Developing countries are at much higher risk of going bankrupt if diabetes or diabetes complications are not prevented. Previous chapters were discussing the various aspects and possibilities to prevent diabetes and its complications. Those activities should be based on knowing the magnitude of the problem by determining the prevalence of diagnosed and undiagnosed diabetes cases. Although the global estimates reported for a particular country are based on sound methods, sometimes the results from a local study could give surprising results, as each country has its own specifics.

Mapping of available health care resources dedicated to diabetes care is critical to realize if they are sufficient across healthcare levels and geographical coverage, or to compensate for age transition and migration to developed countries for better paid jobs. National Program of Residencies and Fellowships has to be in place, at least for a 4 years period, as it is not possible to produce Endocrinologists and Diabetologists in a short period of time (Fig. 9.1) [1]. Age of physicians involved in diabetes care needs to be monitored closely for smooth transition of retired staff.

The number of residencies and fellowships for Endocrinologists and Diabetologists in the Republic of North Macedonia was increased by 20% in the period 2015–2016. Plans should also be available for other healthcare providers involved in diabetes care. National plans covering healthcare resources have to be updated at least on an annual basis.

In the most affected developing countries diabetes has to be brought up very high on the political agenda, otherwise it would not be possible to provide the required resources to implement the nationwide policies. Political support is necessary for implementation of activities to prevent diabetes and its complications. Medical community and scientific associations could initiate dialogue with political leaders and offer solutions; however, there has to be a strong political will for the country-wide measures to be implemented.

The example of Republic of North Macedonia confirms the importance of political support in designating diabetes as a specific medical condition in the laws [2]. If the regulatory infrastructure is in place, in addition to the National Diabetes
Plan, National Diabetes Care guidelines and the NeHS, there has to be a national body accountable for the implementation of activities and monitoring of adherence (Fig. 7.3) [3–7].

That body, National Diabetes Committee, has to be stipulated in the laws to have executive power and accountability [2]. It should be responsible for overseeing the situation with diabetes care in the country, and for planning of future activities. Those activities might include more Endocrinologists, more Diabetes Centers, more insulin pharmacies, evaluation of cost-effectiveness of current and introduction of novel diabetes treatments or glucose monitoring technologies. The National Diabetes Committee has to be composed of high-level experts with integrity and no conflicts of interest.

All the activities, plans, timelines related to diabetes care in the country have to be consolidated in a National Diabetes Plan, a strategic document endorsed by the highest political levels. Such document could be developed by the National Diabetes
Committee, but has to be backed by the Ministry of Health and the Government. It should be a live document that is continuously updated.

The most important tool for the National Diabetes Committee would be the NeHS with its numerous possibilities of generating analysis and reports (Figs. 7.1 and 7.2) [4, 5, 7]. There are many disadvantages for small developing countries affected by the diabetes pandemic. One of the advantages is that all the aforementioned steps could be implemented in a relatively short period of time, if there is a strong political will and support by the medical community. The Republic of North Macedonia is an example that all the steps could be achieved in a setting with limited resources.

When such systemic approach is undertaken, main diabetes drivers in the country need to be identified, such as overweight, obesity, prediabetes, smoking and GDM. Activities to curb the drivers have to be described in the National Diabetes Plan.

Diabetes is a very costly disease exerting huge pressure on the healthcare budgets of both developed and developing countries. Unfortunately, many countries spend most of their healthcare resources on treating complications, and not on prevention. It is critical to shift the paradigm towards diabetes prevention. Such change has to come initially from the medical community, and to be conveyed to the policy makers afterwards. Otherwise, it would be difficult to implement nationwide measures, especially in a relatively healthy population not diagnosed with any NCD at the time being.

Both developed and developing countries have to be focused on the prevention of diabetes and diabetes complications in order to prevent bankruptcy of their healthcare systems. Even in the developed countries, it is estimated that more than one third of people with diabetes are not receiving the recommended care that helps prevent complications. This share is much higher in developing countries. Unfortunately, the latest COVID-19 global pandemic would urge even the most developed countries to look for creative solutions for managing the rising diabetes costs.

If main modifiable diabetes drivers are identified, efforts should be directed towards prevention and management of these conditions. Understandably, in order to manage it you have to measure it first. Therefore, the prevalence of diabetes drivers has to be estimated. If the parameters such as BMI, smoking status, or prediabetes are recorded in the EHRs, it would be relatively easy to estimate the prevalence from the NeHS and to target the affected population.

Another step would be to set nation-specific targets for curbing the prevalence of drivers in the SMART manner; i.e. the targets have to be Specific, Measurable, Achievable, Realistic and Time-bound. One example could be the reduction of obesity by 5% on an annual basis, which should be monitored by the National Diabetes Committee from the NeHS. All these activities and targets have to be specified in the National Diabetes Plan.

In creating national targets for prevention of diabetes and related complications, the WHO Global NCD Targets could be used as a reference, and adjusted according to the local circumstances [8]. Those targets include relative reduction of premature
death from NCDs by 25% by 2025, at least 10% relative reduction in the harmful use of alcohol, at least 10% relative reduction in prevalence of insufficient physical activity, 30% relative reduction in sodium intake, 30% relative reduction in prevalence of current tobacco use, 25% relative reduction in the prevalence of hypertension, halting the rise of diabetes and obesity, at least 50% of eligible people to receive drug therapy and counseling (including glycaemic control) to prevent heart attacks and strokes, and an 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat NCDs [8].

Education on healthy nutrition for the general population has to start as early as possible, even in the kindergarten. And such dietary patterns, accompanied by obtaining skills in preparing healthy food, have to be taught throughout all levels of education. Avoiding carbohydrate rich beverages, processed carbohydrates, or adding carbohydrates rich sweeteners, should be a community standard in order to prevent the rising obesity prevalence in children and adolescents.

It has been reported that carbohydrate rich beverages are the main source of carbohydrate ingestion leading to obesity and diabetes, especially in youth. Some developed countries, such as the UK, have introduced the so-called ‘sugary drink tax’ or ‘soda tax’, as a tax on sweetened beverages aiming to reduce the consumption of drinks with added sugar. Such initiative or a similar one taxing the ‘junk food’ could certainly be replicated in developing countries.

Another area that could significantly contribute to the reduction of atherosclerosis and CVDs is the ban on trans-fats. The ban has already been imposed in certain developed countries, including Denmark, Switzerland, Canada, the UK and the US. Although global food companies have reduced the amount of trans-fats in developed countries, they have not been banned in most of the developing countries.

The WHO announced an ambitious plan to eliminate the use of trans-fats worldwide, including the industrially produced edible oil for making margarine that have been linked to millions of premature cardiovascular deaths [9]. Although artificial trans-fats, or partially hydrogenated vegetable oil, have contributed to a half million deaths annually, many of developing countries are not prepared to address this health challenge [9].

It was mentioned that each developing country should have its own Guidelines on Nutrition (Fig. 8.3) [10]. Those should be communicated broadly to the general population through all available channels. The Guidelines have to be jointly developed by various Ministries, including those responsible for Health, Education, and Economy. They have to be implemented for the preparation of meals for children in kindergarten and throughout all levels of education. Such Guidelines could include banning machines for beverages or candies inside or close to the schools and universities. As already emphasized, if the habits for a healthy diet are not gained at an earliest age, it is extremely difficult to modify them later throughout life.

People preparing the food in kindergarten and schools have to be educated on the requirements of the National Guidelines on Nutrition, and have to adhere to those requirements. They should be encouraged to use a lot of vegetables and fruits, and in some cases to select certain spices that would make the food appealing to the children.
In many cases teachers have to be involved in the train-the-trainer education. If the teachers are overweight or obese, and they are the role models for the pupils, it would be very difficult to teach the children on a healthy nutrition.

In other instances, the parents of affected children have to be involved, as children are usually a reflection of the parents’ habits or lifestyle. It would be more productive if education on nutrition is jointly attended by both parents and children. Resources to guide them for preparation of healthy food could be in various forms, including mobile apps, online platforms, or brochures.

Homework for children could include preparing a healthy dish with their parents, or completion of certain physical activity, in addition to doing math and science. Despite aggressive marketing campaigns of global food chains, children should be discouraged to consume unhealthy snacks, neither sweet nor salty, and should be taught to use vegetables or fruits as a snack instead.

The menus in all restaurants have to provide nutritional and calories value of the choices offered, so the customers would be familiar with the information before ordering the type and quantity of the food.

Monitoring of overweight and obesity in children is of particular importance due to the rising prevalence of type 2 diabetes at an earlier age. Children and the total population should be encouraged to use bikes as a means of transportation, thereby increasing their physical activity.

One way of promoting such a healthy lifestyle could be to assign prominent public figures who are physically active, lean, and non-smokers, as ‘Ambassadors of Healthy Lifestyle’. They could be used as lifestyle role models for the entire population.

It is recommended that people with diabetes should practice at least 60 min per day of moderate- or vigorous-intensity aerobic activity, spread over at least 3 days per week, with no more than 2 consecutive days without activity [11]. Shorter durations of minimum 75 min per week of vigorous intensity or interval training could be adequate for younger and physically prepared individuals [11]. Adults with diabetes should have at least 2–3 sessions of resistance exercise per week on non-consecutive days [11].

Although the above recommendations are directed towards people with diabetes, they are also relevant for the people with no diabetes. Developing countries should consider increasing the hours of physical activity of preschool and school population at all ages, accompanied with theoretical support of the benefits of increased physical activity. In addition, facilities for physical activities have to be provided at schools, universities, workplaces or neighborhoods.

The lockdown imposed in times of global pandemics, such as the recent one with COVID-19, presents additional challenge for the physical activities desperately needed for regulation of glycaemia. Even under such circumstances, people with diabetes should be encouraged to be physically active.

Mobile technologies and apps could be very useful in keeping track of the daily calories intake and physical activity. They also provide opportunities to share the data with the healthcare providers for analysis, discussion and mutual agreement on the further steps. As such, they are great resources for diabetes prevention, or
improvement of metabolic control in people with diabetes to prevent complications.

When the NeHS is in place, the data on calories intake and physical activity should also be recorded in the individual EHRs for monitoring of the modifiable risk factors for diabetes.

Furthermore, comprehensive national programs for smoking cessations have to be in place, as smoking has been identified as one of the risk factors for development of diabetes, and a major risk factor for CVDs. Activities should include smoke-free work and other public places, spending on public information campaigns, comprehensive bans on advertising and promotion, large direct health warning labels, and absolute ban for selling cigarettes to minors.

It is very important that above measures are accompanied by considerable increase in prices of cigarettes, making them less affordable for the general population. Another could be to drastically increase the contribution to healthcare insurance fund if a person is a smoker, compared to a non-smoker. All these initiatives have already worked effectively in developed countries, and could certainly be implemented in developing countries.

Developing countries should be advised against the use of cigarettes and other tobacco products, or e-cigarettes [12]. The legal status of e-cigarettes is currently pending in many countries, and the list of countries banning the use of e-cigarettes is getting longer. Fortunately, many developing countries are implementing activities against smoking cigarettes, tobacco, or e-cigarettes.

After identification of tobacco or e-cigarette use, smoking cessation counseling has to be implemented in addition to other forms of treatment as a routine component of diabetes care. Initiatives for reduction or quitting of smoking could use the 5A Concept, A (Ask)—always ask about current smoking status; A (Advise)—unambiguously advise all smokers to quit smoking; A (Assess)—assess the level of dependency and preparedness to quit smoking; A (Assist)—assist with behavioral and pharmacological support if needed, agreeing when to quit smoking with a precise date; A (Arrange)—arrange the next follow-up visit to monitor the progress of quitting smoking [13].

In addition to overweight and obesity, prediabetes should primarily be targeted to prevent progression into type 2 diabetes. People diagnosed with prediabetes have to be monitored, although many of them would not be pharmacologically treated. It is very important to address preventive activities towards this vulnerable population, as it is estimated that one third of people with prediabetes progress to diabetes, one third remain in prediabetes, and one third could convert into normoglycemia. This condition is independently associated with increased cardiovascular risk even prior to the diagnosis of diabetes, which only emphasizes the importance of its management.

People with prediabetes need to be considered for intensive lifestyle intervention programs based on the DPPs to achieve and maintain weight loss. Combination of aerobic and resistance training is preferred for prevention of diabetes.

Recommended lifestyle for reducing diabetes risk should include diet with no more than 30% of daily energy from fat; no more than 10% of energy from saturated
fat; at least 10% of monounsaturated fatty acids, at least 20 g of fiber per 1,000 kcal; at least 30 min per day of moderate physical activity; and at least 5% weight reduction annually [13].

Excessive calories intake has to be avoided in people with prediabetes and replaced with reduced calories intake and reduced intake of carbohydrates. Vitamins or micronutrient supplementation are not recommended for prevention of diabetes, if there is no underlying deficiency.

The initial treatment for diabetes, metformin, could be considered in people with prediabetes, especially for those with BMI > 35 kg/m², age over 60 years, and women with prior GDM [11]. Prediabetes is associated with increased CVD risk; therefore, screening for modifiable risk factors for CVD and their treatment is highly recommended. Structured education programs may be appropriate for people with prediabetes, particularly the modules on nutrition and physical activity.

The main goal of people already diagnosed with diabetes is to prevent diabetes complications. Adequate glycaemic control is crucial in prevention of microvascular and macrovascular complications. The glycaemic control should be monitored through the individual EHRs from NeHS, enabling the monitoring at a national level.

Very important step in prevention of diabetes complications is early diagnosis of diabetes. That could be done only after thorough assessment of diabetes risk factors, or by using diabetes risk tools, and testing for diabetes in identified high-risk individuals.

Benchmarks could be implemented to identify hospitals that are achieving targets in glycaemic control, or in other metabolic parameters. Those benchmarks could serve for incentives of physicians achieving better results, but also for the people with diabetes to be aware of the quality of care they receive in different hospitals.

Indicators and targets for prediabetes and diabetes could be included in the Balanced Score Card system for evaluation of the overall performance of healthcare institutions, where the remuneration and bonuses for the management and the healthcare workers would be linked to the achievement of the targets.

The NeHS could be used as a platform for prevention of diabetes, through monitoring of people with prediabetes or other diabetes drivers. The NeHS can be used for monitoring the development of diabetes complications, but also if the physicians are adhering to the frequency of screening for diabetes complications, as recommended by the National Diabetes Care guidelines. It could be considered that part of remuneration of physicians is based on achieving certain diabetes related indicators reflecting adequate metabolic control and management of diabetes complications.

Psychosocial stress should not be neglected as an important driver for development of diabetes, and for worsening of glycaemic control in people with diabetes. Physical activity could be helpful for alleviating the psychosocial stress in many instances. In more severe cases, professional support has to be offered.

It was mentioned that these nationwide initiatives require top-level political support in order to be implemented. Many initiatives were undertaken in the Republic of North Macedonia, a developing, European country with limited resources.
However, continuity is necessary for implementation of such initiatives, as results are not immediately visible and politicians in many developing countries usually think only until the next elections.

Some of these initiatives could be quick wins or produce short- to mid-term results, but the majority of initiatives stipulated in the National Diabetes Plan produce results and benefits for the society in the long-term. One of the challenges for developing countries is the lack of continuity of nationwide initiatives, when it comes to change of political leadership.

Diabetes tsunami is coming in developing countries with its whole complexity. However, by introducing some of the proposed initiatives there is a possibility for providing sustainable diabetes care with favorable outcomes even in a setting with limited resources.

What could be done to prevent diabetes and is complications?
Each developing country should…

• … maintain a National Program of Residencies and Fellowships in Endocrinology and Diabetes,
• …shift the paradigm and more resources towards diabetes prevention,
• …monitor modifiable risk factors for development of diabetes, and metabolic control for prevention of diabetes complications,
• …implement Guidelines on Nutrition for the general population, and across all levels of education, starting as early as in kindergarten,
• …increase physical activity for the general population, and across all levels of education;
• …ensure continuity of initiatives stipulated in the National Diabetes Plan if there is a change of political leadership.

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