

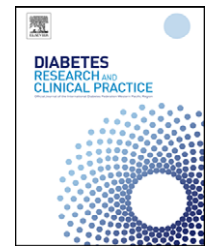


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International Diabetes Federation



### Review

# The Kathmandu Declaration: “Life Circle” approach to prevention and care of diabetes mellitus

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#### ABSTRACT

**Objectives:** To formulate strategies and action plans for the prevention and care of diabetes mellitus as part of the implementation of the International Diabetes Federation (IDF) United Nations Resolution (UNR) 61/225 through a unique concept of a “Life Circle” approach.

**Method:** Consensus following review of evidence available and presented at a meeting convened to achieve the objective co-chaired by the IDF President and President elect and diabetologists from several countries in the IDF regions.

**Conclusions:** The Kathmandu Declaration presents the concept of a “Life Circle” approach to prevention and care of diabetes—a continuum beginning from preconception, pregnancy, infancy and childhood to adult life in an integrated manner. Emphasis is on the benefits on entering the circle at any point and formulates guidelines that could be incorporated in any national diabetes prevention and care programme, indicating the interactive role of all known aetiological factors.

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### Contents

1. Introduction . . . . .	21
2. Primary prevention strategies: “Life Circle” approach . . . . .	21
2.1. Preconception . . . . .	21
2.1.1. Educate that pregnancy can be a risk factor . . . . .	21
2.1.2. Infections/inflammation . . . . .	21
2.1.3. Screen for diabetes and its risk factors in the potential mother . . . . .	21
3. Pregnancy . . . . .	21
3.1. Fetal programming . . . . .	21
3.1.1. Maternal nutrition . . . . .	21
3.1.2. Prenatal psychosocial stress . . . . .	22
3.1.3. Screening during pregnancy . . . . .	23
3.1.4. Postnatal follow-up . . . . .	23
3.2. Infancy and childhood . . . . .	23

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3.2.1.	Nutrition of the infant . . . . .	23
3.2.2.	Monitor growth and well-being . . . . .	23
3.2.3.	Legislation to promote good dietary environment. . . . .	23
3.2.4.	Physical activity . . . . .	23
3.2.5.	Risk assessment and lifestyle modification . . . . .	23
3.2.6.	Initiate nutrition, physical activity and stress reduction programmes in educational institutions and the community . . . . .	23
3.3.	Adult life . . . . .	23
3.3.1.	Screening for high risk individuals . . . . .	23
3.3.2.	Proper nutrition . . . . .	23
3.3.3.	Encourage physical activity . . . . .	23
3.3.4.	Stress in adult life. . . . .	23
3.3.5.	Promote employer and employee education . . . . .	23
3.4.	Increased awareness and education throughout the “Life Circle”. . . . .	24
3.5.	Secondary prevention strategies . . . . .	24
3.5.1.	Multi-factorial/multi-disciplinary/multi-sectoral approach to care . . . . .	24
3.5.2.	Access to quality essential medicines to all. . . . .	24
4.	Conclusions . . . . .	24
	Acknowledgements . . . . .	24
	References . . . . .	24

## 1. Introduction

The global prevalence of diabetes mellitus in 2007 estimated at 246 million and of impaired glucose tolerance (IGT) at 308 million is projected to increase to 380 million and 418 million respectively by 2025 with 95% being diagnosed with Type 2 diabetes mellitus (Type 2 DM) [1]. DM being a chronic, debilitating and costly disease, the United Nations adopted Resolution 61/225 (UNR) in 2006, urging all countries to take immediate action to halt the pandemic [2].

The Kathmandu Declaration was formulated at a joint meeting of the International Diabetes Federation (IDF) and Diabetes in Asia Study Group which was convened for the specific purpose of implementing the UNR on Prevention of Diabetes in Nepal in October 2008. Foundations laid by consensus statements on aetiology in Colombo in 2002 [3] and on prevention in Lisbon in 2006 [4], have been integrated in a holistic manner using a unique “Life Circle” approach (Fig. 1) concentrating on offsetting modifiable risk factors associated with behaviour and environment.

## 2. Primary prevention strategies: “Life Circle” approach

### 2.1. Preconception

Preventive strategies are best instituted at this stage. It is essential that young females/potential mothers before conception obtain adequate nutrients both macro and micro together with increased physical activity and stress reduction to ensure the healthy development of the oocyte and the fetus. Such actions are important to ensure the development of appropriate physical and mental health of the young female/potential mother. A healthy mother will produce a healthy child with minimal risk.

#### 2.1.1. Educate that pregnancy can be a risk factor

Pregnancy should be encouraged after full physical development of the young female giving due consideration to cultural and ethnic sensitivities. Motherhood between the ages of 13–17 years carries a higher risk than those over 20 years [5]. In addition, a late pregnancy carries a higher risk to mother and child [6].

#### 2.1.2. Infections/inflammation

One factor in the pathogenesis of Type 2 DM, dyslipidaemia and atherosclerosis, involves an ongoing cytokine-induced acute-phase response related to the activation of the innate immune system. This in turn is caused by a low grade inflammation/infection leading to a stress response, elevation of blood sugar, oxidative stress and increased insulin resistance [7]. It is therefore imperative that improved sanitation should be established to reduce the incidence of infections.

#### 2.1.3. Screen for diabetes and its risk factors in the potential mother

This new concept needs to be popularised in the light of the increased incidence of early onset Type 2 DM in the young. This declaration supports the World Health Organisation (WHO) sequential STEPwise approach to case detection through screening: “the best that can be afforded” [8]. It is essential that screening is instituted in the school environment [9].

## 3. Pregnancy

### 3.1. Fetal programming

#### 3.1.1. Maternal nutrition

Hales and Barker’s ‘thrifty phenotype’ hypothesis suggests that development of beta cell mass is affected by nutrition in

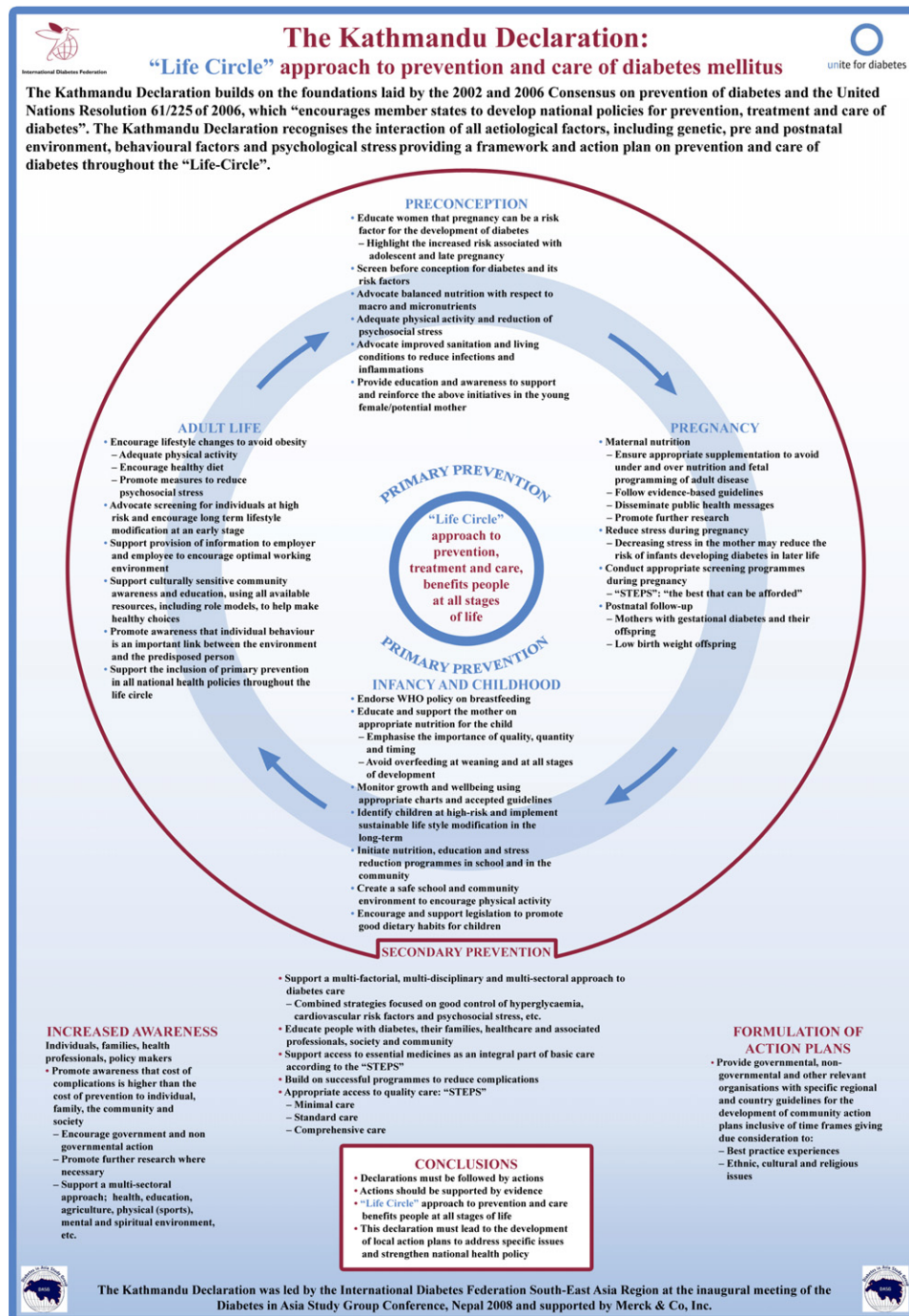


Fig. 1 – Life Circle approach to prevention and care of diabetes mellitus.

uterus [10]. When the fetus is exposed to programming agents such as hormones, growth factors and cytokines in a sub-optimal environment of inadequate nutrition, it leads to the alteration of the metabolic and immune systems and predisposes the fetus to increased insulin resistance and Type 2 DM in later life [11].

Adequate macro and micro nutrients ensure healthy development of the fetus. The Pune Maternal Nutrition Study [12] highlights the ‘thrifty phenotype’ hypothesis and suggests that low maternal vitamin B12 and low folate in pregnancy lead to insulin resistance and adiposity in young offspring.

### 3.1.2. Prenatal psychosocial stress

Mechanisms associated with psychosocial stress in Type 2 DM have been identified [13].

Exposure to prenatal stress may contribute to the development of insulin resistance in the offspring. It elevates placental corticotrophin-releasing hormone (CRH), which is associated with preterm delivery, low birth weight and influences the development of the fetal nervous system [14]. Fetal programming may make the offspring more susceptible to environmental influences in later life, as a result of their “stress-modified” systems [15].

Optimal fetal development is fundamental for the well-being of all communities. Policies and appropriate interventions to improve the health of the mother and child must be promoted [16].

### 3.1.3. Screening during pregnancy

Appropriate screening should be conducted ideally in the mid trimester to detect Gestational Diabetes Mellitus (GDM) and good glycaemic control should be ensured in all persons so detected.

### 3.1.4. Postnatal follow-up

Good glycaemic control during and after pregnancy in the mother and offspring minimises the risk of Type 2 DM in later life [17]. Postnatal follow-up of mothers with GDM and their overweight offspring is essential.

In addition, low birth weight babies should be monitored as their reduced muscle mass and increased visceral fat predispose them to insulin resistance in later life: the “thin fat Indian baby” [18].

## 3.2. Infancy and childhood

The first few years are vital in the development of a healthy child.

### 3.2.1. Nutrition of the infant

WHO guidelines of exclusive breastfeeding during the first six months followed by continued breastfeeding with appropriate supplements up to two years should be encouraged [19]. The avoidance of overfeeding at all stages including weaning should be emphasised [20].

Studies of low birth weight infants (<2500 g) have shown that excessive weight gain in later life increases the development of the metabolic syndrome [21]. Good obstetric facilities and care according to WHO guidelines should be instituted where possible.

### 3.2.2. Monitor growth and well-being

Adequate growth is the best indicator of well-being. Use of standard growth charts is recommended [22,23]. Body Mass Index (BMI) is an accepted measure of total body fat and the use of the newly developed BMI charts (up to 5 years) will assist in monitoring health [24]. Other risk factors are increased waist circumference, decreased physical activity and abnormal glucose tolerance.

### 3.2.3. Legislation to promote good dietary environment

It is recommended that high calorie soft drinks with low nutritional value be removed from the school environment [25].

### 3.2.4. Physical activity

It is essential to advocate increased exercise through physical activity and sports as a prerequisite for maintaining ideal weight and good health in childhood. This often influences the pattern followed in adult life [26].

### 3.2.5. Risk assessment and lifestyle modification

Detection through screening at regular intervals (STEPwise approach) [8] and long term lifestyle modification is to be

advocated in those at high risk. Physical activity should be included in the school curriculum and encouraged at home on a regular basis [27].

Obese children are more likely to develop Type 2 DM indicating that the pathogenic process starts in early life. In addition, obesity may be associated with psychological stress at school and at home and should be identified and corrected early [28].

### 3.2.6. Initiate nutrition, physical activity and stress reduction programmes in educational institutions and the community

Educational institutions are the most suitable environment to implement preventive programmes [29]. Support of the individual, parent and the teacher are essential in reaching the objective.

## 3.3. Adult life

Individual behaviour is the pivotal link between the environment and the predisposed person.

### 3.3.1. Screening for high risk individuals

Regular screening to detect persons at high risk and sustainable long term lifestyle modification should be advocated wherever possible.

### 3.3.2. Proper nutrition

A diet suitable for a person with diabetes is suitable for the entire family and could be referred to as “a diet for healthy living”, with quality, quantity and timing as its principle components [30]. These guidelines are applicable throughout the “Life Circle”.

### 3.3.3. Encourage physical activity

The Diabetes Prevention Program (DPP) demonstrated that increased physical activity combined with appropriate nutritional advice leading to weight loss in adults reduced the risk of transition from IGT to Type 2 DM [31]. Lifestyle modification reduced incidence of Type 2 DM in overweight individuals with IGT [32,33]. Therefore physical activity is by far the most protective lifestyle intervention and should be encouraged at all ages on a regular basis according to age and ability.

### 3.3.4. Stress in adult life

Stressful circumstances may arise at any point in the “Life Circle” due to failure of expectations. This could be secondary to nutritional inadequacy, psychosocial problems, infections and inflammations. This destabilises glycaemic control and may produce IGT/DM or worsen DM in the already established. Depression and anxiety could result and difficulties in self-care may emerge. These events may lead to oxidative stress and increased insulin resistance [34].

### 3.3.5. Promote employer and employee education

Good health increases the productivity of the workforce and minimises absenteeism. This is a positive investment in human resource and improves the health economics of every country.

### 3.4. Increased awareness and education throughout the “Life Circle”

Preventive strategies in preconception unite with that of adult life and complete the protective umbrella in the “Life Circle”. Awareness and education of this approach is the key to prevention, taking into considerations individual behaviour and environmental factors. Strategies and programmes should be tailored according to cultural practices in different communities, utilising guidelines set by successful programmes [35]. Further research should be advocated where necessary..

### 3.5. Secondary prevention strategies

The micro- and macrovascular complications of diabetes pose a huge social and economic burden. Early detection and adequate therapy will minimise complications as shown in the UKPDS and DCCT studies [36]. Continuing benefits in micro- and macrovascular risk reductions have been documented. In macrovascular complications, longterm intensive intervention of multiple risk factors such as lowering of glucose, blood pressure and lipids is essential [37,38].

The total cost of managing individuals with complications is three times that of persons with diabetes without complications [39]. It has also been shown that there is a significant reduction in complications with lifestyle or pharmacological intervention [40]. Healthcare expenditure can be decreased by early diagnosis and adequate control to minimise complications. Hence secondary prevention strategies should be implemented as per the IDF Global guidelines [41].

*Promoting awareness that the cost of complications is higher than the cost of prevention to individual, family and community is vital.*

#### 3.5.1. Multi-factorial/multi-disciplinary/multi-sectoral approach to care

The multi-sectoral approach advocates the concept of total care: health, education, agriculture, physical (sports), mental and spiritual environment.

The multi-disciplinary approach requires the support of a team of well-trained, healthcare professionals and active participation of people with diabetes in the daily management of their condition [42].

The multi-factorial approach requires the person with diabetes to be active in self-management in all aspects of their condition. It has been established that education through regular and structured reviews improved patient outcome and care [43].

Combined strategies focused on good glycaemic control and reduction of cardio-renal risk factors are important.

This holistic approach to prevention throughout the “Life Circle” should be adopted in the national health programmes of all countries.

#### 3.5.2. Access to quality essential medicines to all

The level of care provided will depend on local circumstances and resources. Advocacy to achieve access to essential

medicines should be made a priority in all health systems. Further, quality control of all medication is essential based on WHO policies with regard to access to essential medicines and the right to the highest attainable standard of health [44].should be instituted using the STEPwise approach [8].

## 4. Conclusions

The Kathmandu Declaration has given consideration to the early onset and the rising incidence of Type 2 DM and has addressed the need for effective primary and secondary prevention strategies to reduce the burden. It has highlighted the need for comprehensive, low cost, culturally sensitive and pragmatic primary prevention strategies to be developed and implemented through local action plans based on evidence.

The unique “Life Circle” approach to prevention and care is vital in the planning and implementation of national, regional and global diabetes prevention programmes as the interactions of all aetiological factors are recognised.

*Entering the circle at any point is beneficial and never too early nor too late.*

By virtue of the evidence presented, the Kathmandu Declaration merits its position as an integral component of the implementation strategy of the IDF UNR on prevention and care of Type 2 DM.

## Conflict of Interest

None.

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