with CVD and diabetes, less than 1% had all four designated service readiness factors including the availability of guidelines, trained staff and equipment as well as appropriate medicine (Biswas et al., 2018). The availability and use of current guidelines is seen as especially important to improve future care (Campbell et al., 2021, Niaz et al., 2019). Similar findings were seen by Legido-Quigley *et al.* (2019) where patients with hypertension had concerns with accessing health care including medicines (Legido-Quigley et al., 2019).

Encouragingly, we have seen in Bangladesh a growth in the availability of newer long-acting insulin analogues to help address issues of patient convenience and hypoglycaemia in recent years (Haque et al., 2021a). This has been helped by the increasing availability of low cost biosimilars, different to the situation among a number of African countries including those with universal healthcare (Haque et al., 2021a, Haque et al., 2021b, Godman et al., 2021a, Godman et al., 2021b, Godman et al., 2021c). However, as mentioned, there are concerns with diagnosis and monitoring of patients with diabetes including adherence to prescribed medicines. We have initiated a pilot study to explore this more closely starting with patients with T2DM in out-patient clinics of public hospitals as poor record keeping and monitoring will compromise future care. This builds on studies across Bangladesh and LMICs (Afroz et al., 2019b, Mwita et al., 2020, Mwita et al., 2019, Chetoui et al., 2020, Pinchevsky et al., 2017).

In conclusion, there are considerable concerns with the current management of patients with NCDs across LMICs exacerbated by the recent COVID-19 pandemic. Suggestions for the Government in Bangladesh to improve the future management of patients with NCDs, especially those with diabetes, include prioritizing vulnerable populations through for instance subsidizing high costs of care for patients with NCDs when the need arises (Rahman et al., 2020). In addition, improving diagnosis as well as access and availability to medicines to adequately treat patients with NCDs including those with T2DM (Ozawa et al., 2019, Ewen et al., 2019). Alongside this, being proactive generally regarding the management of NCDs in line with suggested National programmes, with, as mentioned, such approaches estimated to provide appreciable net economic and healthcare benefits given current costs (Nugent et al., 2017). Improved information technology can also help with data collection and analysis given the predominantly paper based approaches currently within Bangladesh with concerns with the adequate monitoring of patients (Islam, 2016). Furthermore, potentially exploring the utilisation of innovative technologies as well as greater use of telemedicine, including mobile telephones, to change patient behaviour, especially their

lifestyles (Tabassum et al., 2018). We will be exploring and monitoring a number of aspects in future studies.

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