

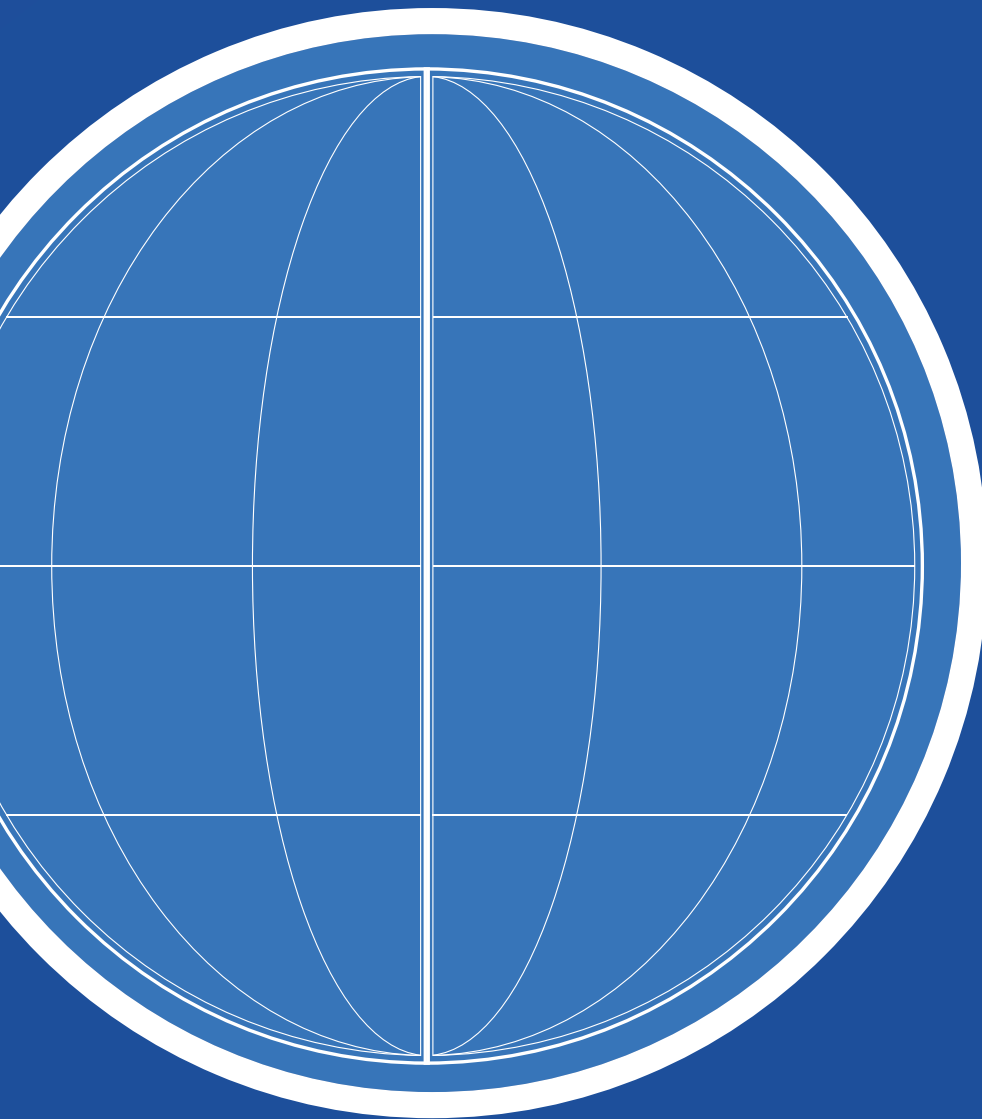


**International  
Diabetes  
Federation**

# Diabetes and Climate Change Report

International Diabetes Federation

June 2012



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This report has been produced with the support of Bupa.

# EXECUTIVE SUMMARY

Global trends in demography, migration, urbanisation, consumption and production are creating new challenges that threaten to damage human health and livelihoods, and derail human development and economic growth. Two urgent challenges in the 21st century are the global diabetes epidemic and climate change. Both are rapidly accelerating, are fuelled by changes in the way we live and work, and will have intergenerational effects on health, wellbeing and security. The human and financial costs of diabetes and climate change are staggering. There are 366 million people with diabetes today, a number expected to exceed half a billion by 2030. Diabetes causes 4.6 million deaths and costs over 465 billion US Dollars in global healthcare expenditure every year. Climate change is on a similar trajectory; global greenhouse gas emissions (GHGs) are set to increase by 52% by 2050, creating profound environmental, economic and human impacts.

Recognition of the immense human, economic, and environmental cost of these two challenges, particularly for low and middle-income countries (LMICs), is increasing and a large number of political commitments for action have been made. In September 2011, Member States convened at the UN High-Level Summit on Non-Communicable Diseases (NCDs) in New York and adopted the landmark Political Declaration on NCD Prevention and Control, which firmly elevates diabetes and the related NCDs onto the global stage and unequivocally reframes diabetes as a development issue. Two months later the UN Climate Change Conference took place in Durban and advanced the international community's response to climate change mitigation with the adoption of the Durban Platform for Enhanced Action. The devastating impact of diabetes and climate change in the developing world was evident in these negotiations; resource-poor countries called for urgent assistance in adapting health systems and national infrastructure to health and environmental challenges.

However, while there is an increasing sense of urgency for action, recognition of the connections between these two issues and approaches capable of jointly mitigating their risks and repercussions has been missing in policy dialogue. Policies to combat both risks to date have largely been developed in isolation, with little consideration for the impact health has on the environment and vice versa. Silos are evident in the recent political commitments, with health barely mentioned in the UN Framework Convention on Climate Change and climate change merely a footnote in the Political Declaration on NCDs.<sup>2</sup>

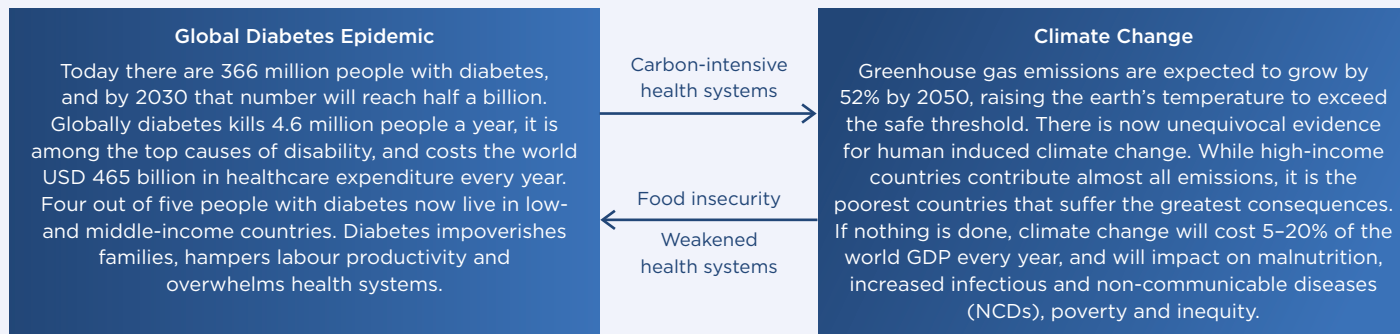
Diabetes and climate change provide a lens for understanding the broader interface between people, health and the environment. As the United Nations Conference on Sustainable Development (Rio+20) has renewed political attention on the concept of sustainable development, health must be at the heart of the agenda. Health is not only a critical outcome of sustainable development, but a vital precondition to achieving progress across the three pillars of sustainable development – social, economic and environmental. Prevention and treatment of diseases like diabetes is an opportunity to alleviate human suffering and social inequity, support economic development and lessen the environmental burden of health systems.

*The Diabetes and Climate Change Report* aims to outline the interconnections between climate change and diabetes; establish the co-benefits of combating two global risks in an integrated policy agenda; and inform the global discussion on health and sustainable development. By establishing that integrated action on diabetes and climate change will entail substantial health and environmental benefits, this report strengthens the place of diabetes, NCDs and health within sustainable development. The importance of sustainable development in defining the future development agenda – after the current Millennium Development Goals end in 2015 – necessitates this inclusion. *The Diabetes and Climate Change Report* aims to inform a holistic approach to future development which attributes equal priority to health, economic, environmental, poverty reduction and social concerns.

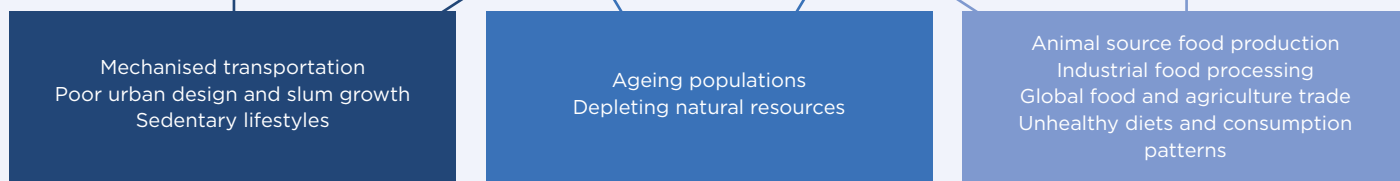
# MAPPING THE INTERCONNECTIONS:

## TYPE 2 DIABETES AND CLIMATE CHANGE

### DIRECT IMPACT



### PATHWAYS



### GLOBAL VECTORS



# THE ISSUES:

## TWO GLOBAL HEALTH AND DEVELOPMENT DISASTERS

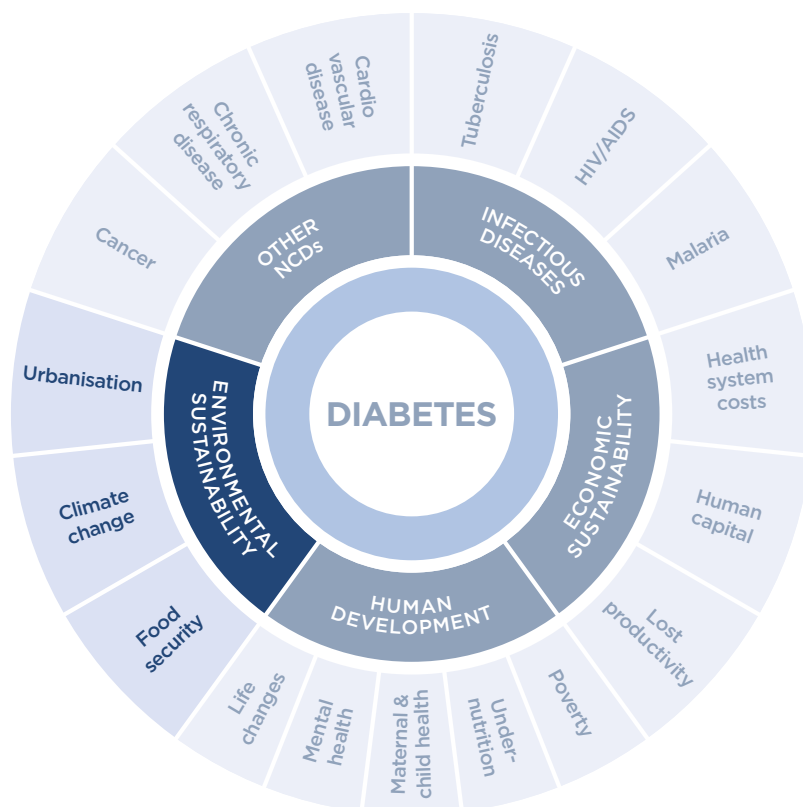
### Diabetes: a growing, deadly and costly disease

Diabetes is a global epidemic at crisis levels. Today there are 366 million people with diabetes worldwide, a figure which will rise to 552 million by 2030. Over four million people die from diabetes every year, and it is among the top 10 causes of disability worldwide.

In addition to these severe health consequences, this single disease intersects with all dynamics of human and economic development, and impacts most cruelly on low- and middle-income countries (LMICs). Four out of five people with diabetes now live in LMICs and over the next twenty years the greatest increases in diabetes prevalence will be in Africa, the Middle East and South-East Asia.

The World Economic Forum (WEF) has consistently recognised diabetes and related NCDs as one of the top threats to the global economy. Diabetes results in high healthcare expenditure, loss of labour productivity and decreased rates of economic growth. The International Diabetes Federation (IDF) estimates that diabetes causes USD 465 billion in global healthcare spending in 2011 – equivalent to 11% of total global healthcare expenditure – and the high costs of diabetes treatment and care can plunge vulnerable households into cycles of catastrophic expenditure, impoverishment and illness.<sup>3</sup>

The UN Summit on Non Communicable Diseases (NCDs) held in September 2011, coupled with the Political Declaration on NCD Prevention and Control, constituted worldwide political affirmation that diabetes and NCDs are development issues. The Political Declaration states that the “*global burden and threat of NCDs constitutes one of the major challenges for development in the 21st Century*”.



**Figure 1: The Critical Connections of Diabetes**

IDF has explored the critical connections between diabetes and many aspects of global development. They range from other health issues, including other NCDs and infectious diseases, and human development, economic sustainability and environmental sustainability. These fundamental links mean that preventing and controlling diabetes brings significant and measurable benefits for global development and the objectives prioritised in the Millennium Development Goals (MDGs).

“  
CLIMATE CHANGE  
IS THE DEFINING  
CHALLENGE  
OF OUR  
GENERATION”

UNITED NATIONS  
SECRETARY GENERAL  
BAN KI-MOON

### **Climate Change: an environmental, economic and human threat**

Climate change and its rapid progression in recent decades threaten the health and survival of our planet and its ecosystems, and thus humans. There is now unequivocal evidence for human-induced climate change. The process of industrialisation has led to widespread increases in the use of fossil fuels and the release of greenhouse gases (mostly carbon dioxide) into the atmosphere.<sup>4</sup> In conservative estimates, global greenhouse gas emissions (GHGs) are expected to grow by 52% by 2050, raising the earth's temperature to above the 'safe threshold.' GHGs increased by 5.8% in 2010 alone.<sup>5</sup>

Climate change has environmental, human and economic implications. Well-established environmental impacts include increasing ocean temperatures and rising sea levels; changes in rainfall patterns creating severe droughts and floods; the extinction of many habitats and species; and the increasing frequency and intensity of extreme events such as hurricanes, floods and droughts.<sup>6</sup>

Climate change is potentially the largest threat to human health in the 21st Century. Climate change is exacerbating existing health risks including increased morbidity and mortality from NCDs; the spread of many infectious diseases; and the outbreak of extreme events which lead to death, injuries and the outbreak of diseases, diarrhoea and malnutrition.<sup>7</sup> Climate change was estimated to cause 5.5 million disability adjusted life years (DALYs) in 2000.<sup>8</sup> It will widen social and health inequity through mass environmental displacement, unplanned migration and conflict. Such population insecurity will have profound consequences for the social determinants of health – the conditions in which people are born, grow, live, work and age.<sup>9</sup>

Climate change destabilises economies and undermines development, estimated to cost between 5% and 20% of global Gross Domestic Product (GDP) every year.<sup>10</sup> This is without consideration of rapidly accelerating GHG rates. And climate change has the greatest effect on those who have the least resources and who have contributed least to its cause. The world's poorest one billion people account for just 3% of GHGs but experience the most devastating impacts of climate change.<sup>9</sup> Some 70% of natural disasters occurred in the Pacific region, Asia, the Middle East and Africa between 2004 and 2006.<sup>8</sup> Climate change and extremes lead to major resource scarcity and the degradation of agricultural land and water, threatening the most vulnerable populations. Climate change threatens the achievement of the MDGs.<sup>11</sup>

### **Global issues in a diverse world**

Diabetes and climate change are global threats affecting all countries. However, their impact and the action needed to combat them differ widely dependent on resource setting. The burden of diabetes, NCDs, poor health and climate change is felt most severely in vulnerable and poor populations. Development aid and technical assistance is urgently needed in poor countries for climate change mitigation and adaptation, and diabetes prevention, early diagnosis and treatment. Investment in the health systems, urban planning and food systems of low-income countries is an opportunity to promote sustainable development, providing an alternative to overconsumption and environmental degradation. Global action is needed to protect vulnerable populations in climate change negotiations and development discussions to ensure an equitable response to health and environmental threats.

# THE INTERCONNECTIONS:

## DIABETES AND CLIMATE CHANGE

### **Diabetes and climate change work separately and together to undermine human and economic development**

The evidence of the magnitude of both diabetes and climate change is now widely accepted, as is recognition that failure to invest in these two global phenomenon has led to the current crisis. Together, this is fostering a new level of political leadership to stem these urgent challenges. In order to leverage this momentum, the linkages between these two issues must be fully recognised.

This will guide a global response that is coordinated, rather than siloed; will confer measurable benefits; and return on investment for both issues simultaneously.

Diabetes and climate change are directly and indirectly interconnected.<sup>1</sup> Direct connections refer to how diabetes and climate change adversely impact upon each other. The indirect connections refer to the common global vectors and pathways that are fuelling both these health and development disasters. Combined, they form a rationale for an aligned policy agenda to combat these problems.



<sup>1</sup>There are three major forms of diabetes – type 1, type 2 and gestational diabetes (GDM.) This report primarily focuses on type 2 diabetes, a combination of insulin resistance and insulin deficiency, which accounts for 95% of all diabetes globally

# DIRECT CONNECTIONS

## SMALL ISLAND STATES - DIABETES AND CLIMATE CHANGE

Small island developing states – at high risk of climate extremes – are disproportionately affected by diabetes, with prevalence rates in adults reaching over 20% in Pacific Islands such as Kiribati, Samoa and Tuvalu. Health systems in LMICs are ill-equipped to adapt to the rising diabetes burden and climate extremes. Diseases, injuries and the need for emergency services after extreme events place health systems under increasing pressure.

An increasing body of evidence shows that diabetes and climate change are directly linked. These links include: the impact of heat waves and extreme weather events on the health outcomes of people with diabetes; the impact of climate change on food security and type 2 diabetes risk; and the impact of rising obesity levels and diabetes complications on GHG emissions.

### Adverse Health Outcomes and Increased Diabetes Risk

People with underlying medical conditions such as diabetes are more vulnerable to the adverse health impacts of climate change. In hotter temperatures, dehydration and heatstroke increases morbidity and mortality in people with diabetes. People with diabetes are predisposed to cardiovascular events during heat waves and higher mortality from heart attack on days of high air pollution.<sup>12</sup>

Climate change increases the occurrence of extreme climatic events such as hurricanes, floods, fires, tsunamis, earthquakes and drought, which often displace people and create inadequate living conditions, slum growth, and increase resource scarcity. These are environments where the diabetes epidemic thrives, as urban slums are directly associated with obesity and diabetes risk.<sup>13</sup>

The increase of extreme climatic events is likely to damage healthcare infrastructure and threaten the delivery of care for vulnerable people with diabetes.<sup>14</sup> For example, after Hurricane Katrina swept through the southern US in 2005, over 200,000 people with chronic medical conditions such as diabetes had no access to care or essential medicines. These were primarily vulnerable and elderly populations physically unable to leave.<sup>15</sup> And, while a person with type 2 diabetes may survive without medication in the short to medium term, people with type 1 diabetes can die in a matter of days if deprived of life-saving insulin – especially in the presence of infectious and diarrhoeal diseases that are endemic in the immediate aftermath of such events.

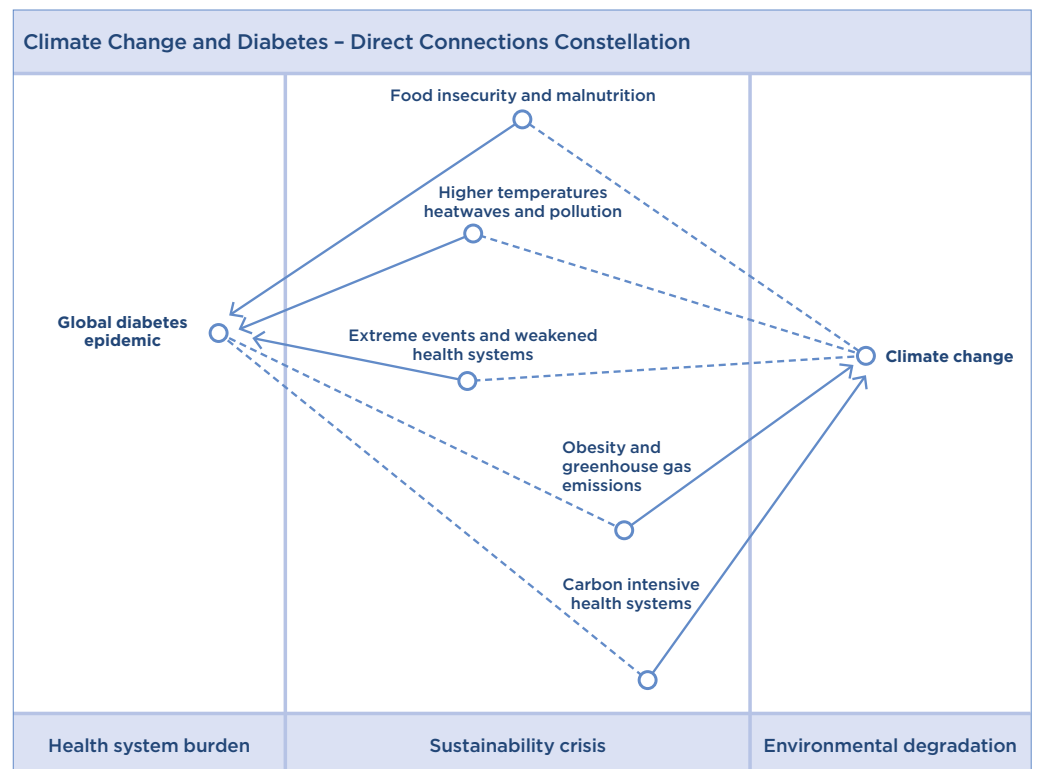


Figure 2: Diabetes and Climate Change Direct Connections Constellation



## Food Insecurity and Malnutrition

Climate change is exacerbating food insecurity. Climate change threatens agricultural production and the food supply through water scarcity and drought, the destruction of crops by climactic extremes, and impact of disasters on food logistics. Recent climate extremes – such as floods in Thailand, wildfires in Russia and droughts in Ethiopia – have created price volatility and severe food insecurity. As rising temperatures affect crops, it is estimated that half the world will experience food shortages by the end of the 21st Century.<sup>8</sup>

Food insecurity has major implications for malnutrition, health and diabetes. Both over-nutrition and under-nutrition increase an individual's risk of developing type 2 diabetes and related NCDs. Maternal under-nutrition in pregnancy increases the risk of the infant developing obesity and type 2 diabetes in later life.<sup>17</sup> Under-nutrition in pregnancy is already widespread in LMICs and will only increase as climate change intensifies.

Climate change will make fresh produce expensive and scarce as traditional food supplies are disrupted.<sup>18</sup> Vulnerable and low-income populations, who rely on agriculture and follow traditional diets, are particularly at risk. Research has established that indigenous people – who depend on traditional lands, waters, plants and animals for survival – are severely threatened by climate change.<sup>14</sup> As traditional food sources are threatened, indigenous people are forced to rely on imported and processed foods that have little nutritional value, exacerbating type 2 diabetes risk.<sup>19</sup>

Food insecurity will thus not only account for the majority of immediate climate change deaths,<sup>9</sup> but by increasing malnutrition, is set to increase type 2 diabetes and NCD risk.

## Diabetes, Obesity and Greenhouse Gas Emissions

The rising burden of type 2 diabetes and its principal driver, obesity, are likely contributing to climate change. Increasing obesity prevalence in a population increases GHG emissions from food production and car travel. It has been estimated that a population in which 40% of people are obese requires 19% more food energy than a population in which there is a normal BMI distribution.<sup>20</sup>

The rising burden of NCDs can also be casually linked to increasing emissions generated by health care systems. Failure to prevent and manage diabetes can lead to greater demands on health systems and increase their already large carbon footprint. Diabetes-related complications – such as CVD, stroke and renal failure – cost lives and money. Hospitalisations from such complications are also energy-intensive and increase GHG emissions.<sup>21</sup> This supports the argument to reorient health systems from the traditional focus on acute care to a more proactive and preventative continuing care model. Development assistance is required in resource-poor countries to support basic prevention, early diagnosis and treatment of diabetes and strengthen sustainable health system which can cope with the rising burden of NCDs.

THE NATIONAL  
HEALTH SERVICE  
IN ENGLAND  
GENERATES OVER  
18 MILLION  
TONNES OF  
CARBON DIOXIDE  
EMISSIONS EVERY  
YEAR –  
WHICH AMOUNTS  
TO 25% OF ALL  
PUBLIC SECTOR  
CO<sub>2</sub> EMISSIONS

NHS SUSTAINABLE  
DEVELOPMENT UNIT,  
NHS ENGLAND CARBON  
EMISSIONS CARBON  
FOOTPRINTING REPORT,  
SEPTEMBER 2008

# INDIRECT CONNECTIONS

DEVELOPING COUNTRIES WILL BE BUILDING THE EQUIVALENT OF A CITY OF A MILLION PEOPLE EVERY FIVE DAYS FROM NOW TO 2050

THE ROYAL SOCIETY, POPULATION AND PLANET, 2012

## Global vectors – demographic changes, rapid and unplanned urbanisation and the food system – are creating shared pathways to diabetes risk and climate change

Global vectors are forging common pathways towards type 2 diabetes and climate change. There are three major nexuses that describe these indirect interconnections:

- Rapid urbanisation – diabetes – climate change
- Changing population demographics – diabetes – climate change
- Globalised food system – diabetes – climate change

### Nexus 1: Rapid Urbanisation – Diabetes – Climate Change

The 21st Century will see unprecedented increases in urbanisation. Over half the world's population currently live in urban areas, a number predicted to rise to five billion by 2030. This transition will be concentrated in the developing world. Unplanned urbanisation intensifies the vectors of type 2 diabetes and GHGs,

including slum growth, rapid industrialisation, mechanised transportation, pollution and resource degradation.<sup>14</sup> Urbanisation – which rapidly changes lifestyles and increases exposure to risk factors including mechanised transport, insufficient physical activity and unhealthy diets – is strongly associated with type 2 diabetes risk.<sup>22</sup>

Fossil-fuel based transport adversely impacts on health and the environment. The Intergovernmental Panel on Climate Change states that 23% of global GHGs are from transport – with road traffic constituting 75% of these emissions.<sup>23</sup>

Sedentary lifestyles – defined by high levels of mechanised transportation, inactive occupations and insufficient physical activity – are also increasing worldwide. Physical inactivity is one of the four leading NCD risk factors and accounts for nearly a third of type 2 diabetes prevalence.<sup>24</sup> Increasing car use, established as a major threat to the environment, also correlates with sedentary lifestyles. Evidence shows car ownership and use correlates with physical inactivity.<sup>25</sup> These links necessitate a new urban planning model which provides healthy and 'green' transport solutions.

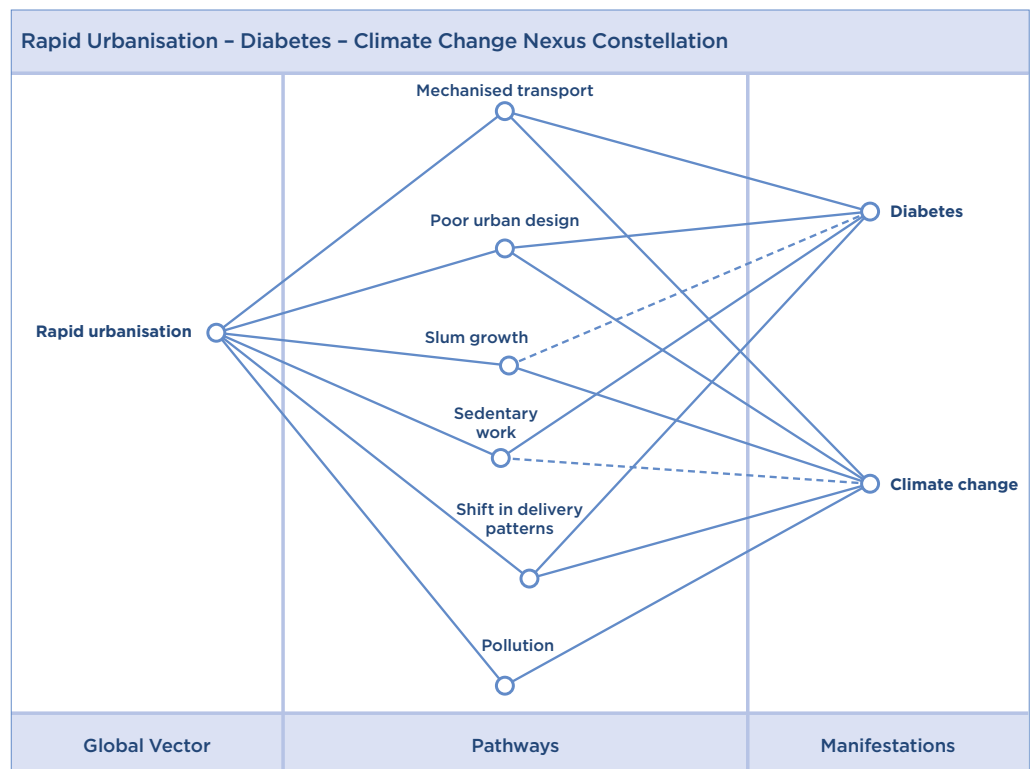


Figure 3: Rapid Urbanisation-Diabetes-Climate Change Nexus Constellation

### Nexus 2: Changing Population Demographics - Diabetes - Climate Change

The world's population is predicted to grow from seven billion in 2011, to nine billion by 2050. Such major population growth increases production and industrialisation, which are both driving type 2 diabetes and climate change.<sup>26</sup> The trend is accelerating fastest in the developing world. The population of sub-Saharan Africa is set to double or treble by 2050.

Increasing global population levels and overall material consumption have major implications for the world's resources, energy consumption and GHG emissions.<sup>27</sup> Rapid demographic changes are shifting production and consumption patterns. Spurred by globalisation, young populations in developing countries will increase demand for goods and resources. At the same time, the global population is ageing - the number of people over 60 will increase from 605 million to nearly two billion by 2050.<sup>28</sup> The prevalence of type 2 diabetes and other NCDs increases with age, with critical implications for healthcare, social services and energy consumption.<sup>2</sup>

### Nexus 3: Global Food System - Diabetes - Climate Change

The 21st Century Global Food System (GFS) is underpinned by globalisation, trade liberalisation and industrialisation. While the GFS has increased agricultural output, access to common foods and choice across the globe, this has come at a major cost to human and planetary health.<sup>29</sup> The GFS does not encourage sustainable agriculture or healthy diets, and is unsustainable in its present form. The activities of the GFS - the production, processing, storage, distribution and consumption of food - are increasing GHGs and type 2 diabetes risk.

**AGRICULTURE:** The agricultural system produces up to a third of GHG emissions worldwide - with agricultural food production responsible for 10-12% of global emissions. Livestock production causes the majority of agricultural emissions and poses a major threat to the planet.<sup>30</sup> GHGs are emitted at almost every stage of the livestock production process and the 'carbon cost' of meat is seven times that of vegetables.<sup>31</sup>

“ THE CURRENT FOOD SYSTEM IS DEEPLY DYSFUNCTIONAL. THE WORLD IS PAYING AN EXORBITANT PRICE FOR THE FAILURE TO CONSIDER HEALTH IMPACTS IN DESIGNING FOOD SYSTEMS, AND A CHANGE OF COURSE MUST BE TAKEN AS A MATTER OF URGENCY ”

OLIVIER DE SCHUTTER,  
UN SPECIAL RAPPORTEUR  
ON THE RIGHT TO FOOD

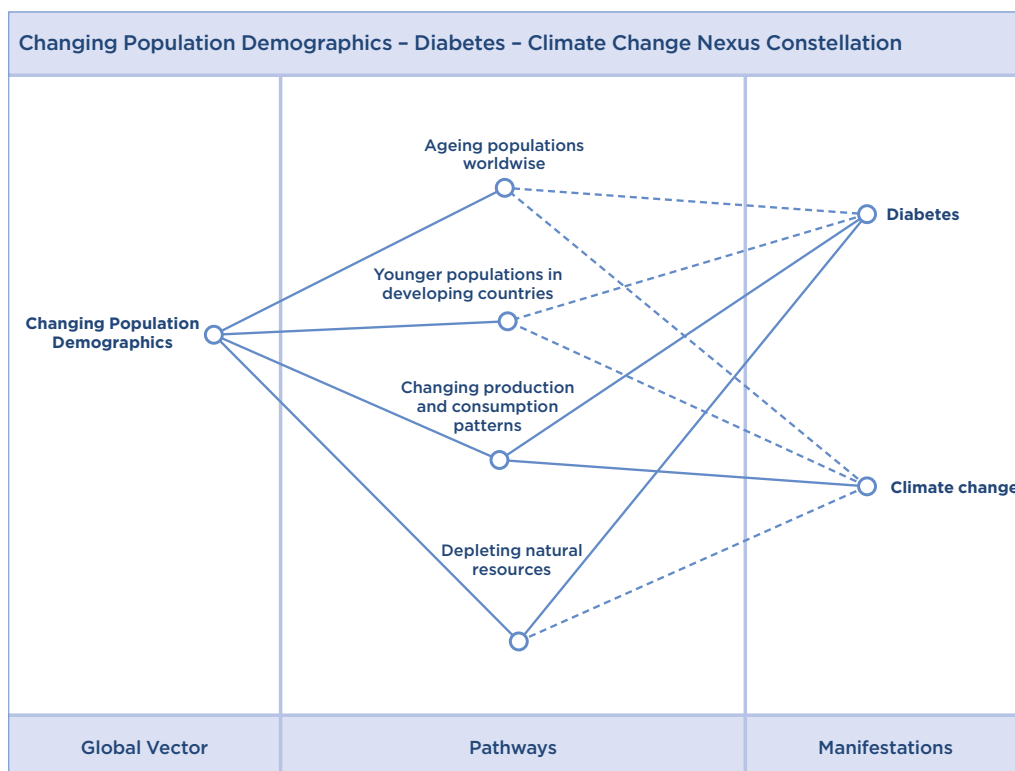


Figure 4: Changing Population Demographics-Diabetes-Climate Change Nexus Constellation

**BRAZIL – LIVESTOCK SECTOR**

The expansion of the livestock sector in Brazil – the country now accounts for 25% of the world’s beef exports – has come at a major environmental and public health cost. Brazil is the fourth largest emitter of CO<sub>2</sub> worldwide and the livestock sector is responsible for 75% of GHG emissions in the country. The increase in animal produce is driving a rising fast food culture in Brazil. 1.6 million Brazilians eat at McDonalds every day.

Brighter Green, Policy Brief: Cattle, Soyation and Climate Change – Brazil’s Agricultural Revolution

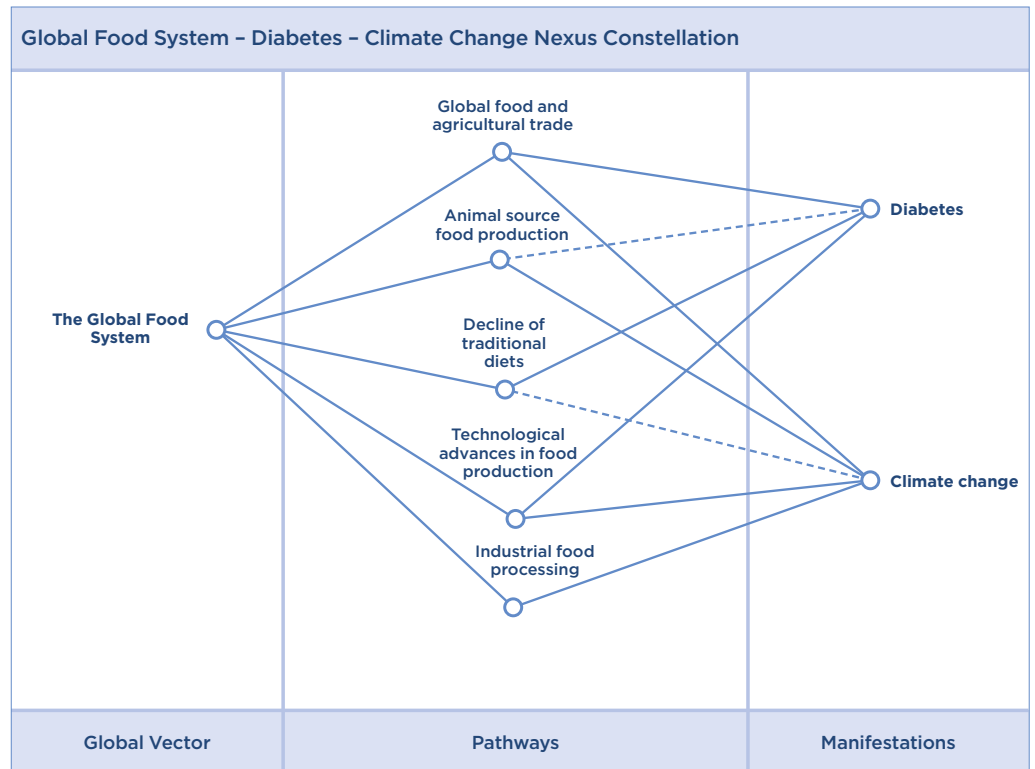
Demand for animal produce continues to grow in the 21st Century. Rising demand – particularly in transition economies – is projected to increase by a staggering 85% from 2000-2030, with major implications for GHG emissions, the degradation of resources and food security.<sup>32</sup> Animal products are nutritionally important, but are equally major sources of saturated fat and leading components of unhealthy diets. Diets high in saturated fats from animal products – particularly red meat and processed meats – are associated with increased obesity, type 2 diabetes and NCD risk.<sup>33</sup>

**FOOD PRODUCTION:** Advances in food production in the 20th Century have increased availability and affordability of processed and energy-dense foods.<sup>34</sup> Processed foods not only increase type 2 diabetes and obesity risk in comparison to fruit, vegetable and cereal products but have adverse environmental impacts.<sup>35</sup> Carbon intensive production, transport, storage and retailing methods are required for processed and packaged foods.

Urbanisation contributes to this problem, with urban areas disconnected from traditional fresh foods and reliant on imports, increasing distances from ‘farm to fork’ and GHGs from transportation.<sup>36</sup>

Demand for processed foods in urban areas has increased palm oil and sugar production in tropical countries, leading to harmful land clearing and deforestation practices.<sup>37</sup>

**DIETARY PATTERNS:** Economic development and the globalisation of the world’s food system have led to major changes in dietary patterns. As people’s incomes increase, food consumption moves away from traditional diets based on staple grains, locally grown vegetables and fruits, to diets high in processed foods, saturated fats and sugar, and low in fibre. This ‘nutrition transition’ is associated with high levels of obesity, diabetes and NCDs.<sup>38</sup> Obesity rates nearly doubled in every region of the world between 1980 and 2008.<sup>39</sup> The upwards trajectory of the obesity epidemic shows no sign of abating – it is predicted that over 50% of adults will be obese by 2050.<sup>40</sup> Rising obesity in the US and UK is estimated to result in a further 6-8.5 million diabetes cases by 2030.<sup>41</sup> Over-nutrition correlates with socio-economic inequality and is widespread in LMICs, where under and over-nutrition can co-exist in the same countries, communities and even households.

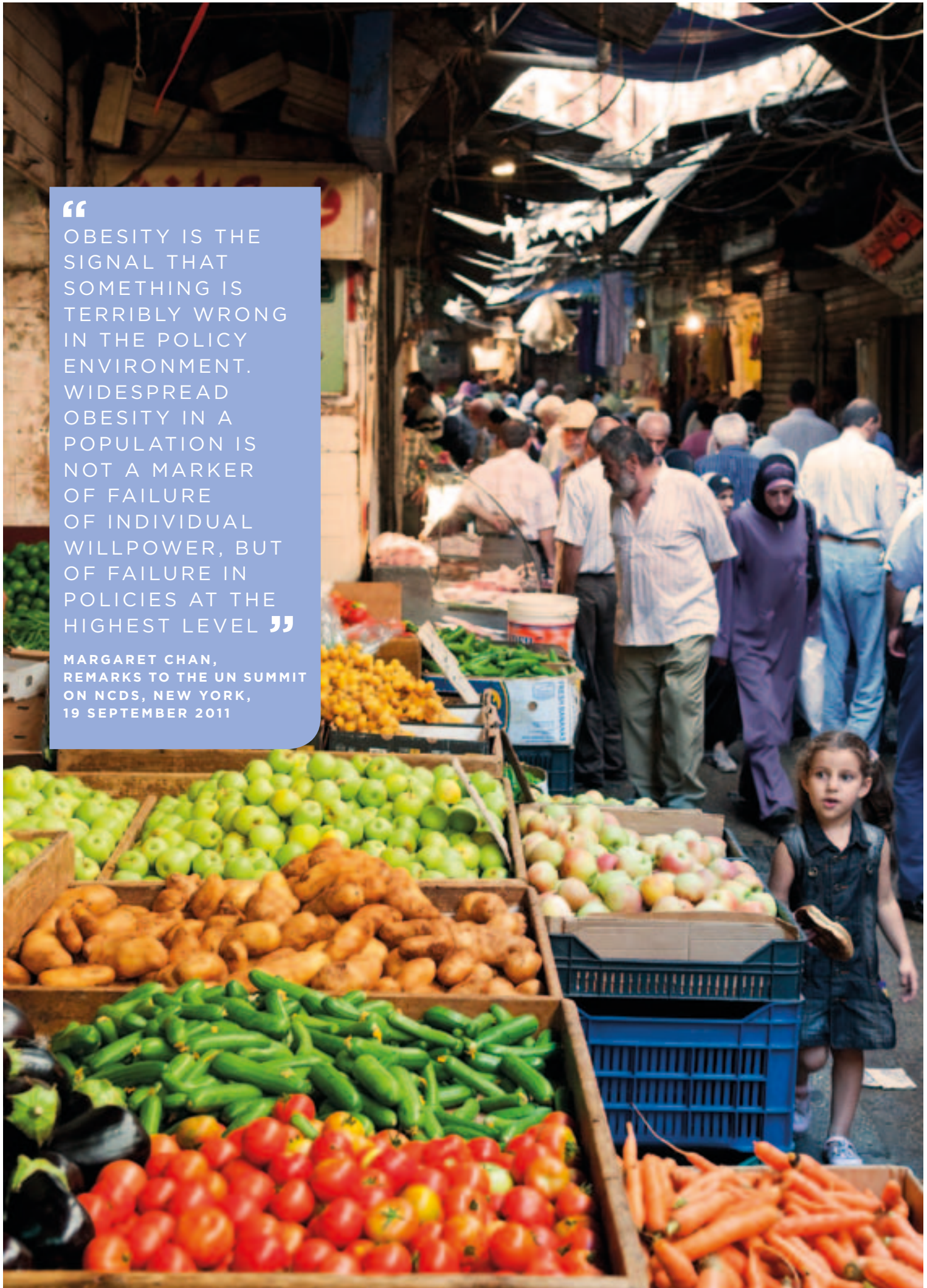


**Figure 5: Global Food System-Diabetes-Climate Change Nexus Constellation**

“

OBESITY IS THE SIGNAL THAT SOMETHING IS TERRIBLY WRONG IN THE POLICY ENVIRONMENT. WIDESPREAD OBESITY IN A POPULATION IS NOT A MARKER OF FAILURE OF INDIVIDUAL WILLPOWER, BUT OF FAILURE IN POLICIES AT THE HIGHEST LEVEL ”

MARGARET CHAN,  
REMARKS TO THE UN SUMMIT  
ON NCDs, NEW YORK,  
19 SEPTEMBER 2011



# THE OPPORTUNITY:

## CO-BENEFIT APPROACH TO COMBATING DIABETES AND CLIMATE CHANGE

### Co-benefit strategies are an opportunity to drive sustainable lifestyles, supporting healthy choices with a low environmental impact and promoting equity and wellbeing

Given the connections between diabetes and climate change, there is an urgent need to end silos between health and environmental sectors. The shared vectors of type 2 diabetes and climate change present opportunities to combat these threats together. Greater policy alignment in the global response could provide 'win-win' opportunities to mitigate climate change and risk of type 2 diabetes simultaneously. In this regard, the health co-benefit approach is crucial. There are two significant arguments for its importance:

- **PUBLIC AND POLITICAL SUPPORT:** By reframing climate change in public health terms, environmental issues will be made more understandable, significant and personally relevant to the public. Evidence has shown that individuals respond more positively to climate change mitigation policies with health benefits than those without.<sup>43</sup>
- **HEALTH, ECONOMIC AND ENVIRONMENTAL BENEFITS:** Investing in co-benefit strategies will have major health, economic and environmental benefits and build new models for sustainable development.

There can be no comprehensive answer to the challenges type 2 diabetes and climate change pose to society. However, the co-benefit strategies outlined below aim to transform high-carbon obesogenic societies to active low-carbon living, building a green economy which integrates both health and environmental concerns.

### Urban Planning Policies

Well planned urban environments can improve human and planetary health. Transport policy and urban design can facilitate healthy and sustainable choices in urban environments.

#### Transport Policy

Active travel – the distances walked and cycled by individuals – will reduce GHGs and increase physical activity. It is estimated that physically active individuals reduce their risk of developing type 2 diabetes by up to half.<sup>44</sup> In Delhi, India, increased active travel has shown to reduce diabetes prevalence by 6-17%.<sup>45</sup> If half of short trips were made by bicycle in the US, an annual USD 3.8 billion would be saved from avoided mortality and reduced health care costs.<sup>46</sup>

Active travel requires urban environments which ensure that walking and cycling are the most direct, convenient and appealing options for urban transport.<sup>45</sup> Strategies to achieve this include:

- **Urban design** which prioritises the safety and access needs of pedestrians and cyclists;
- **Vehicle restriction** by reducing car access in cities, implementing road pricing schemes, and limiting car speeds;
- **Investment and improvement in public transport infrastructure** to facilitate urban access needs, increase walking and decrease GHGs;
- **Investment in active transport infrastructure** with dedicated bicycle networks; clear signage with directions, distances and times; adequate parking for bicycles; and affordable bicycle hire and share schemes;<sup>47</sup>
- **Behavioural change promotion** through public awareness campaigns and motivational street signage to promote awareness of healthy and sustainable choices;<sup>48</sup>
- **Incentives to facilitate behavioural change** including employers subsidising employees who use public or active transport and do not commute by car.<sup>25</sup>

### Urban Planning and Design

The design of many cities is a barrier to physical activity. Impractical distances between employment, services and residential areas discourage physical activity. Integrating physical activity into everyday life is established as a crucial strategy for obesity prevention.<sup>49</sup> Implementing 'active design' into our communities, streets and building will facilitate physical activity, cut carbon emissions and support healthy physical and social living environments crucial for reducing health inequities.

Strategies to achieve 'active design' include:

- **Mixed land use** which locates housing, retail, employment and open green space close together, to ensure that walking and cycling can facilitate access needs in urban areas;
- **Green Spaces** with local access to parks and green space for leisure to provide crucial sites for exercise and serve important environmental functions;<sup>50</sup>
- **Health and Sustainability Assessment** including the environmental sustainability of buildings – such as BREEAM and LEED ratings which measure a building's environmental performance – which often incorporate health concerns.<sup>51</sup>

#### URBAN DESIGN CASE STUDY: C40 CITIES

C40 cities is a network of large cities committed to sustainability. Many of these cities have set 'green space targets', including:

- Addis Ababa: 40% of the city to be green space
- Berlin: all residential neighbourhoods to have access to public parks and city squares
- Shanghai: city to have 35% green cover and 30% forest cover by 2020

Arup and C40 Cities,  
Climate Action in Megacities,  
June 2011



**ACTIVE TRAVEL CASE STUDY:  
BOGOTA, COLUMBIA**

The capital of Colombia, Bogota, is a world renowned sustainable city. Investment in public transport and accessible pathways have improved the urban environment, active travel and sustainability since 1995. The landmark feature of the city's sustainability is the 'Ciclovía', where 120km of road is inaccessible to cars every Sunday. Women regularly participating in Ciclovía are 7 times more likely to be physically active.

World Health Organization, Policy Brief:  
Physical Activity, Sports and Transport,  
April 2011



A TRANSITION TOWARDS SUSTAINABLE DIETS WILL SUCCEED ONLY BY SUPPORTING DIVERSE FARMING SYSTEMS THAT ENSURE THAT ADEQUATE DIETS ARE ACCESSIBLE TO ALL, THAT SIMULTANEOUSLY SUPPORT THE LIVELIHOODS OF POOR FARMERS AND THAT ARE ECOLOGICALLY SUSTAINABLE ”

OLIVIER DE SCHUTTER, UN SPECIAL RAPPORTEUR ON THE RIGHT TO FOOD

## BRAZIL - INTEGRATED FOOD POLICY

The Zero Hunger program is a social protection scheme which provides an integrated approach to food security, poverty eradication, health and sustainability. It is based around a cash transfer to poor households on the condition that children attend school and continue health check-ups. The program also supports small scale sustainable agriculture – up to 30% of food for national school meals is procured from local family farms. The program has taken 49 million Brazilians out of poverty and aims to lift the remaining 16 million out of poverty by 2014. 'Zero Hunger' is inspiring similar initiatives in other Latin American, Asian and African countries.

UN Conference on Sustainable Development Secretariat, Rio+20 Issue Brief: Food Security and Sustainable Agriculture, December 2011

## Food Policies

The Global Food System (GFS) needs to be reformed to support an increasing population with a diet low in animal products and processed foods, and high in locally-produced fruit and vegetables.<sup>42</sup> The aim of the GFS must be to ensure a 'sustainable diets' – which have low environmental impacts, deliver food and nutrition security and support healthy life for present and future generations.<sup>52</sup> Outlined below are context-specific policies for climate change mitigation which will combat both over- and under-nutrition.

### Reducing production and consumption of animal products

Cutting livestock production and consumption has been identified as a crucial strategy to reduce GHG emissions, improve diets and reduce exposure to obesity and type 2 diabetes risk.<sup>53</sup> This section relates to regions in which overconsumption of animal produce is causing overweight and obesity. However, one billion people remain lucky to eat meat once or twice a year. Reducing consumption for animal products in high income countries – and shifting crop production away from animal feed – has the potential to increase human food production and is an equitable strategy to mitigate climate change.<sup>54</sup> Behaviour change in high income countries is needed to reduce demand for animal products.<sup>30</sup> The following strategies have the potential to change consumption patterns:

- Nutritional information, through dietary guidelines, awareness campaigns and food labelling to inform the public on the health and environmental threats of a diet high in animal produce;
- Marketing provides an opportunity to promote and raise awareness of healthy and sustainable diets. Countries as diverse as Sweden, Brazil and South Africa, have promoted 'meat free days' once a week;
- Market Interventions including fiscal measures to restrict unhealthy choices and enhance access to better food can be used in conjunction with other policies, as shown in countries such as France, Denmark, Finland and Peru.

However, taxation alone is not enough to change consumption habits and may have a disproportionate impact on lower socio-economic groups.

## Sustainable Agriculture

Cutting the production of processed food has to be balanced with ensuring food security and nutrition for all. Sustainable agriculture is the primary means to achieve this balance. Sustainable agriculture is defined as the capability of agriculture to contribute to overall human welfare, providing food security in an efficient, environmental sound and socially responsible way.<sup>55</sup> Investing in sustainable agriculture in low income countries will support the right to food and generate opportunities for income.<sup>52</sup>

Strategies include:

- **Localising the food system** to support small scale and sustainable agriculture rather than industrial food production.<sup>56</sup> A localised and decentralised food system will reduce food transportation, fossil fuel consumption, and ensure access to seasonal and nutritional foods.<sup>42</sup> Prioritising local and small scale food production will additionally protect health and rights of indigenous communities, support a 'green' and equitable economy and strengthen food security.
- **Urban Agriculture** is also a key strategy for localising the food system, decreasing GHGs from imported foods which entail extensive transport and storage processes.<sup>57</sup> Urban agriculture produces food within or near city centres through initiatives such as urban farms and community and school gardens. Farmers markets, street sellers and grocery stores then facilitate local access to fresh, local and seasonal foods.<sup>50</sup> Urban agriculture decreases reliance on highly processed 'street foods' by ensuring that healthy and sustainable food products, particularly fruit and vegetables, are accessible and attractive choices in cities. Successful examples exist in various resource settings, including Cuba – where urban agriculture decreased energy use, and increased food security and the production on healthy foods.<sup>58</sup>



# CONCLUSION

The scale and impact of these two challenges – type 2 diabetes and climate change – cannot be underestimated. These are truly global phenomena, threatening the health and social fabric of societies and undermining environmental and economic sustainability of all countries.

Their shared trajectories are indicative of a wider sustainability crisis that not only compromises the health of people and the planet in the future, but are impacting on the health and wellbeing of populations today. Concerted action and investment to curb type 2 diabetes and climate change is urgently required, makes economic sense, and is a moral imperative to protect current and future generations.

As the *Diabetes and Climate Change Report* has demonstrated, there are certainly no quick solutions for either of these issues. These are complex challenges that require fundamental shifts in the way we live, the way we define and approach development, and demand a long-term view that transcends many political horizons. Indeed, this has been one of the major obstacles in harnessing political leadership for both threats. However, the underexplored interconnections that this report highlights between type 2 diabetes and climate change suggest important implications for policy makers, academia and civil society within health and environment sectors. These include:

- **Coordinated thinking and aligned policies and strategies can have substantial benefits for both reducing the risk of type 2 diabetes and climate change:** Opportunities exist to unite climate change mitigation strategies with those promoting population health and diabetes prevention, including transport, urban design and food policies.
- **Framing these issues as interconnected could harness greater political leadership and support from the general public:** Reframing climate change as a global health threat has the potential to make environmental issues more socially attractive to policy makers and the general public. Vice versa, by emphasising that diabetes shares common vectors with climate change adds further urgency to tackling health;

- **There is an urgent need to end the silos between health and environmental communities and combat these global risks together:** The lens of diabetes and climate change reinforces the broader interconnections between health, environmental and economic issues. Greater collaboration and alliances is needed between UN agencies, governments, NGOs and academics to protect planetary and human health.

- **Equity must be at the core of the international response:** Social conditions determine vulnerability and impact of diabetes and climate change on populations. It is low-income countries and poor communities that are particularly vulnerable to poor health and the effects of climate change. Policy alignment on these issues needs health equity at the core and a social determinants of health approach to improve overall population and environmental health, and reduce the impact on disadvantaged populations.

- **Sustainable development must include health, diabetes and NCDs:** Health is not only a critical outcome of sustainable development, but a vital precondition to achieving progress it's three pillars – social, economic and environmental. Prevention and treatment of diseases like diabetes is an opportunity to alleviate human suffering and social inequity, support economic development and lessen the environmental burden of health systems.

*The Diabetes and Climate Change Report* raises a number of questions for health, the environment and sustainable development communities which demand further attention and further research. We look forward to forging new alliances and partnerships to take this agenda forward.

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BRUNDTLAND -  
THE ARCHITECT OF  
THE SUSTAINABLE  
DEVELOPMENT CONCEPT.

# REFERENCES

- <sup>1</sup> Andy Haines and Carlos Dora, How the low carbon economy can improve health, *BMJ*, 344:e1018, 19th March 2012
- <sup>2</sup> A/66/L.1 Political declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases. Sept 2011 United Nations; United Nations Framework Convention on Climate Change, 1992; United Nations, Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1998
- <sup>3</sup> International Diabetes Federation, *Diabetes Atlas: 5th Edition*, 2011
- <sup>4</sup> Intergovernmental Panel on Climate Change. Climate change 2007. The physical science basis. Contribution of working group I to the fourth assessment report of the intergovernmental panel on climate change. Solomon S, Qin D, Manning M, et al, eds. Cambridge University Press, 2007.
- <sup>5</sup> Olivier J G J et al., Long-term trend in global CO<sub>2</sub> emissions, PBL Netherlands Environmental Assessment Agency, The Hague, 2011
- <sup>6</sup> United Nations Framework Convention on Climate Change, Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries, 2007, UNFCCC
- <sup>7</sup> World Health Organization, Protecting Health from Climate Change (2008); Jonathan A Patz and R Sari Kovats, 'Hotspots in climate change and human health', *BMJ*, Vol 325 (November 2002)
- <sup>8</sup> *Lancet* and UCL Institute for Global Health Commissions, 'Managing the health effects of climate change', *Lancet*, Vol 373 (May 2009)
- <sup>9</sup> Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. 2008. Geneva, World Health Organization.
- <sup>10</sup> Stern N. The economics of climate change. Cambridge: Cambridge University Press, 2007.
- <sup>11</sup> Nicholas Stern, Managing climate change and overcoming poverty: facing the realities and building a global agreement on poverty', Policy Paper, Centre for Climate Change Economics and Policy, Grantham Research Institute on Climate Change and the Environment, 2009
- <sup>12</sup> Michael A McGeekin and Maria Mirabelli, Potential impacts of climate variability and change in temperature-related morbidity', *Environmental Health Perspectives*, Vol 109 (May 2001); Harvard School of Public Health, Effects of temperature patterns on long term mortality, accessed on line at <http://www.hsph.harvard.edu/news/press-releases/2012-releases/summer-temperature-variability-mortality-risk.html>; Semenze et al., Excess hospital admissions during the July 1995 Heat Wave in Chicago, *Am J Prev Med*, 16 (4) (May 1999); Antonella Zanobetti and Joel Schwartz, Cardiovascular damage by airborne particles: are diabetics more susceptible?, *Epidemiology*, Vol 13, No 5, September 2002
- <sup>13</sup> Misra A., High prevalence of diabetes, obesity and dyslipidaemia in urban slum population in Northern India', *Int J Obes Relat Metab Disord*, 25, 11 (November 2001)
- <sup>14</sup> Intergovernmental Panel on Climate Change. Climate change 2007. Impacts, adaptation, and vulnerability, Contribution of working group II to the fourth assessment report of the Intergovernmental Panel on Climate Change. Parry ML, Canziani OF, Palutikof JP, van der Linden PJ, eds. Cambridge University Press, 2007); International Institute for Environment and Development, Health: mainstreaming environment and climate change (July 2011)
- <sup>15</sup> White House, The Federal Response to Hurricane Katrina - Lessons Learned (2006)
- <sup>16</sup> Anthony J McMichael, 'Climate Change and Health: Priorities and Perspectives', *Centre on Global Health Security, Chatham House* (December 2011); Brighter Green, Policy Brief - 'Climate, Food Security and Growth: Ethiopia's Complex Relationship with Livestock'
- <sup>17</sup> Fall CHD. Developmental Origins of Cardiovascular Disease, Type 2 Diabetes and Obesity in Humans. In: E.M.Wintour-Coghlan & J.A.Owens, eds., Early Life Origins of Health and Disease. 573 ed. London: Springer Science+Business Media; 2006. 8-28
- <sup>18</sup> Intergovernmental Panel on Climate Change, *Fourth Assessment Report - Human Health* (2007)
- <sup>19</sup> Myrna Cunningham, Health, in UN DESA, State of the World's Indigenous Peoples, United Nations, New York, 2009.
- <sup>20</sup> P Edwards and I Roberts, Population adisposity and climate change', *International Journal of Epidemiology* 2009, 38 (4) 1137:1140
- <sup>21</sup> Imogen Tennison, Indicative carbon emissions per unit of healthcare activity, NHS sustainable Development Unit and Eastern Region Public Health Observatory, April 2010
- <sup>22</sup> World Health Organization, Global Status Report on Noncommunicable Diseases 2010, Geneva, 2011.
- <sup>23</sup> Kahn Ribeiro, S., S. Kobayashi, M. Beuthe, J. Gasca, D. Greene, D. S. Lee, Y. Muromachi, P. J. Newton, S. Plotkin, D. Sperling, R. Wit, P. J. Zhou, 2007: Transport and its infrastructure. In Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- <sup>24</sup> World Health Organization: First Global Ministerial Conference on Healthy Lifestyles and NCD Control - Policy Brief: Physical Activity, Sports and Transport (April 2011)
- <sup>25</sup> Roger L Mackett and Belinda Brown, Transport, physical activity and health: present knowledge and the way ahead, Centre for Transport Studies, London, December 2011
- <sup>26</sup> UK Government for Science and Foresight, The future of food and farming: challenges and choices for global sustainability (2011); John McKinlay and Lisa Marceau, 'US public health and the 21st century', *The Lancet*, 356, August 2000.
- <sup>27</sup> The Royal Society, Population and Planet, April 2012
- <sup>28</sup> United Nations Department for Economic and Social Affairs, World population prospects: the 2008 revision, highlights, 2009
- <sup>29</sup> Chicago Council for Global Affairs, *Bringing Action to the Table: How Agriculture and Food can Play a Role in Preventing Chronic Disease* (2011)
- <sup>30</sup> Food and Agriculture Organisation of the United Nations (FAO), Livestock's long shadow - environmental issues and options, FAO, 2006
- <sup>31</sup> M. Berners-Lee, C. Hoolohan, H. Cammack, C.N. Hewitt. The relative greenhouse gas impacts of realistic dietary choices, *Energy Policy*, 2012
- <sup>32</sup> Sharon Friel et al., Health and Climate Change 4 - Public Health benefits of Strategies to Reduce Greenhouse Gas Emissions: Food and Agriculture', *The Lancet*, (Vol 374, December 2009)
- <sup>33</sup> Sharon Friel et al op.cit; World Health Organization, Global Status Report on Noncommunicable Diseases 2010 op.cit; FAO op. cit; D. Aune & G. Ursin and M. B. Veierød, Meat consumption and the risk of type 2 diabetes: a systematic review and meta-analysis of cohort studies', *Diabetologia*, 52 (2009)
- <sup>34</sup> R Labonte, KS Mohindra and R Lencucha, Framing international trade and chronic disease', *Global Health*, 2011; 7 (1): 21
- <sup>35</sup> UK Government for Science and Foresight, The future of food and farming: challenges and choices for global sustainability (2011)
- <sup>36</sup> Nugent, R., Bringing agriculture to the table: how agriculture and food can play a role in preventing chronic disease, Chicago Council for Global Affairs, (2011); Kickbusch I., The food system: a prism of present and future challenges for health promotion and sustainable development, Health Promotion Switzerland (July 2010)
- <sup>37</sup> Ruth S DeFries et al., Deforestation driven by urban population growth and agricultural trade in the 21st Century', *Nature Geoscience*, 3, 178-181 (2010)
- <sup>38</sup> FAO op. cit, Kickbusch I op. cit
- <sup>39</sup> World Health Organization, World Health Statistics: A Snapshot of Global Health, 2012
- <sup>40</sup> B A Swinburn, G Sacks, K D Hall, K McPherson, DT Finegood, M L Moodie and S L Gortmaker, The global obesity pandemic: shaped by global drivers and local environments' *Lancet*, 378: 9793, 804 - 814 (August 2011)
- <sup>41</sup> Y CWang, K McPherson, T Marsh, SL Gortmaker and M Brown, Health and economic burden of the projected obesity trends in the USA and the UK, *Lancet*, 378: 9793, 815-825 (August 2011)
- <sup>42</sup> World Health Organization, First global ministerial conference on healthy lifestyles and NCD control - policy brief: food and nutrition (April 2011)
- <sup>43</sup> Kickbusch I., The food system: a prism of present and future challenges for health promotion and sustainable development, Health Promotion Switzerland (July 2010)
- <sup>44</sup> Edward W Maibach et al., Reframing climate change as a public health issue: an exploratory study of public reactions, *BMC Public Health*, 10: 299 (2010)
- <sup>45</sup> UK Department of Health 2004, At least five a week. evidence on the impact of physical activity and it's relationship to health, available from [http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/documents/digitalasset/dh\\_4080981.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4080981.pdf)
- <sup>46</sup> Woodcock J, Edwards P, Tonne C, Armstrong BG, Ashiru O, Banister D, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport, *Lancet* 2009;374:1930-43.
- <sup>47</sup> Maggie L Grabow et al., Air quality and exercise related health benefits from reduced car travel in the midwestern United States, *Environmental Health Perspectives*, 120, 1 (January 2012)
- <sup>48</sup> Sustrans, Creating the environment for active travel, February 2007; City of New York, Active design guidelines: promoting physical activity and health in design (2010)
- <sup>49</sup> N Cavill and A Bauman, Changing the way people think about health-enhancing physical activity: Do mass media campaigns have a role, *Journal of Sports Sciences*, Col 22, Number 8, pp. 771-790
- <sup>50</sup> Institute of Medicine of the National Academies, Accelerating progress in obesity prevention: solving the weight of the nation', May 2012
- <sup>51</sup> City of New York, *Plan NYC* (April 2011)
- <sup>52</sup> Royal Institute of Chartered Surveyors, Supply, demand and the value of green buildings, March 2012
- <sup>53</sup> UN A/HRC/19/59, Report submitted by the UN Special Rapporteur on the Right to Food, Olivier de Schutter , 26 December 2011
- <sup>54</sup> Haines A, McMichael AJ, Smith KR, Roberts I, Woodcock J, Markandya A, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: overview and implications for policy makers. *Lancet* 2009; 374:2104-14.
- <sup>55</sup> Foley J Ramankutty N, Brauman KA, Cassidy ES Gerber JS et al., Solutions for a cultivated planet, *Nature* 2011;478; 340-342
- <sup>56</sup> United Nations Department of Economic and Social Affairs - Department for Sustainable Development, Sustainable Development Innovation Brief Issue 7: The contribution of sustainable agriculture and land management to sustainable development. New York (May 2009)
- <sup>57</sup> Declaration of the 64th Annual UN DPI/NGO Conference Chair's Text, Sustainable societies: responsive citizens, Bonn, Germany, 3-5 September 2011
- <sup>58</sup> RUA Foundation and START, Urban agriculture, climate change and food security: responses in northern and southern Cities', accessed online at [http://resilient-cities.iclei.org/fileadmin/sites/resilient-cities/files/Resilient\\_Cities\\_2011/Presentations/A4\\_Dubbeling.pdf](http://resilient-cities.iclei.org/fileadmin/sites/resilient-cities/files/Resilient_Cities_2011/Presentations/A4_Dubbeling.pdf)
- <sup>59</sup> Corrine Kisner, 'Green Roofs for Urban Food Security and Environmental Sustainability', Climate Institute (December 2008)

# ANNEX:

## EXAMPLES OF POLICY INTERVENTIONS

### Global Governance

Further integrate global policies and practices on health and the environment in the context of sustainable development:

- Increase intergovernmental and multilateral cooperation, sharing of best practice and capacity building for integrated health and environmental action;
- Ensure global commitments and targets for food security, agriculture and urban planning integrate health concerns and impacts;
- Innovate, invest and develop health co-benefit policies, particularly in active travel, mixed land use, building design, sustainable and healthy diets, reducing animal produce consumption and urban agriculture;
- Scale up development aid and technical assistance for climate change mitigation, adaptation, and the prevention, treatment and care for diabetes and NCDs.

### National and Local Government

Implement multisectoral co-benefit strategies in urban planning and the food system to support a healthy green economy, prioritising low-income communities:

- Scale up development aid and technical assistance for climate change mitigation, adaptation, and the prevention, treatment and care for diabetes and NCDs;
- Prioritise investment in sustainable and healthy urban development, particularly focusing on active travel, public transport, and measures to decrease car use;
- Review existing agricultural policies and subsidies which encourage industrial livestock and processed food production;
- Incentivise the production, distribution and marketing of healthy foods, particularly through small scale production, urban agriculture and sustainable public procurement for schools and public institutions.

### Civil Society

Unite across health and environmental communities to:

- Promote the co-benefit approach at national and global levels, focusing on sustainable and healthy cities and food systems;
- Provide support to respective communities where needed for climate change mitigation strategies and health impact assessment;
- Collaborate on research and the promotion of linkages between health and the environment in the context of sustainable development;
- Monitor and support governments in the implementation of existing climate change and health policies.

### Business

Implement comprehensive health and sustainability initiatives:

- Implement workplace wellness schemes which prioritise health and environmental concerns, particularly through incentivising and subsidising active travel and public transport;
- Provide access to healthy and sustainable choices;
- Ensure workplaces incorporate health and environmental concerns, focusing on energy efficiency and building design which encourages physical activity and promotes health.

# ACKNOWLEDGEMENTS

The Diabetes and Climate Change Report was developed by the International Diabetes Federation (IDF) by the writing team of Ann Keeling, Katie Dain and Lucy Hadley in the Executive Office. We are indebted to the following members of the Informal Advisory Group for their invaluable contribution to this report:

Dr Fiona Adshead  
Sir George Alleyne  
Associate Professor Ruth Colagiuri  
Professor Sir Michael Marmot  
Professor Anthony J McMichael  
Professor Hugh Montgomery

IDF gratefully acknowledges the support of Bupa in the production of the report.

With additional thanks to :  
Dr. Si Win Tin, Health and Sustainability Unit,  
Boden Institute, University of Sydney  
Dr. David Pencheon and the NHS Sustainable  
Development Unit.