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Diabetes, along with other non-communicable diseases (NCDs), is a significant public health challenge of the 21st century, and a leading threat to human development. An estimated eight to 14 million people die prematurely every year in developing countries due to preventable NCDs.

According to the 4th Edition of the International Diabetes Federation Atlas, diabetes already accounts for over 9% of all deaths in the adult population in the South and Central American region, and its prevalence is expected to increase by 65% in the next two decades. In the Caribbean region, diabetes prevalence ranges between 10% and 12% in the adult population. Brazil and Mexico rank among the world’s top 10 countries with the largest population suffering from diabetes. It has a propensity to impact the poorest and most vulnerable people in low-income countries, and imposes a heavy burden on socio-economic development. Yet prevention and control of diabetes remain neglected and grossly underfunded.

The Diabetes Summit for Latin America was hosted by the World Diabetes Foundation (WDF), with co-sponsorship of the Pan American Health Organization (PAHO), and the Brazilian Ministry of Health. The summit was supported by a wide range of organisations, notably the International Diabetes Federation (IDF); the World Bank; the Latin American Diabetes Association (ALAD); the National Association of Diabetes Care, Brazil (ANAD); the National Federation of Organizations for Diabetics, Brazil (FENAD); the Juvenile Diabetes Association (ADJ), Brazil; the Cuban Society of Diabetes, National Institute of Endocrinology and Ministry of Health, Cuba; the Caribbean Food and Nutrition Institute (CFNI); the Ibero-American Development Programme for Science and Technology (CYTED) and the Spanish Diabetes Foundation.

The aim of the summit was to serve as a forum where key stakeholders in the area of NCDs, key opinion leaders, World Diabetes Foundation partners and international media could interact to create a network of committed influencers, who can drive the agenda on prevention and care in the developing world.

The summit encouraged governments worldwide, policy makers and funding bodies to prioritise prevention and care and the implementation of much-needed sustainable and far-reaching solutions to address the burden of diabetes and related NCDs. It was attended by more than 250 senior representatives, including delegates from the Brazilian Federal government as well as state health secretaries.

Representatives from 42 PAHO member states and ministries of health, plus researchers and public health experts from leading academic institutions, were among those addressing the meeting. In addition, members of national diabetes associations from the IDF South and Central America region; North America and Caribbean region; plus regional and local media also attended.

The summit brought together specialists, academics and primary care providers to discuss strategies and solutions to improve the prevention and care of diabetes. The summit unanimously agreed on the Bahia Call for Action, which calls on health authorities and policy makers from the Latin American and Caribbean Region to act now to stem the tide of NCDs threatening the public health systems and economies of developing countries. It is essential that the UN includes NCDs in its Millennium Development Goals and creates a global fund for health. With their support, participants at the summit have strengthened WDF in its resolve to work towards this goal.

Professor Pierre Lefèbvre
Chairman, World Diabetes Foundation
Dr Anil Kapur, Managing Director, World Diabetes Foundation (WDF), welcomed the speakers and participants to the Diabetes Summit for Latin America in Salvador, Bahia, Brazil. He said the summit had brought together key stakeholders and influencers who could actually make a difference to diabetes care worldwide.

Dr Kapur reminded the participants that they were all here because of the need to focus attention on the people at risk of developing, or already living with, diabetes. He was therefore delighted to introduce Ms Isabelle Melo, who has lived with diabetes for over 25 years, to welcome the delegates. She now works as a coordinator with the Brazilian Juvenile Diabetes Association on a project promoting education and awareness about healthy living in schools in Sao Paulo, in partnership with WDF.

Speaking on behalf of everyone living with diabetes in Latin America, Isabelle said that diabetes is a major challenge to both individuals and health systems, particularly in the developing world, but too little is being done to tackle it. Ms Melo said she was grateful to be able to address people who had the influence and capability of bringing about change. She said she was fortunate that her diabetes was detected in time and she had access to good care, but this was not the case for children in many developing countries. They die prematurely because their diabetes is not detected in time, because their parents do not have the resources to obtain care, because healthcare professionals lack adequate knowledge, and because health systems are ineffective. She said the government of Brazil is acting to improve access to diabetes care and, while she was thankful for it, she wished more attention could be paid to diabetes in Brazil as well other countries around the world.

Diabetes is a development issue, she continued; it causes pain and suffering as a result of easily preventable complications and prevents attainment of full potential of the people affected by it, particularly when it strikes early. She said we need to find ways to communicate the potential suffering and convert it into positive action for change if we are to win the battle. No organisation can do this alone and Ms Melo called on the governments of Latin America to come together at the summit and learn from one another. ‘We have seen the evidence, we have witnessed the despair. What we need is action,’ she said.

Professor Pierre Lefèbvre, WDF Chairman, welcomed everyone to the summit. He suggested that it is sometimes useful to re-examine history. In 1892, Dr William Osler’s *The Principles and Practice of Medicine* included only 10 pages on diabetes. He wrote that diabetic coma is an ‘almost hopeless complication’. After the discovery of insulin this should no longer be the case, Professor Lefèbvre said, but it remains sadly true in countries where insulin is not easily accessible, or where health systems do not have the capability and capacity to deal with the problem. Osler also wrote that diabetes was well known in Europe but rare in America. Today it is common in Europe and America alike, and its prevalence is increasing rapidly throughout the world. Osler also noted the fundamental role of unhealthy lifestyle in increasing the risk of diabetes. Professor Lefèbvre said it was disappointing that, in an age when genetic science has advanced so much, 16 genetic variants associated with type 2 diabetes have an almost negligible predictive value compared with classical clinical risk factors. Although we know a great deal about the causes of diabetes, its pathophysiology is still poorly understood.

Professor Lefèbvre likened the challenge of diabetes to an iceberg. The small portion showing above the water represents hyperglycaemia – an obvious marker of diabetes. Under the waterline are hidden the huge medical, economic and social consequences. He cited the case of a girl in Guatemala City with type 1 diabetes who died from ketoacidosis ‘diabetic coma’ because her mother could not afford the cost of only one vial of insulin. He pointed out that, in India, the personal cost of cardiovascular complications of diabetes drives many families into poverty. WDF aims to alleviate the burden of diabetes in developing countries, he continued, but emphasised that success depends on commitment from everyone involved.

Professor Jean Claude Mbanya, President of the International Diabetes Federation (IDF), told the summit that there is a battle raging in which Latin America and the Caribbean have suffered many casualties. He said diabetes is responsible for more than 8% of all adult deaths in South and Central America. Brazil and Mexico are among the world’s top 10 countries with the largest population of people with diabetes. Nearby, in the Caribbean, between 10% and 12% of adults have diabetes, much higher than the world average of 6.4%. If no action is taken, the problem will be even worse in the future: the IDF Diabetes Atlas predicts that 438 million people will have diabetes by 2030.

But there has been encouraging news. Latin America and the Caribbean have been leading the way in finding local, regional, and global solutions for the treatment and prevention of diabetes and other NCDs. When fighting such a global epidemic, partnerships are key. Prevention will especially require broad dialogue across all sectors.
including health, food and agriculture, urban design, and transport, as well as radical rethinking on how we live, and our concepts of development, progress, and what constitutes a good life.

The NCD Alliance is proof of the enormous power of partnerships. The alliance was formed in 2009 between IDF and its sister federations, the World Heart Federation and the International Union Against Cancer, because it was clear that they would be more effective by speaking with one voice. In 2010 they were joined by the International Union Against Tuberculosis and Lung Disease. The alliance currently represents 880 national member associations in over 170 countries.

The alliance’s first major campaign was for a United Nations summit on NCDs. On 13 May 2010, UN member states unanimously voted in favour of a high level meeting of the UN General Assembly on NCDs to be held in September 2011. The summit will take action on NCDs to a new level: raising the profile of these too long neglected diseases; mobilising the international community; securing commitments from heads of state; and sending a clear message to donors and funders on the importance of tackling NCDs. This is a best practice example of what a broad global partnership can achieve when government, civil society, academia, and other key stakeholders work together in pursuit of a clear and focused objective.

Professor Mbanya thanked Brazil for its key role in helping to make the case for the NCD summit at the UN briefing in February, and other South and Central American countries for their critical support as early champions for the NCD summit. Everyone should help with this effort and ensure that the NCD summit is not just a talking shop. Professor Mbanya concluded with the hope that, in five years’ time, we can look back and say that people in every part of the world have better lives because of what has been achieved in 2010 and 2011.

The Pan American Health Organization (PAHO) and the World Health Organization (WHO) view diabetes and NCDs as a high priority, said Dr James Hospedales, Senior Adviser, Prevention and Control, PAHO, Washington DC. People with diabetes outnumber those with HIV by a factor of 10, and many experience a lifetime of disability. Until the complex problem of obesity is resolved, the prevalence of type 2 diabetes will continue to rise. Member states agree on the importance of combating NCDs and in the actions they are taking. Good progress is being made at a policy level.

However, the importance of diabetes and other NCDs is still not fully acknowledged in Latin America, or even in North America. PAHO is preparing a road map towards the 2011 UN summit on NCDs, including information gathering, engagement and advocacy, and supporting developing countries to prepare briefings. This summit is a major policy window, Dr Hospedales said. It will raise awareness of diabetes, mobilise political commitment and resources, and stimulate the necessary inter-sectoral action. Participants will also agree goals and objectives for the years ahead. Experience of the UN’s 2001 response to HIV/AIDS shows how important this summit will be as a tipping point in the fight against the diabetes epidemic. It is therefore important that heads of state attend the summit, armed with information about the impact of diabetes on economic outcomes and social justice. There is a need for unity among summit participants and collaboration with agencies concerned with hunger and malnutrition, and to break the false dichotomy between under- and over-nutrition.

As the developing world acquires wealth, said Dr Luis Perez, Senior Public Health Specialist, the World Bank, Buenos Aires, Argentina, it also acquires the health problems of developed countries. The unhealthy lifestyles that are associated with economic gain, such as increased consumption of refined foods and reduced physical activity, are the basis of many chronic diseases. The prevalence of risk factors for NCDs increases in line with national income, and yet the poor in these countries are worst affected.

A healthy workforce is essential for economic growth and it is therefore counterproductive to ignore the burden of NCDs. In wealthy countries, health insurance and state funding meet many of the costs of healthcare. In developing countries, individuals and families bear a disproportionate share of the cost, and out of pocket spending by patients and their families forces them into poverty. Financial protection for patients is critically important. The World Bank recognises that such ‘catastrophic spending’ and impoverishment are becoming more common and pose a real challenge to developing economies.

Dr Perez pointed out that the risk factors for diabetes and its complications are shared by cardiovascular disease, respiratory disease and cancer. Diabetes prevention is therefore a key component of the World Bank’s strategy for improving health systems. This is an evidence-based systemic approach to inter-sectoral collaboration (involving education, economic change and regulation), disease prevention and health promotion. Policy makers still adopt an historical approach to NCDs, relying on ineffective models of care, and there is still a need for policy advocacy.

Diabetes affects a range of medical specialties and we need very broad involvement and collaboration to tackle it, said Dr Roger Glass, Director of the Fogarty International Centre, National Institutes for Health (NIH), Bethesda, USA.

The issue of global health has gone beyond infectious diseases and child health alone, he said. Life expectancy has risen over the last five decades and an ageing population means we need to consider a different portfolio of diseases. Whereas malnutrition was once a major challenge for middle-income countries, obesity in children and young mothers has become an important threat in only one generation.

In the US, interest in tackling NCDs has spread beyond the medical world. Business schools have become interested in how to deliver care and the logistics of economics. Schools of engineering are interested in developing new diagnostic

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Dr Alwan emphasised that this summit will serve as a forum where key stakeholders, important opinion leaders, international non-governmental organisations and international media can interact in creating a network that is committed in driving the agenda on prevention and care in the developing world. Dr Alwan invited participants to join the global NCDs network (NCDnet), which was launched by WHO during the High Level Segment of the Economic and Social Council in Geneva last year. NCDnet’s aims are shared by many: strengthening partnerships for stronger advocacy; better resource mobilisation; and scaling up the implementation of the Action Plan of the Global Strategy for the prevention of NCDs.

There is also a pressing need for national authorities to accord a higher priority and stronger political commitment to the prevention of diabetes and other NCDs. The Global Strategy for the Prevention and Control of NCDs, and its action plan, identify three priorities that all countries must address. They should establish a surveillance system as an integral part of the national health information system; reduce exposure to risk level to prevent disease; and improve healthcare, with an emphasis on primary healthcare.

His Excellency José Gomes Temporão, Minister of Health, Brazil, was unable to attend the summit and provided his message via a pre-recorded video speech which was presented by Dr Adson França, Special Technical Adviser to the Federal Ministry of Health, Brazil. He said the debate about diabetes prevention is of special relevance to his country.

The Honourable Minister of Health said that for Brazil it is, without doubt, a source of great satisfaction to welcome specialists from 34 countries at this summit, during the biggest event on diabetes in Latin America.
Brazil is experiencing a series of transitions, cutting across the whole of Brazilian society and having a huge impact in the health sector. The first of these transitions is a demographic one. Brazil is doing in 50 years what Europe took 100 years to do. The differences and inequalities that persist in Brazilian society mean that the chronic diseases associated with affluence exist side by side with the problems of underdeveloped countries. As the structure of the Brazilian family evolves, the average family’s pattern of consumption is changing, with a tendency to eat more foods with a high concentration of sodium, sugar and fat. This is reflected in the illnesses suffered and causes of death of Brazilian citizens. The most recent research shows that 40% of the Brazilian population are overweight and 15% are obese. It is estimated that 11 million people have diabetes, of whom 7.5 million are aware of their diagnosis. This is why, His Excellency said, we stress the need to change lifestyle by eating appropriate food and taking regular physical exercise.

The Ministry of Health is raising a new political awareness with regard to health – ensuring, for example, that citizens understand that prevention and suitable guidance on healthy habits have a direct impact on the quality of life, on the profile of disease and mortality of the population, and on the pressure of demands on the health system. Since 2007, Brazil has been developing the National Health Education Strategy for Diabetes Self-Care. This envisages the formation of a network of tutors and facilitators to disseminate health education. In the specific case of diabetes, while giving priority to prevention and promotion, the government has also invested in treatment. In Brazil, the Ministry of Health provides the population with free oral medicines for diabetes, NPH and regular insulin, as well as the resources for monitoring blood-sugar levels, and syringes for administering insulin.

Diabetes patients are cared for in the public system, at levels ranging from basic to highly complex care. It is complicated work that involves different sectors, such as supervision, training of professionals, research and management. The challenges are enormous, providing even more justification for this summit.

This summit is the next step in a series of important international health events taking place in Brazil. In late 2009, this country hosted the World Health Organisation’s first Global Forum on Trauma Care and the 36th World Hospital Congress, both in Rio de Janeiro. Looking ahead, in December 2010 it will hold the first World Congress of Social Security Systems. Brazil has also been chosen to host the first World Congress on Social Determinants of Health, an official event of the World Health Organization, in October 2011. Not long ago, the city of Rio de Janeiro was chosen to host the 2016 World Congress on Family Health, along with the Olympic Games. He concluded by wishing everyone attending the summit success, good work and an excellent conference.

His Excellency Mr Jaques Wagner, Governor of Bahia, Brazil, was unable to attend the summit. His speech was delivered by Dr Jorge José Solla, State Health Secretary, Bahia. Dr Solla said that Brazilians have become increasingly concerned about diabetes and this has been reflected in a demand for information from the public and growing interest in the media. To spontaneous applause from the participants, Dr Solla stated that the Federal Government in Brazil had passed a legislation on food labeling and advertising. He congratulated those in the administration who had worked to introduce and approve the legislation. This issue is fundamental to protecting public health and reduce NCDs, Dr Solla said, and Brazil was brave to tackle it.

In 1988, Brazil approved a universal health system – a daring move for a country with such deep inequalities and economic difficulties. The plan provides prevention, diagnosis, and treatment for the entire population. Substantial progress has been made to reduce infectious diseases, child mortality and malnutrition, and overweight and obesity, and these have extended to the poorest groups in society. With a fall in unemployment and an expansion of the middle class, there has been an increase in type 2 diabetes, and it is believed that 16% of the over-40s may have diabetes. There has also been an increase in demand for hospital beds, rising from 9000 in 2005 to 11 000 now.

These are major concerns for the health system and there is an urgent need to develop health promotion policies to tackle these challenges. Brazil has made a huge effort to increase access to medicines. In Bahia, the number of trained health professionals has been increased and the hospital network expanded. Brazil recognises that diabetes presents a major challenge to public health and it is pleased to participate in, and to support, this summit.
The prevalence of diabetes has risen rapidly in the US as the population has become older, more diverse, more sedentary, and more overweight and obese. Nationwide, 11% of adults have diabetes, and over a quarter of those over 65 are affected. Diabetes is the leading cause of irreversible kidney failure and of new cases of blindness in adults aged 20–74; it accounts for 60% of lower limb amputations; it increases the risk of heart disease, stroke and birth defects; and is the seventh leading cause of death on death certificates.

While proven effective treatments can substantially improve outcomes at every stage of the disease, prevention of diabetes and its complications offer even greater health gains (Figure 1). NIDDK (www.niddk.nih.gov) has supported several major trials of strategies for primary and secondary prevention of diabetes and its complications in young people and adults. Of particular note is the Diabetes Prevention Program which demonstrated the efficacy of lifestyle change or metformin in preventing or delaying type 2 diabetes in adults with pre-diabetes. This landmark trial has been followed up with translational research, testing more cost-effective approaches to prevention that can be widely implemented in communities. The pilot phase has shown that affordable group sessions in community settings may be a feasible and cost-effective strategy for adults with pre-diabetes, and led to coverage of the service by a major US health insurer.

There is growing acceptance that medicine should be more predictive, personalised, pre-emptive and participatory. Genetics offers us an avenue to achieve this. Progress has been rapid with approximately 30 genes or gene regions associated with type 2 diabetes, and 40 associated with type 1 diabetes identified. Uncovering genes predisposing to diabetes brings the prospect of a better understanding of disease pathways and more targeted interventions. The Genes and Environment Initiative at NIH (http://genesenvironment.nih.gov) is bringing together research to identify genetic variation associated with chronic illnesses alongside studies developing technology and biomarkers for the effects of environmental factors such as nutrition and physical activity. For example, it has recently been shown that gut bacteria may be important determinants of nutrient absorption: bacteria associated with increased capacity for extracting energy from the diet predominate in obese mice and humans compared with lean controls. These novel findings add to earlier knowledge of factors contributing to weight gain in ethnic groups who migrate from impoverished to wealthy countries; we know that low metabolic rate, low spontaneous physical activity, low sympathetic nervous system activity and low fat oxidation may all contribute to an increased risk of obesity.

The US National Diabetes Education Programme is a Department of Health and Human Services initiative co-sponsored by NIH and the Centers for Disease Control and Prevention, with more than 200 public and private partners. It aims to reduce the burden of diabetes by facilitating the adoption of proven approaches to prevent or delay the onset and progression of diabetes and its complications. The programme has two outreach strategies, one for prevention (Small Steps, Big Rewards, or Paso a Paso) and diabetes control (Control your Diabetes. For Life) (see www.yourdiabetesinfo.org and www.diabetesinformacion.org). Information to support lifestyle change is available in 16 languages and includes consumer-friendly publications tailored to young people and different age, ethnic and cultural groups.

**Figure 1.** Health gains from treatment of diabetes and its complications are smaller than early prevention of diabetes.
This session was chaired by Professor Jean Claude Mbanya and Dr James Hospedales.

Estimates of the global and regional burden of diabetes

There are 285 million people with diabetes globally and 344 million with impaired glucose tolerance, according to statistics from the International Diabetes Federation (IDF). By 2030, these figures are expected to rise to 438 million and 472 million respectively. Dr Gojka Roglic, Technical Officer, WHO, Geneva, Switzerland, pointed out that these estimates are based on data that are about seven years old and it is worrying that recent research suggests the true figure may be much higher. In China, new data suggest that 92.4 million people have diabetes – more than double previous estimates. Brazil has the largest population with diabetes in Latin America (7.6 million) and ranks fifth in the world.

The age-adjusted prevalence of diabetes among 20–79 year olds is highest in the Middle East and South Pacific, with the island of Nauru the highest at 30.9% compared with 13–19% in the Middle East. Worldwide, prevalence is higher among men under 50 years of age but higher in women over 55 (Figure 2).

There are no recent estimates of the global burden of diabetes complications because there is a lack of standardised definitions, and very few population-based studies have been carried out. It is hoped that WHO’s Global Burden of Disease update for 2005 will fill this gap.

In 2002, WHO estimated that diabetes accounted for 7% of all blindness in Latin America and the Caribbean (it is a more frequent cause of blindness in developed countries as there are fewer other causes).

Of the 33 countries in Latin America and the Caribbean (LAMC), 12 have published diabetes survey data; of these, the data from six are more than 10 years old, and 10 countries have based their estimates on 1999 data from Jamaica. IDF estimates that there are 11.2 million men and 14.5 million women with diabetes in LAMC. However, recent Chinese research suggests these data may underestimate the true burden of the disease. By contrast with developed countries, the largest proportion of people with diabetes in LAMC are in middle age groups (40–59).

In LAMC, the age-adjusted prevalence of diabetes is highest in upper and lower-middle income countries and in islands such as Trinidad and Tobago (11.7%) and the Dominican Republic (11.2%), followed by Mexico (10.8%), Jamaica (10.6%), and Suriname (10.5%). Prevalence is lowest in upper-middle income countries in central and western coastal South America, including Paraguay (4.9%), Colombia (5.3%), Ecuador (5.9%), Bolivia (6.0%), and Peru (6.2%). In high-prevalence countries, the prevalence of diabetes increases continuously with age whereas in low-prevalence countries it declines after age 60, possibly due to an increase in mortality.

In 2007, 3.7 million deaths worldwide were directly attributable to diabetes (compared with 2.1 million for HIV/AIDS). In 2010, there are likely to be 3.9 million deaths worldwide related to diabetes and its complications, of which 239 000 will occur in LAMC. In the over 50s, diabetes accounts for about one-fifth of excess deaths in women and one-tenth in men overall, although some countries report a smaller difference between genders.

It is often said that we face a diabetes epidemic. Possible causes include population aging, younger age at onset and decreased mortality from other causes, but these factors explain only 20–25% of the observed increase in prevalence. The most likely explanation is therefore an increase in the incidence of diabetes. There is currently little hard evidence to support this view but it seems likely that an increase in the prevalence of risk factors – most notably unhealthy diet, obesity and physical inactivity – is a major cause.

Diabetes related excess risk of cardiovascular diseases, chronic renal failure, retinopathy and limb amputations

As the prevalence of obesity increases, diabetes accounts for a growing proportion of mortality and cardiovascular morbidity in Brazil, said Dr Maria Inês Schmidt, Associate Professor of Social Medicine, School of Medicine, Federal University of Rio Grande do Sul, Porto Alegre, Brazil.

She explained how diabetes mortality in Brazil can be estimated from the SUS-Hiperdia registry of six million people with hypertension (n=8.9 million) and/or diabetes (n=1.6 million) and the SIM mortality registry, which...
Percentage excess risk of death due to diabetes, Countries with a high prevalence of TB and diabetes (Figure 3). The registries included overall death rates in Brazil (Figure 3). The rate of deaths linked to those with diabetes in the SUS-Hiperdia registry, 2003–2007, with rates for the general population (IM= myocardial infarction, IHD= ischemic heart disease).

Among those with hypertension in the registry, the additional presence of diabetes produced an excess risk of approximately 45% for ischaemic heart disease, 50% for renal disease, 90% for myocardial infarction and 70% for stroke. Analyses adjusting for age and gender with logistic regression demonstrated similar excess risk, comparing the rate of deaths linked to those with diabetes in the SUS-Hiperdia registry with overall death rates in Brazil (Figure 3).

A five-year cohort study in Porto Alegre, Brazil, showed that diabetes increased the risk of all-cause death by 260%, and increased the risk of fatal or non-fatal cardiovascular disease more than three-fold. In patients undergoing renal dialysis, survival is significantly lower in those who have diabetes.

Brazil aims to reduce mortality and improve the quality of life for people with diabetes, although it is still in the early stages of developing strategies to improve glucose control and prevention of macrovascular and microvascular complications. It has established a surveillance system and is promoting public health measures related to smoking control, diet and physical activity. The management of diabetes and hypertension is being reorganised to enhance primary healthcare through greater coverage by family health teams. The challenges faced are those shared by other LAMC countries and indeed throughout the world. It is essential to strengthen measures to prevent NCDs generally and diabetes in particular.

Rising burden of diabetes and consequences for tuberculosis (TB) control

The border of South Texas and Mexico is an impoverished area. The prevalence of diabetes among people with TB living there is significantly higher than in the general population, and those who have both diabetes and TB take longer to overcome their infection and have a higher prevalence of multidrug resistant TB.

Dr Blanca Restrepo, Assistant Professor of Epidemiology, University of Texas School of Public Health in Brownsville, Texas, USA, described a study involving 261 US and Mexican people with confirmed TB. The prevalence of diabetes was 42% among those from Texas (compared with 19.5% in the general population), and 36% in those from Mexico (versus 15.2%). The profile of people without diabetes was typical of a population with TB: younger, usually male, a history of drug and alcohol abuse, served time in prison, and positive HIV status. Those with both TB and diabetes represented a newly recognised group of people with diabetes at increased risk of developing TB: they were older, overweight and more likely to be women. They were also more likely to have pulmonary than extra-pulmonary TB, possibly due to the nature of the underlying immunological deficit. They were not new to the healthcare system and therefore represent a missed opportunity for TB prevention.

HIV infection is a major contributory factor to the risk of TB at the individual level, but at the population level, the attributable risk of developing TB is much greater in people with diabetes (a third of all TB cases are due to diabetes) than those with HIV (up to 6%). In this study, the highest risk group was 35–64-year-olds with diabetes, in whom TB was attributed to diabetes in half of the cases. It is therefore important for every country to be aware of the burden of TB and diabetes. WHO data show that the countries with a high prevalence of both conditions are China, India, Brazil, Bangladesh, Indonesia, Pakistan and Russia (Figure 4). There needs to be a synergy between diabetes management programmes and TB control programmes if resources are to be utilised most efficiently. Workers in TB programmes have a close, long-term relationship with their patients and this offers a good opportunity to provide education about diabetes management and control. All patients with diabetes should know their TB status, and diabetes programmes should include identification of individuals at risk of TB, such as those with poorly controlled diabetes and contacts of recent TB cases.

Figure 3. Percentage excess risk of death due to diabetes, 2007, obtained by comparing linked mortality rates of those with diabetes in the SUS-Hiperdia registry, 2003–2007, with rates for the general population (IM=myocardial infarction, IHD= ischemic heart disease).

Figure 4. Countries with a high prevalence of TB and diabetes.
The prevalence of diabetes varies widely throughout the Americas but is high in many LAMC countries, with rates as high as 17% reported for Belize, and 15% for Managua. This is strongly associated with an epidemic of obesity, with 35% of people in Belize reportedly obese (BMI ≥30 kg/m²), 32% in the USA and 20–30% in many LAMC countries. Dr Alberto Barcelo, Regional Adviser, Pan American Health Organization (PAHO), Washington DC, USA, pointed out that diabetes carries a heavy social burden. In LAMC countries, people with diabetes are 1.5 times less likely to be employed (36% versus 56%), 1.8 times less likely to achieve a technical or university degree (7.8% versus 13.8%) and 2.6 times more likely to be permanently disabled (8% versus 3%).

The economic cost of diabetes is also high. In 2000, LAMC countries spent $65 billion on diabetes care compared with $174 billion in the USA and $5 billion in Canada. In LAMC countries, the annual indirect costs of diabetes were estimated to be $3.1 billion due to increased mortality, $783 million due to temporary disability, and $50.8 billion due to permanent disability. Direct costs totalled $10.7 billion, due to hospitalisation ($1 billion), consultations ($2.5 billion), complications ($2.5 billion) and drug treatment with insulin ($1.9 billion) and oral anti-diabetic drugs ($2.8 billion). Of the long-term complications of diabetes, nephropathy accounted for 73% of costs, retinopathy for 11%, cardiovascular disease for 10% and neuropathy and peripheral vascular disease for 3% each.

The total economic burden of diabetes exceeds health expenditure in many countries (Figure 5) and, because diabetes affects men in their economically productive years, the cost of morbidity and mortality is high: in the Caribbean islands, diabetes accounts for 21206 years of productive life lost each year at a cost of $145 billion.

A large share of these costs fall on individuals. In Mexico in 2005, patients with diabetes seeking care paid a total of $162 million in out of pocket costs whereas health insurance paid out $9.4 million (the remaining costs were met by public health spending). In Brazil, out of pocket costs for diabetes in 2008 were $2108 per patient; direct costs accounted for 63% of this sum. In patients with diabetes attending selected clinics in Guatemala, Honduras and Nicaragua, mean annual out of pocket expenses totalled $528, $1168 and $245 respectively, and overall were higher for patients with at least one comorbidity than those without ($676 versus $439).

The economic burden of diabetes in LAMC countries is likely to increase as prevalence rises and this will overwhelm healthcare systems across the world, in particular the middle income LAMC countries. Strategies for primary and secondary prevention of diabetes have been shown to be effective and should be incorporated into public health programmes.

Health and social burden of diabetes in women in the Americas

Diabetes is among the main causes of death for women in the Americas and in some countries mortality among women exceeds that in men, with rates 40–50% higher in Cuba, Paraguay, Nicaragua, Panama, Haiti, Dominican Republic, El Salvador, and Guadalupe.

Healthcare appears to be less effective for women than men, said Dr Micheline Milward de Azevedo Meiners, National Professional for Non-Communicable Diseases on the Communicable and Non-Communicable Disease Unit, Pan American Health Organization, Brazil. This difference is probably due to a greater propensity to develop metabolic syndrome, poor diet, overweight and obesity, increased cardiovascular risk, a higher prevalence of depression, a different pattern of care uptake (affected by socio-cultural factors), and inadequate management of diabetes. This has implications for sexual and reproductive health, and special attention is needed on healthcare during and after pregnancy. Also, families are at risk because women are the centre of support as they are more likely to be the carers, yet they are less likely to have adequate self-care.
In 2008, PAHO published a study of the role of gender in diabetes prevention and control in Mexico. This was prompted by evidence of a 20% excess mortality from diabetes among women even though they had greater contact with health services, and the prevalence of diabetes was similar to that in men.

The gender perspective was incorporated into the Mexican diabetes programme to identify opportunities to reduce gaps in health. The new programme differentiated between men and women: the message of the diabetes prevention and control campaign shifted from ‘Mexico is taking measures’ to ‘Men and women are taking measures’. PAHO developed educational brochures targeted specifically at women (Figure 6), incorporating different recommendations for physical activity, images designed to appeal to women, and different designs and colours from literature intended for men. The initiative was well received and both women and men requested gender-specific brochures.

A copy of PAHO’s collaborative work on gender inequalities (Health of women and men in the Americas, Profile 2009) is available from the PAHO website, as is the report of the Mexico study (Best practices in gender, ethnicity and health).

In the discussion following the first session, the speakers were reminded that diabetes and other non-communicable diseases (NCDs) are associated with a greater health burden than infectious diseases. Why is this not reflected in the way WHO allocates funding? Dr Roglic said a lot of effort has gone into getting NCDs onto the development agenda, which is the route to obtaining funding. However, WHO responds to the requests of its member states and allocates its resource according to their priorities – this explains the relatively generous funding for HIV.

Dr Hospedales said there is a need to strengthen the scientific evidence linking obesity to the increased risk of diabetes and its complications. He said it is important for advocates for increased funding to speak to the head, heart and pocket of aid agencies and politicians. We should remember that diabetes risk varies not only between countries but between communities within countries. We need to update the evidence of the excess costs associated with diabetes, he added.

Several speakers at the summit described how they had incorporated the chronic care model (Figure 7) into strategies for preventing diabetes and its complications. Developed by the MacColl Institute for Healthcare Innovation, the model visualises how the components of the healthcare system and the community interact with healthcare professionals and patients. A version more relevant to low and middle income countries, the Innovative Care for Chronic Conditions (ICCC) framework, has been developed by WHO and is available from their website (www.who.int/en/).
This session was chaired by Dr Alan Moses and Dr Elsa Giuliani, who was standing in for Dr Alberto Beltrame.

**Foetal and early life origins of NCDs – maternal malnutrition and small for gestational age (SGA) babies**

The foetal origin of increased risk of non-communicable chronic disease is one of the great success stories of epidemiology, said Dr Bruce Duncan, Associate Professor, School of Medicine, Federal University of Rio Grande do Sul. Research by David Barker in the 1980s first revealed the strong ecologic association between neonatal mortality and cardiovascular disease years later. Next, he established a relationship between low birth weight and risk of diabetes in 60–70-year-olds. In recent years it has been estimated that, compared with infants of normal birth weight, those with low birth weight (<2.5kg) are 49% more likely to develop diabetes. For each kg less in birth weight, the risk of diabetes increases by 25%.

Adverse foetal and early life events are believed to program changes in gene expression that lead to disease in adult life. The specific stimulus believed to be associated with increased risk of diabetes is intrauterine growth restriction, resulting in insulin resistance, chronic low grade inflammation and endothelial dysfunction. Teleologically, these changes can be viewed as part of an intrauterine adaptive process that evolved to optimise survival in a hostile environment. However, in the current environment which is very different from that in which the human species evolved these changes have long-term adverse consequences.

Foetal programming may well be having a major impact on chronic diseases, Dr Duncan said. However, as in Latin America, low birth weight is not that frequent, the long term consequences of programming in response to intrauterine growth restriction, in population terms, are unlikely to be large. As such, although certainly deserving attention, low birthweight is unlikely to be the root cause of the current diabetes epidemic.

What can be done about it? Some major determinants, such as the size of the mother and her uterus, cannot be altered. Micronutrient supplementation is not effective. The strength of evidence supporting most interventions is at best moderate. The major modifiable determinants of low birth weight are infection, smoking and maternal weight gain. It is therefore important to screen women for infection and provide treatment. In terms of maternal weight gain, the Brazilian Study of Gestational Diabetes showed that more than one-third of underweight and normal weight women do not gain enough weight during pregnancy, while approximately 80% of overweight and 40% of obese women have excessive weight gains (Figure 8), facts Dr Duncan described as ‘shocking’ and meriting greater attention during prenatal consults.

Finally, although all women smokers anticipating pregnancy or who are pregnant should be encouraged to quit, an additional benefit can accrue in women with inadequate weight gain, he said, as women who stop smoking gain more weight during pregnancy.

If we are to stop the epidemics of obesity and diabetes we must focus not only on adults, but also on early life events, Dr Duncan concluded. Important steps toward the solution to the underlying causes of low birth weight are to create a more just society and provide quality primary care. For example, the incidence of microsomia in Brazil is lower among women with higher educational attainment and decreases with the number of prenatal visits to a doctor.

**Gestational and pre-gestational diabetes and large for gestational age (LGA) babies**

There is a strong link between obesity and overweight and the risk of type 2 diabetes, said Dr Patrick Catalano, Professor, Reproductive Biology, MetroHealth Medical Center, Case Western Reserve University, Cleveland, USA. The distribution of obesity in the United States is almost identical to that of diabetes, although the pattern varies according to ethnic background.

Boys and girls of Hispanic origin are more likely than children of non-Hispanic white, or non-Hispanic black, background to have a body mass index and adiposity above the 80th centile. Compared with the non-Hispanic white population, the risk of developing type 2 diabetes in 10–19 year olds is greater among African Americans, American Indians, Asian and Pacific islanders, and Hispanic people.

Gestational diabetes is becoming more common in the US, with the largest increase occurring in young African American women aged under 25. The intrauterine environment determines the proportion of fat at birth (normal range 12–15%) whereas fat-free mass (normally...
85–88%) is determined by genetic endowment at conception. Women who develop gestational diabetes have increased insulin resistance before they become pregnant and insulin resistance is higher in overweight and obese women. The effect of increased insulin resistance is to increase the availability of nutrients for foetal growth, leading to a large for gestational age baby. Dr Catalano said there has been a steady increase in birth weight in infants delivered at his centre which he attributed to maternal obesity.

Diabetes is a disorder of glucose metabolism, lipids and systemic inflammation and there is evidence that each of these may be present during pregnancy. In 2008, the HAPO (Hyperglycaemia and Adverse Pregnancy Outcomes) study demonstrated that maternal glucose levels – raised but below those currently used for the diagnosis of gestational diabetes – are associated with increased birth weight and an increased level of the foetal growth factor C-peptide in cord blood. Maternal triglyceride levels correlate strongly with foetal weight and, compared with lean women, obese women have raised levels of systemic inflammatory markers such as leptin, interleukin-6 and C-reactive protein.

Maternal pre-pregnancy BMI is an important determinant of neonatal fat mass and percent body fat. Among mothers with normal glucose tolerance during pregnancy, neonates born to women with BMI >25 and reduced maternal weight gain during pregnancy have significantly increased fat mass and percent body fat, compared to women with a BMI <25. Furthermore, neonates born to women with well-controlled gestational diabetes have significantly increased fat mass and percent body fat compared with those born to women with normal glucose tolerance. Maternal BMI also influences neonatal metabolic parameters at birth; compared with children born to lean mothers: those with obese mothers have increased placental weight, raised cord levels of insulin and glucose. Higher insulin resistance is associated with greater adiposity in neonates.

These changes have long-term consequences for the child. Neonatal adiposity predicts adiposity at age eight; percent neonatal body fat correlates with maternal BMI, even among women with normal glucose tolerance during pregnancy. Pre-pregnancy maternal body mass accounts for 18% of the variance in obesity at age eight; adding gestational diabetes increases this to 20–25%. Gestational diabetes is therefore important, Dr Catalano concluded, but maternal obesity accounts for the vast majority of risk.

Dr Catalano summarised these data in a model linking increased insulin resistance and systemic inflammation associated with obesity and diabetes with foetal programming and increased risks of obesity and metabolic syndrome during childhood and adult life (Figure 9).

**Early infancy as a critical period for development of obesity and diabetes**

Obesity is a leading cause of death and disability in the developed world. In the US, overweight and obesity are becoming more common even in the youngest children, with the prevalence among children aged up to two years rising by about 50%. It is emerging as a major health problem associated with nutritional transition in developing countries. Childhood obesity is bad for children and leads to adverse outcomes in adult life. It is associated with psychosocial problems, musculoskeletal and endocrine disorders, and cardiovascular disease.

Prevention must therefore start early in life, explained Dr Mathew Gillman, Professor, Harvard Medical School and Harvard School of Public Health, Boston, USA. But what are the modifiable determinants of obesity? He pointed out that weight gain in the first few months of life is predominately an increase in fat, whereas fat-free mass preferentially increases later in life. Rapid growth in infancy predicts obesity (defined by BMI) in later life. Weight gain during the first six months of life is associated with fat mass and waist circumference at age 17 and an increased score for metabolic risk factors (such as raised blood pressure and triglycerides).

Project Viva, a study funded by the US National Institutes for Health, is assessing pre- and perinatal influences on the outcomes of infancy, childhood and adult life. Adjusting weight gain for growth using the weight-for-length score (WFL), it has confirmed that WFL gain in the first six months predicts higher metabolic risk (obesity and raised blood pressure) at age three (Figure 10).

Project Viva has also shown that low cord blood levels of the hormone leptin are associated with smaller size at birth, but more pronounced weight gain in the first six months. It is therefore likely that pre- and perinatal endocrine factors may play a role in determining infant growth and the later development of obesity (in developed countries, at least).

Evidence for low- and middle-income countries is provided by the Consortium on Health Oriented research in Transitional Societies (COHORTS), which includes data from Brazil, Guatemala, India, the Philippines and South Africa. COHORTS showed that weight gain in the first two
years of life predicts better schooling and higher blood pressure, although not more so than weight gain later in childhood. Data from Brazil suggest that weight gain before age two is associated with increased waist circumference, waist/height ratio and lipid levels when compared with later weight gain.

These findings could be interpreted as suggesting that the timing of growth in lower income settings has different effects from those in high income countries. While this is a possibility, it is important to distinguish between changes in lean and fat mass. Wasting is uncommon in low- and middle-income countries but stunting in overweight children is not, and the COHORTS and Brazilian data are consistent with the effects of variation in linear growth. In line with the US data, the National Nursery School Council Program in Chile has shown that BMI at age 18 months predicts metabolic risk factors at age four. In India, lower initial BMI followed by rapid weight gain is associated with an increased risk of impaired glucose tolerance or diabetes.

There is a need for more research into this relationship to differentiate between linear growth and excessive weight gain and for longitudinal studies to investigate the role of body composition as we do not know what the optimal rate of weight gain is. It may vary for different populations and for the individuals within them. Dr Gillman cautioned against overfeeding full-term, small for gestational age babies, as this could do more harm than good because we do not know enough about the long-term consequences.

Figure 10. Weight for length gain in first six months of life predicts probability of obesity (BMI>95th centile) at age three years

PANEL DISCUSSION

Non-communicable disease prevention needs robust and integrated maternal and child health programmes

BBC presenter Mr Quentin Cooper co-ordinated questions from the floor to a panel of the morning’s speakers: Dr Maria Ines Schmidt, Dr Bruce Duncan, Dr Patrick Catalano, Dr Mathew Gillman, Ms Ann Keeling, Dr Mauricio Barreto, Dr José Calvo.

The discussion centred on how best to deliver health education to women. Dr Schmidt and Dr Catalano agreed that pregnancy provides an opportunity to deliver health messages to women and children, although there’s a lack of research to show how best to do this. Ms Keeling said IDF is developing a ‘women in diabetes’ programme with the aim of raising awareness globally. It is possible to interrupt the intergenerational transmission of diabetes by educating and empowering women and girls, she said. The panel agreed that the global importance of diabetes and other non-communicable diseases should be better recognised by funding agencies.

Dr Gillman cautioned against giving the appearance of blaming the mother for increased diabetes risk in her children: we need to find ways to intervene without making women feel bad, he said, and healthcare should be better integrated. One suggestion was to link diabetes education with a child health programme. Strong public health and primary care systems are needed to deliver education, Dr Duncan said, adding that Brazil has recently made good progress in these areas. However he warned that unless the diabetes epidemic is tackled effectively, harsher measures will be necessary to address the causes. He emphasised the importance of research in these areas, as a strong evidence base would be needed to justify such measures.

Ms Keeling said that persuading people that diabetes is a maternal and child issue is ‘a huge case to sell’. Acknowledging the concerns of several panel members that knowledge is incomplete, she emphasised the importance of this message. Many women don’t have access to healthcare and won’t prioritise their own health above that of their family.

The role of physical activity in early childhood has received little attention. Dr Gillman pointed out that recent research has shown how difficult it can be to raise activity levels, and there is still uncertainty about how much activity is necessary. Any physical activity is better than none, Dr Duncan noted, but Dr Barreto said it is difficult to define targets that policymakers can use.
ADDRESSING THE BARRIERS: FROM RESEARCH TO POLICY AND PROGRAMME

This session was chaired by Mrs Lureline Less, Dr Ruy Lopez-Ridaura, Dr Juan Rosas Cuzmán and Professor Ib Christian Bygbjerg.

Translating research into action for diabetes, learnings from the TRIAD project

Translating Research Into Action for Diabetes (TRIAD) is a programme of studies of diabetes care in managed settings in the US. It began in 1998, a time when effective interventions were not optimally implemented and it was recognised that a systems-based approach would be needed to tackle diabetes as a public health issue. TRIAD was designed to identify the barriers to delivering better diabetes care and included 11,297 patients in 10 healthcare plans. Dr Edward Gregg, Chief of Epidemiology and Statistics Branch of the Division of Diabetes Translation, Centers for Disease Control and Prevention, Atlanta, USA, summarised the findings of most value to other countries.

TRIAD showed that intensive disease management strategies improved the processes of care and patients’ perceptions of quality compared with less intensive management, but did not improve intermediate outcomes such as HbA1c, blood pressure, or serum LDL. Structural factors such as incentivising physicians and networking groups also improved care processes. TRIAD then examined the role of patient-related factors. It found that greater out-of-pocket costs (due, for example, to inadequate health insurance) were associated with lower rates of retinal examinations, health education and self-management, and with under-use of medicines and worse risk factor control. Poor diabetes control was associated with African American origin, concern about costs, depression, lack of trust in the physician, smoking and physical inactivity.

Disease management does not always achieve what health professionals expect, Dr Gregg noted, partly due to patient-related factors. In particular, TRIAD showed that this approach took no account of depression, which was particularly important for African Americans; control of cardiovascular risk factors was more thorough in men than women; and young adults with diabetes, who appeared to be healthier than their older counterparts, were particularly unlikely to receive preventative care.

These findings suggest effective diabetes management means looking beyond measuring only the processes of care. Integrated care is crucial for diabetes, out of pocket costs to the individual should be minimised (especially for effective interventions that are being promoted), and systems must be tailored to the characteristics of the community.

Further information about the TRIAD study is available at: www.cdc.gov/diabetes.

Improving care provider and patient knowledge is key to better diabetes outcomes in low resource economies

The prevalence of diabetes is increasing in Latin America because many people have a sedentary lifestyle and overweight and obesity are common. In patients who have diabetes, glycaemic control is unsatisfactory in half, and blood pressure is satisfactorily controlled in fewer than a quarter. Poor risk factor control increases the likelihood of complications and hospitalisation, both of which are associated with increased healthcare costs.

It is therefore essential that we improve the quality of healthcare, said Dr Juan Jose Gagliardino, Director of Experimental and Applied Endocrinology at the National University of La Plata, Argentina. He described the educational initiatives carried out in Latin America since 2001 to improve the knowledge and skills of the healthcare team and to empower patients. These have been shown to improve clinical and metabolic indicators of diabetes control, reduce spending on medicines, reduce hospitalisation and cut the per capita cost of care.

The latest initiative is PRODIACOR, an education intervention for doctors and patients with diabetes or hypertension. In a comparative trial, physician education was shown to reduce the median costs of drug treatment for diabetes and hypertension and this reduction was greater when patients were also educated. Providing no education, or educating patients only, was associated with increased costs over a three-year period. Clinical, psychological and metabolic indicators improved in all groups with a trend to greater gains associated with education (Figure 11). Delivering education is not an easy task but, Dr Gagliardino said, it is important never to give up.

Addressing the double burden of diabetes and tuberculosis (TB): is programme intervention at the primary care level possible?

People with diabetes are at increased risk of developing infectious disease and, as other risk factors for TB are coming under control, diabetes is becoming increasingly important as a risk factor and is threatening targets for controlling TB, said Dr Mauricio Barreto, Professor of Epidemiology, Institute of Public Health, Federal University of Bahia, Brazil. This has important implications for resource allocation.

Globally, diabetes accounts for about 10% of TB cases but there is wide variation between countries. A recent meta-analysis of 13 observational studies conducted worldwide found that diabetes is associated with a three-fold increased risk of developing TB overall, with higher risks in studies conducted outside North America. In Mexico, the risk of TB attributable to diabetes was 25%. Diabetes was found to increase the risk of TB nearly seven-fold and the effect of diabetes on TB prevalence
Pract Diab Int Supplement 2010

Primary healthcare was reorganised in 1995 to provide a family health strategy comprising 30 600 teams who deliver health promotion, disease prevention and basic clinical care; community health agents deliver education, health promotion and disease prevention. In 2004, a programme was introduced to transfer funding to families in poverty. In 2007, the government passed legislation to guarantee free distribution of medicines, and monitoring materials for people with diabetes enrolled in educational programmes.

Hiperdia is a primary care programme, based on the Chronic Care Model of integrated prevention and care for diabetes and hypertension. It includes management guidelines, education and training for health professionals, education on self-care for patients and families, advocacy, information support and pharmaceutical assistance.

It is estimated that approximately 24% of people with diabetes and 38% of those with hypertension are currently registered with Hiperdia. Three initiatives ensure access to drugs: a national list of essential drugs; a federal government programme providing a network of pharmacies from which the essential drugs are available (The People’s Pharmacy of Brazil); and a 90% subsidy for medicines for diabetes, hypertension and contraception from private pharmacies. This has successfully increased the availability of medicines; for example, the use of NPH insulin has increased annually since 2006.

The strong association between diabetes and TB suggests that joint control strategies are likely to be cost-effective. TB programmes are well established whereas diabetes control programmes are relatively recent; there is little research to show how they can best be integrated. Key high priority questions include how to implement screening (which screening algorithm, frequency, screening tools); which treatment outcomes should be measured (liver function tests, treatment effectiveness, TB recurrence, therapeutic drug monitoring, TB sensitivity); the value of the DOTS model for diabetes case management; and evaluating point-of-care diagnosis and monitoring for diabetes.

**Developing and implementing national policy for hypertension and diabetes – the Hiperdia programme**

Delivering healthcare through Brazil’s unified health system is challenging. It is a very large country with a population of approximately 193 million, 83% of whom live in urban areas. There are 5564 towns, of which 71% have fewer than 20 000 inhabitants. There are significant regional and social inequalities, and three-quarters of the population rely on public healthcare, said Dr Rosa Sampaio Vila Nova de Carvalho, National Coordinator Hypertension and Diabetes, Ministry of Health, Brasilia, Brazil. Greater affluence has been associated with increasing prevalence of overweight, and the prevalence of diabetes has been rising slowly in recent years (in 2009, it was 5.8%).

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The education strategy for health professionals facilitates teaching of self-care for people with diabetes. National and state tutors deliver education to local networks through meetings, distance learning and literature. Resources include printed materials, CDs and videos, an online library and a virtual community for forums to encourage sharing of experience (www.telessaudebrasil.org.br). To date, 1140 students have enrolled for distance learning (60 hours over six weeks), with a pass rate of 81%.

**Cost-effective interventions for preventing and treating diabetes and its complications in low resource and emerging economies**

Several interventions have been shown to reduce cardiovascular risk in people with diabetes – lifestyle change, drug therapy, controlling glucose and blood pressure, and reducing lipids. However, it may not be possible to afford every intervention. Resources are limited, interventions are not of equal value, and spending money on one initiative means forgoing an intervention elsewhere. It is therefore essential to prioritise spending to obtain the most value.

The value of health interventions is described by their cost-effectiveness – a calculation of economic cost per standardised unit of health gain (such as a quality-adjusted life-year, or QALY). There are often insufficient data from developing countries to calculate cost-effectiveness, but translating evidence from developed countries to a local setting can be challenging, said Dr Venkat Narayan, Professor of Epidemiology and Medicine, Emory University, Atlanta, USA. Effectiveness is assumed to be the same in developed and developing countries but different costs apply for the intervention and medical
Getting serious about diabetes and related non-communicable diseases

BBC presenter Mr Quentin Cooper co-ordinated questions from the floor to a panel of the afternoon’s speakers – Dr Jorge José Solla, Dr Eduardo Botelho Barbosa, Dr Maria Cristina Escobar, Dr K Venkat Narayan, Dr Edward Gregg, Mrs Lureline Less, Dr Griffin Rodgers, Dr Simone Cardoso, Dr Juan Rosas Guzman and Dr Alan Moses.

Dr Narayan noted that the incidence of diabetes and its complications could be halved just by implementing interventions that are cost-saving or cost less than $1500 per QALY and pose some feasibility challenges. Lowest priority are interventions that cost more than $1500 per QALY and pose considerable feasibility challenges.

Using this approach, Dr Narayan calculated that the first priority interventions for diabetes control in Latin America are: reducing HbA1c to <9%; reducing blood pressure to <160/95mmHg; and foot care. Second priority interventions include, in order of increasing cost: preconception care; prevention by lifestyle change; flu vaccination; eye examination; smoking cessation; and ACE inhibitor therapy for all patients with diabetes. Of these, ACE inhibitor therapy and flu vaccination are the most feasible. Third priority interventions are prevention with metformin, reducing total cholesterol to <200mg/dl, reducing HbA1c to <8%, screening for diabetes and testing for microalbuminuria, for which costs per QALY range from $3630 to $8550.

Dr Narayan cited two examples of translation trials in developing countries that will provide direct economic data. In Chennai, India, the D-CLIP study, co-funded by IDF, is evaluating the cost-effectiveness of culturally appropriate primary prevention in 700 people with prediabetes by low-cost interventions such as lifestyle change and, if necessary, metformin. In India and Pakistan, the CARRS study is evaluating secondary prevention in 1120 people with diabetes using guidelines-driven management and low-cost multifactorial risk-factor reduction.

Investing in programmes of unproven value, or not cost-effective, is a waste of limited resources – we need better information about cost-effectiveness in developing country settings, Dr Narayan concluded. Further information about setting disease control priorities in developing countries is available at: www.dcp2.org/pubs/DCP.
production, food and communication. Ultimately, however, society must change. Brazil’s success in controlling smoking was achieved not by public health measures alone but also by a change in society’s attitudes.

Emerging countries should act together in global markets to bring down the cost of medicines, Dr Narayan proposed. They have a great capacity for innovation and should not repeat the economic mistakes of developed economies by not integrating their services. Dr Moses noted that the priority is to reduce complications by improving control from moderate to good, to very good. We clearly need to supply the drugs we already have more broadly – insulin is a good example: Novo Nordisk has selected the 50 markets with the lowest per capita income to distribute insulin at very low cost and, for children in Africa with type 1 diabetes, at no cost at all. However, distribution remains an important problem that is often out of the manufacturer’s control.

A member of the audience commented that the summit had heard a lot about healthcare teams but, he pointed out, health professionals only see patients during clinic time. In Jamaica, community representatives have been trained in the basics of diabetes care so they can be a more accessible local resource; this initiative has achieved a rapid improvement in glucose control and will help the management of other NCDs. Mrs Less agreed that this was a good model when it is culturally appropriate. In Chile and other middle-income countries, she said, doctors act like God and it is the nurses and nutritionists who have contact with patients. In that country, community workers deliver health promotion but not diabetes care. Dr Guzman suggested that patients should be educated so they know what care they should expect from doctors.

Another member of the audience described a project to promote nutrition in schools in Sao Paulo, Brazil, in which the biggest obstacle to success was the adherence of the schools to the protocol. Shouldn’t nutrition and physical activity be part of the curriculum, she asked? Dr Cardoso said that people need to accept more personal responsibility for what they eat. The food industry is not united in support of tighter regulation, preferring to focus on delivering positive messages about change. Turning to how public behaviour can be changed, a speaker from the audience commented that diabetes is often presented as a biomedical issue rather than one of public health. Do all these statistics communicate effectively with the public? Dr Narayan said this reflected the way research has been done in the past. He suggested using interdisciplinary forums to disseminate information at many more levels. Dr Rodgers said that social networking provides an opportunity to introduce change – we are influenced by the behaviour of the people we interact with. Dr Gregg said that statistics are useful for informing macro-level policy but not local decisions.

Mrs Less said that diabetes is a lifestyle disease, not a medical one. We are not making progress in the fight against it and we need to step back and identify the challenges facing us. We need to raise the profile of diabetes to the same level as HIV and cardiovascular disease. ‘We need to scream the data at people because diabetes and its complications are silent killers,’ she said. ‘And now we’re dying silently.’

Asked for a final positive message from the day’s proceedings, panel members agreed that preventing diabetes is key. To achieve this, patients and health professionals need better education; emerging countries should collaborate more closely; technology should be deployed more efficiently to disseminate health messages; and healthcare should be more closely integrated.
This session was chaired by Dr Kaushik Ramaiya and Dr Manuel Vera Gonzalez.

**PAHO’s regional strategy and plan of action on an integrated approach to the prevention and control of disease**

There is still insufficient awareness among both the public and policy makers about the problems associated with diabetes and what can be done to address them. Chronic diseases have a huge economic and health impact. But, although 80% of cardiovascular disease, diabetes and stroke, and 40% of cancers, could be prevented by applying what we know, social and environmental determinants of ill health persist. They include consumption of unhealthy foods; financial and agricultural policies that work against healthy lifestyles; and a low emphasis on physical activity in the workplace, transport and schooling. In addition, public health training pursues a dated agenda by underplaying the role of non-communicable diseases (NCDs) and there is often poor access to quality health services. We are all responsible for this state of affairs, said Dr James Hospedales, Senior Adviser, Prevention and Control of Chronic Diseases, PAHO, Washington DC, USA.

In 2006, PAHO published its strategy and plan of action for prevention and control of chronic diseases, including diet, physical activity and health. Its goal was a 2% annual reduction in mortality from chronic disease in addition to current trends. This would be achieved through policy and advocacy, surveillance, health promotion and prevention, and integrated management of non-communicable diseases.

PAHO established the CARMEN (Collaborative Action for Risk factor prevention and effective Management of NCDs) network to facilitate the development of integrated policies between countries. CARMEN provides a forum for collaboration and sharing experiences, and currently includes 32 countries in South America. Together with several other agencies and government and non-governmental organisations, PAHO created the Partners’ Forum (www.partnersforum.org) to help build partnerships between the business sector, aid agencies and consumer representatives. The Partners’ Forum aims to prevent three million deaths by strategies such as reducing salt intake and tobacco use each by 20%, and increasing coverage for prevention of cardiovascular disease to 60%.

Dr Hospedales reported on progress with PAHO’s Regional Strategy. He said 250 million of the 890 million people in the Americas have a chronic disease, with low- and middle-income people worst affected. The prevalence of obesity is expected to rise to 39% by 2015 and it will become more common in children and adolescents. Although almost all member states have made progress implementing their national plans, funding for strategies to tackle chronic disease remains too low. Policy and advocacy continues with resolutions to combat chronic disease successfully passed by international agencies; many countries now include NCDs and their treatment in social care programmes. Details are available at: www.paho.org.

The Caribbean Community and Common Market countries (CARICOM, www.caricom.org) proposed a UN summit on the prevention and control of NCDs in September 2011. This will present a unique policy window Dr Hospedales said, and we have to think big. There has been too much disunity. We need to unite the forces working against diabetes and chronic diseases and for health promotion behind a clear policy package. We need a road map for before, during and after the summit, and a country-by-country advocacy campaign like that which brought heads of state together to fight HIV. This UN summit should be the biggest thing that is happened to health on this planet. How do we create a global demonstration? Who are our champions? How do we go viral and mobilise one billion text signatures?

**Quality improvement initiatives for diabetes in the Caribbean**

Presenting a Jamaican perspective on the pan-Caribbean chronic care collaborative, Dr Tamu Davidson-Sadler, Medical Epidemiologist for Chronic Diseases and Injuries, Ministry of Health, Kingston, Jamaica, said that chronic NCDs have surpassed communicable diseases as a cause of death in the Caribbean. In Jamaica, the prevalence of cardiovascular risk factors is high: 25% of people have hypertension, 35% have pre-hypertension and 12% have high cholesterol levels (Figure 12). The overall prevalence of diabetes is 7.9% but this masks increasing frequency with age (30% in 65–74-year-olds) and body mass (12% in obese individuals). Of those with diabetes, 24% are unaware of their condition; of those who know they have diabetes, 53% do not have adequate control. Almost one-third of people with chronic renal failure have diabetes.

Dr Hospedales said, and we have to think big. There has been too much disunity. We need to unite the forces working against diabetes and chronic diseases and for health promotion behind a clear policy package. We need a road map for before, during and after the summit, and a country-by-country advocacy campaign like that which brought heads of state together to fight HIV. This UN summit should be the biggest thing that is happened to health on this planet. How do we create a global demonstration? Who are our champions? How do we go viral and mobilise one billion text signatures?
This project has shown that motivation, ideas about what changes to make, and a framework for action to ensure that change leads to improvement, are key to success.

**E-access to diabetes education and information**

Dr Maria Cristina Escobar, Head of the Health of the Adult Programme, Ministry of Health, Chile, described the assessment of a freely available e-learning programme to promote self-care for patients with type 2 diabetes sponsored by WDF as part of the PAHO framework (www.cursodiabetes.com).

The e-learning programme meets the standards set by IDF. It covers approximately 20 topic areas including a description of diabetes and its complications, advice on diet and physical activity, information about medication and blood glucose control, and advice about coping with travel, eating out and illnesses. A link is provided to NUTRAEDUC, an interactive site where individuals can determine their personal nutrition status, prepare their own nutrition programme and estimate cardiovascular risk.

A comparison in 242 people revealed some differences between individuals who chose the online programme rather than a face-to-face course: they tended to be younger, and were more likely to be male, and to have a shorter duration of diabetes, a longer education history and a higher income. No-one discontinued the face-to-face programme but 44% discontinued the online programme before completion.

The face-to-face programme improved knowledge about diabetes management in insulin users and non-users, with the proportion rated as good or very good increasing from 6.3% and 10.9%, respectively, at baseline to 33.7% and 59.5%. In those who completed the online programme, the proportion rated as good or very good increased from 40% to 70%. Both programmes improved glucose control, with a decrease in median HbA1c from 7.2% to 6.6% after the face-to-face programme and from 7.0% to 6.2% with the online programme. Similar proportions of participants said the course content of each course was attractive and informative.

In Chile, health centres do not offer internet access and people who use the public health system often do not have their own internet connection. Educating people about diabetes depends largely on the enthusiasm of nurses and nutritionists; physicians need encouragement from the Ministry of Health to support the programme.

This experience has shown that it is difficult to recruit and retain participants for an online programme, and further studies are needed to evaluate it in a larger population. It can be adapted for use in other Latin American countries, perhaps as an adjunct to provide additional resources in situations with less than optimal resources for the face-to-face programme.

**E-learning for health professionals in Latin America**

Seventy per cent of adults in Mexico are obese. The prevalence of diabetes is 14% and diabetes is the commonest cause of death, primarily due to macrovascular complications, and the most frequent cause of amputation, blindness and chronic renal disease.

The reasons for these gloomy statistics, said Dr Ayeza Bonilla, Professor of the diabetes educators bachelor degree, Mexican Diabetes Federation, Mexico City, Mexico, are unhealthy lifestyle (consuming more food, less healthy food, less exercise), poverty and lack of education – of both the public and health professionals. Physicians in Mexico do not receive adequate training on the management of diabetes. They provide care in a traditional compliance model, and the public is not empowered to look after itself. Physicians and their patients believe many myths about diabetes and the value of traditional medicines.

In 1991, Dr Enrique Pérez Pastén Lucio designed the first formal course to train diabetes educators. Supported by PAHO, WDF and the Mexican Diabetes Federation, this course has been available online since 2008 with the aim of widening access and increasing the number of health professionals who can provide support and education for people with diabetes throughout the country. The eight-month modular online course emphasises the fundamental importance of self-management for diabetes control. It comprises 240 hours of instruction, and uses text and multimedia to deliver information in addition to programmed contact sessions and a forum for students to share experience. Assessment is by an online examination.

So far, 136 students have enrolled on the course, almost equally split between the public and private sectors. Physicians account for 49%, nutritionists for 34%, psychologists for 7% and nurses for 4%. Sixty-nine finished the face-to-face course and 45 finished the online course. Average grade scores were slightly higher for the face-to-face course (91% versus 83%). Since the meeting in Brazil, another 28 diabetes educators have qualified. There are now new diabetes educators throughout the country.
This session was chaired by Dr Agustin Lara Esqueda and Dr Ricardo Lopez Santi.

Building research partnerships
Dr Roger Glass, Director of the Fogarty International Centre, NIH, Bethesda, USA, explained how Fogarty aims to improve global health by supporting collaborative programmes for research and training and by building global partnerships.

In 2009, Fogarty distributed $68 million in over 400 grants to support collaborative research, fellowships and training, and capacity development. Students from the US and their counterparts from other countries train together, and scholars and fellows spend one year outside the US conducting research. Of Fogarty trainees from around the world (over 1300 from Latin America alone), almost all return to work in their home countries. Fogarty supported the Prevention, Awareness, Counselling and Evaluation (PACE) diabetes project in Chennai, India: this community-based project aimed to raise awareness about diabetes and is estimated to have delivered prevention messages to two million people and screened blood glucose in 77,000.

Together with the World Bank, WHO and the Population Reference Bureau, Fogarty is participating in the Disease Control Priorities Project (www.dcp2.org), which aims to identify ‘best buys’ and priorities for action for developing countries. Of the top 10 best buys for health, four are relevant to diabetes – ensuring healthier mothers and children, promoting good nutrition, reducing death from cardiovascular disease, and ensuring equal access to high quality healthcare.

Fogarty recognises the gap between innovations in health and their delivery to the developing world. It aims to bridge the gap in training for implementation research by building long-term collaborative relationships to build human and institutional capacity. We have not addressed the need for skills vital for effective implementation, such as economics, computing and advocacy, Dr Glass said. We need to learn from the private sector when it excels in conducting research. Of Fogarty trainees from around the world (over 1300 from Latin America alone), almost all return to work in their home countries. Fogarty supported the Prevention, Awareness, Counselling and Evaluation (PACE) diabetes project in Chennai, India: this community-based project aimed to raise awareness about diabetes and is estimated to have delivered prevention messages to two million people and screened blood glucose in 77,000.

Models for building in-country capacity for chronic disease/diabetes research
Research capacity building increases a country’s long-term ability to achieve research objectives and to deliver social change. Dr Manuel Ramirez-Zea, General Coordinator, Institute of Nutrition of Central America and Panama (NCAP), Guatemala City, Guatemala, explained the approach adopted in Central America and Panama to strengthen government and academic institutions to conduct research in nutrition.

The model comprises four levels of investment: tools (computers, statistics software, field work equipment, website); research skills (training up to doctoral level, journal club); staff and infrastructure (laboratory facilities, mentorship, provision of up-to-date information); and structures, systems and roles (research awards, regional networks, involvement of health ministries).

The model was applied to the specific task of implementing three research studies into cardiovascular disease (childhood health, primary healthcare of individuals at high risk, and identifying dietary risk factors). The aim was to build a rigorous, comprehensive and sustainable training programme for health professionals and junior researchers focused on the prevention of cardiovascular disease, and to establish a stable, collaborative network among academic and health sector institutions in Central America, Mexico and the Dominican Republic.

A needs assessment for preventing and controlling chronic disease in the nine participating countries identified policy and programme formulation and implementation, surveillance systems, primary healthcare initiatives, and education and training as target areas for development. Partners outside the region were developed with the help of PAHO and the US National Heart, Lung and Blood Institute, and within regions networks were established between universities, government institutions and non-governmental organisations.

Examples of training initiatives included a mentorship programme, encouraging application for doctoral...
programmes in the US, fellowships through the Fogarty Center, support for attending scientific meetings and research dissertation awards. Workshops focused on research methodology and obtaining funding. Information is sent via a website (www.ciipenicap.org) and newsletters.

Priorities and future vision for diabetes research

In 2010, it is estimated that 285 million people worldwide (6.6% of the population) have diabetes, of whom 70% live in low- and middle-income countries. Diabetes causes an estimated four million adult deaths every year with direct costs of $376 billion annually. In 2000, it was predicted that the number of people with diabetes in the world would increase to 366 million in 2030. The International Diabetes Federation now expects that figure to be 438 million, said Dr Griffin Rodgers, Director, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), Bethesda, MD, USA.

One reason for revising the prediction is that recent data from China suggest the prevalence of diabetes there has been grossly underestimated. In 2000, it was believed that approximately 20 million adults in China had diabetes. Careful surveillance has now revealed the true number is 92 million (9.7% of adults), with perhaps a further 148 million (15.5%) having pre diabetes. Worryingly, 60% of adults with diabetes are undiagnosed and 56% of men with diabetes smoke. In adults aged 20–39 in China, 3.2% have diabetes and 9% have pre diabetes. Extrapolating these data to Latin America suggests that 55 million people may have diabetes and 88 million may have pre diabetes.

Dr Rodgers turned to the problem of increasing overweight and obesity in youth. In the US, the proportion of 6–19 year olds who are overweight increased from 5–6% in the 1970s to 17–18% in the mid-2000s. This trend coincided with a marked increase in the availability of fast food, the advent of technology associated with reduced physical activity, and financial constraints that restricted physical activity in schools. He pointed out that in the high risk Pima Indians of Arizona, the risk that a woman’s offspring will develop diabetes in later life increases with declining maternal glucose tolerance, even within what’s considered the ‘normal’ range, as measured during the third trimester of pregnancy (Figure 13). Thus, Dr Rodgers suggested the trend of people developing type 2 diabetes at a younger age portends more intrauterine exposure and a vicious cycle of increased diabetes in future generations. Moreover, earlier onset of diabetes portends earlier morbidity. He pointed out that the cumulative incidence of end-stage renal disease in young people who were born with diabetes parallels that of older patients. When type 2 diabetes strikes in adolescence, young people may develop major diabetes-related morbidity during their early 30s, he said.

NIDDK has been involved in several major trials of primary, secondary and tertiary prevention of diabetes. These include HEALTHY (school-based intervention to reduce obesity and other diabetes risk factors), TODAY (Treatment Options for type 2 Diabetes in Adolescents and Youth, comparing three treatment regimens in 12–17 year olds), DPPOS (Diabetes Prevention Program Outcomes Study), showing the durability of lifestyle change or metformin in delaying type 2 diabetes – this has been followed by pilot translational research. Look AHEAD (showing that lifestyle change reduces cardiovascular risk factors with less medication use in type 2 diabetes) and ACCORD (showing the risk of attempting to normalise blood glucose in people with long-standing type 2 diabetes with or at high risk of cardiovascular disease). These studies demonstrate the heterogeneity of diabetes and the need for tailored treatment.

In the US, the health insurer UnitedHealth Group introduced the Diabetes Health Plan Pilot to capitalize on and disseminate the results of the Diabetes Prevention Program. Only 18% of people in the US with pre-diabetes know they have it, and this pilot initiative in communities aims to identify them and offer interventions.

Dr Rodgers said that research aimed at developing treatments to stabilise and reverse type 2 diabetes offer a window of opportunity for improved medical management, cutting costly complications and enabling patients to benefit from emerging technologies such as regenerative medicine and personalised medicine. Research priorities should address the need to reduce the public health burden of diabetes in low- and middle-income countries. Improved outcomes for people with diabetes will come from raising diagnosis rates through simple low-cost testing, improving diabetes control with low-cost treatment, and improving the detection and management of complications. Primary prevention should promote a healthy diet and physical activity for the population; cost-effective lifestyle interventions are needed for people with pre-diabetes. Standard protocols and definitions are needed to improve the effectiveness of surveillance.

A member of the audience raised the question of effective screening for diagnosis of diabetes. WDF Chairman Professor Pierre Lefèbvre said the use of HbA1c as a diagnostic tool has long been discussed, but WDF currently opposed this because of the cost. Dr Rodgers said that research is ongoing to standardise measurement of HbA1c and he hoped the price of testing would fall as the test is used more widely. IDF President Professor Jean Claude Mbanya said there are many advantages to using HbA1c for diagnosis. He hoped that negotiations with manufacturers would lead to cheaper meters, possibly almost free of charge in low-income countries.
This session was chaired by Ms Ida Nicolaisen, Dr Orlando Landrove, Dr Errol Morrison and Dr Saulo Cavalcanti da Silva.

Training the primary care units – UBS – SUS in diabetes
The Brazilian public health system faces major logistical difficulties in delivering healthcare to the population. Eighty per cent of healthcare problems are managed by primary healthcare units in towns and villages spread throughout the country. There are currently 5366 health teams serving 116 million people. This creates a huge need for education and training.

Professor Fadlo Fraige Filho, President, National Association of Diabetes Care, Sao Paulo, Brazil, described a project to disseminate treatment expertise to health workers in the towns and villages of Brazil. With funding from WDF and other agencies, a programme was implemented in 51 cities to form diabetes teams of individuals nominated by local health authorities. Each team underwent a 20-hour course on diabetes and then used this knowledge to provide an 8-hour course on diabetes for staff in the family health programme, each in a further three adjacent cities. They then recruited community agents or leaders to act as a local resource for people with diabetes. To date, 4806 health professionals have learned how to implement diabetes care in the community and 9473 community agents or leaders have received training; these figures represent a four-fold increase beyond the anticipated targets. So far, the programme has reached an estimated 3.7 million people, including 216 000 patients with diabetes, and has been featured in a TV documentary broadcast on the Discovery Health channel.

Regional diabetes centres in Cuba
Professor Oscar Diaz Diaz, Director of the National Institute of Endocrinology and Head of the Diabetes Technical Advisory National Commission, Cuba, described the development of the regional diabetes care centres network in Cuba. The 17 centres fit between the 498 diabetes units in primary care polyclinics and the network of 229 national hospitals and health institutes. A six-year joint project between WDF and the Cuban Ministry of Health completed the network of regional centres in all provinces of the country, with the inauguration of the Sancti Spiritus centre in 2010. There are now plans to open an additional centre in ‘isla de la Juventud’ municipality in the southern part of the island. The role of regional centres is to deliver specialised diabetes care and education, to offer day hospital services for a week, and to introduce new technologies and manage the integrated diabetes care programme. They currently offer about 308 000 consultations and carry out 318 000 lab tests per year, and have trained 1100 doctors and nurses in diabetes. In the last 10 years the mortality for diabetes has remained stable despite the increasing prevalence of the disease.

Prevention of foot complications – the Andean Vascular Axis
The Eje Vascular Andeno (Andean Vascular Axis) Program is a joint initiative funded by WDF, government ministries and other agencies to develop a programme for diabetic foot in Peru, Bolivia, Ecuador, Colombia and Venezuela. Ms Martha Mora de Garcia Belaunde, President of the Peruvian Juvenile Diabetes Association, Lima, Peru, said the aim is to build capacity for prevention, education, diagnosis, treatment and referral in rural areas to reduce amputation rates as a consequence of diabetes. The programme set a timetable for implementation and developed a diagnostic protocol, and educational materials for lay health workers. It organised an international meeting and workshops to train health providers and community workers. Each country established 10 EVA clinics to replicate this training, with the aim of training 200 workers and reaching 3000 people with diabetes. The programme has shown the value of raising awareness among health authorities, the media and scientific institutions and demonstrated the importance of collaboration. There is a need to build closer links with PAHO and other international organisations and to identify local leaders who can ensure the long-term success of the programme. The programme has been included in the health ministries’ plan in Peru and Venezuela.

Improving access to prevention and care of diabetes in Bolivia
Bolivia is a large country with a population of only 8.3 million. A 1998 survey estimated the prevalence of diabetes at 7.2%; 65% of women with diabetes and 57% of men were also overweight. Dr Elisabeth Duarte de Munoz, Director, Live with Diabetes Centre, Cochabamba, Bolivia, described the development of a national diabetes education programme initiated in 2001 and supported since 2003 by WDF. She said the centre’s programme aims to provide quality education for everyone with diabetes, regardless of social and economic status. The educational materials developed to date include a magazine containing simple informative articles; brochures, a video, a book and leaflets to promote self-care; and teaching aids and an update kit for health professionals. A basic training course for diabetes educators has been delivered in nine departments, health professionals have received refresher courses and training for workers in the EVA programme has been reviewed. Prevention initiatives include diabetes camps for children and teenagers and participation in World Diabetes Day. Insulin and glucose testing equipment is provided free to all children with diabetes and there are programmes to promote self-help for people with type 2 diabetes, prevention and early diagnosis of diabetic foot (EVA) and retinopathy, and a structured educational course. Dr de Munoz emphasised the importance of funding from WDF. Without this, the achievements of the Live with Diabetes centre would not have been possible. The centre is lucky to have a closely integrated multidisciplinary team and is one of only six diabetes education centres in the world certified by IDF.
Developing and implementing nutrition protocol in the Caribbean

Diabetes is among the leading causes of death in Caribbean countries and it is becoming more common, partly due to an increase in the prevalence of overweight and obesity. Dr Laura Richards, Consultant Medical Dietician, Caribbean Food and Nutrition Institute, Kingston, Jamaica, described how, with the support of WDF and other agencies, a protocol was developed to promote the nutritional management of obesity, diabetes and hypertension. Piloted in Belize, Guyana, Jamaica, St Vincent and the Grenadines, and Suriname, the protocol provides evidence-based, standardised nutritional management in primary care and defines a care pathway for each disorder. This helps non-specialists set goals, monitor outcomes and tailor management to individual needs, and makes it clear when referral to a nutrition specialist is appropriate. Introduced in 2005, the protocol has been adopted in nine countries and is included in training programmes for doctors, nurses and dieticians. The protocol is endorsed by PAHO/WHO Office of Caribbean Program Coordination and is available from the PAHO website.

Gestational diabetes diagnosis and treatment in Panama and in the Caribbean

Gestational diabetes is a major factor underlying poor maternal and child health and an obstacle to achieving WHO Millennium Development Goals 4 and 5. Dr Jose Ramon Calvo explained how, with WDF support, the International Centre for Migration, Health and Development in Geneva, Switzerland, is evaluating how to raise awareness of gestational diabetes in Jamaica and Panama. The programme will determine the health burden and perception of the problem among women and health providers, including whether they understand its link with childhood obesity. The second phase includes the development of education and training to build capacity and develop management guidelines. Finally, the impact of the project will be assessed and the findings disseminated through local meetings to assist the development of regional policies. The programme will then be made available to other countries.

Strengthening care for diabetes and pregnancy in Cuba

There are 45 840 women of childbearing age in Cuba who have diabetes. Professor Antonio Márquez Guillén, National Institute of Endocrinology, Havana, described how the National Programme of Diabetes in Cuba will ensure they receive optimum care. The programme, which covers 97% of the population and is free, aims to reduce perinatal mortality to a level comparable with that of the general population, to increase screening for gestational diabetes and to have medical records and follow-up for 95% of women with diabetes of childbearing age. Management extends from preconception to post-delivery and neonatal care. The programme includes developed educational campaigns about the risks of diabetes during pregnancy for health professionals, patients, families and the wider population. There have been 1466 births during the first five years of the programme. Of these, 47% of mothers had good diabetes control and in this group the incidence of malformations was 0.86% and perinatal mortality was 0.72%. In the 53% of women without metabolic control, 8% of children had malformations and perinatal mortality was 6.7%. These data demonstrate the benefits of improving the management of women with diabetes during pregnancy, Professor Guillén concluded, and the support of WDF has been invaluable.

Promoting a healthy lifestyle in school children in the Caribbean

The Caribbean Food and Nutrition Institute (CFNI) aims to prevent diabetes and other chronic diseases through a sustainable school-based behavioural intervention programme – primarily by promoting a healthy lifestyle (improved diet and physical activity) to children in Grades 7–9 in Grenada, St Kitts, St Vincent and Trinidad and Tobago, said Mrs Christine Bocage, Nutritionist at the Trinidad CFNI, University of the West Indies Campus St Augustine, Trinidad and Tobago. With the support of WDF, the four-phase programme began in 2007 with a needs assessment and raising awareness to inform the development of education and training materials for project teachers. Phase 3 involved integrating the behavioural curriculum into the school’s teaching programme, promoting the initiative in the school and developing a supportive school environment, and involving parents and communities. The programme is in its final evaluative phase. At baseline, about 30% of children were overweight or obese; around two-thirds ate breakfast every morning. There was high awareness of the importance of eating fruit and vegetables overall, although children who did so less frequently were less likely to acknowledge the benefits. Mrs Bocage said that lifestyle projects involve complex social, economic and family issues and schools cannot sustain them unaided. Success is constrained by a lack of national policies that hold schools accountable, the commitment of teachers who lack ownership of projects, and the lack of incentives.
MINISTRY OF HEALTH IN BRAZIL AND OTHER INITIATIVES IN THE LATIN AMERICAN REGION

This session was chaired by Dr Enrique Teran and Professor Eduardo Martins da Rocha Meirelles.

Capacity building to improve diabetes care – the PROCED programme

CEDEBA, the Diabetes and Endocrinology Referral Center of the State of Bahia, Brazil, is responsible for the improvement of diabetes care and the development of research in Bahia, northeast of Brazil. It developed the PROJAD training programme to build a diabetes network and the PRODIBA outreach programme to disseminate knowledge and expertise about diabetes care throughout Bahia. Patients who completed the PRODIBA programme significantly improved their control of blood glucose and blood pressure compared with individuals who received usual care only (although there was no change in body mass index or cholesterol levels). After training of the professionals in primary care with clinical protocols for diabetes care, admissions due to hyperglycaemia were reduced by 66%, and amputations were reduced by 45% in the first half of 2006 compared with the preceding six months in the five main hospitals of a health division that included 12 municipalities.

CEDEBA Director Dr Reine Marie Chaves Fonseca described the development of the PROCED project, which aims to extend CEDEBA’s experience with clinical protocols for diabetes care and with raising community awareness. It is also designed to develop strategies and implementation plans to increase community awareness using diabetes educational tools in other Brazilian states as well as other Portuguese-speaking countries (Mozambique, Guine-Bissau). This work is done in partnership with PAHO/WHO, the Brazil Ministry of Health and the Bahia state government. The first training module, delivered as a five-day course, covered prevention, clinical and lab diagnosis and protocols for treatment; this was complemented by a second module on acute and chronic complications. Project participants rated course content and delivery highly, with almost all saying their knowledge of diabetes had increased.

There were, however, major problems. In Brazil, public health diabetes care campaigns were not sustainable, local care protocols were not implemented, there were too few trained professionals, glucose and HbA1c measurement was not available in some areas, and the large geographical size of Brazil posed logistical problems. In Mozambique, shortcomings in primary care overloaded specialist care, and in Guine-Bissau there was no national diabetes programme; neither country had data on diabetes prevalence.

Action plans were developed to tackle these problems. In Brazil, this included developing health education models, customising staged diabetes management programmes to regional needs, and increasing access to HbA1c testing. In Mozambique, programmes for non-communicable diseases (NCDs) were prioritised and education and training, with a focus on primary prevention, were developed for health professionals in primary care, and local adjustments on diabetes care protocols are to be used in training in all the country. In Guine-Bissau, a national programme for diabetes care is being developed, with a tailored intervention for children and teenagers with type 1 diabetes. PROCED is now co-operating with the lay media to spread information about diabetes across the country.

WDF replaced WHO as a partner for modules 3 and 4 of PROCED, with the continuing support of PAHO, the Brazilian Ministry of Health and the Bahia government. These modules focus on strategies for preventing complications, focusing on foot care and retinopathy; establishing 10 sentinel units (one in each city of Bahia and participating states in Brazil) to monitor the quality of care; and promoting self-care through educational activities at each site. This stage specifically seeks to improve the quality of primary care through capacity building, and for the first 50 graduates of the programme, to train more health professionals using e-learning tools (www.eadsus.ba.gov.br/course/view.php?id=5). All sites have access to a telehealth network hosted by the Ministry of Health in Brazil.

Modules 3 and 4 are expected to improve the health of around 36 000 people with self-reported diabetes. Self-care will be promoted directly to 3200 people and indirectly through the Diabetes-Unidia University to a further 11 200. Ten tutors will offer distance learning programmes, and participating municipalities, states and countries have committed to increase capacity by training 300 health professionals. Sentinel units in Brazil have been set the target of achieving a 10% increase in patients registering with SUS-Hiperdia (the national diabetes and hypertension registry) and at least a 10% increase in HbA1c measurements in registered patients.

Dr Fonseca acknowledged all those who had supported the CEDEBA programme and concluded with the hope that education would play an effective part in combating the increasing prevalence of diabetes and its complications.

The chronic care model and diabetes control in Veracruz, Mexico – the VIDA project

The Veracruz Initiative for Diabetes Awareness (VIDA) project aimed to improve the quality of diabetes care. Initiated by the Ministry of Health and supported by PAHO/WHO, 10 health centres in Veracruz were randomised to receive interventions to improve diabetes training and education for health professionals and patients (based on the chronic care model) or to continue with current usual care.


The region comprises seven states (El Salvador, Belize, Nicaragua, Guatemala, Costa Rica, Panama and Honduras) and has a total population of 41.2 million. The prevalence of diabetes averages 8.8%, ranging from 6.1% (Honduras) to 12.4% (Belize). Diabetes mortality is rising; for example, there has been a 10-fold increase over the last 20 years in Guatemala. Overweight/obesity is common (54–67%) and 56–85% of the population are sedentary. Almost a quarter of the population has hypertension, with a similar proportion considered to have prehypertension, and over one-third have hypercholesterolaemia.

To tackle these problems, each country is developing a programme to reduce the morbidity and mortality of chronic NCDs (especially diabetes, cardiovascular disease, and cancer) focusing on prevention and early diagnosis. The main emphasis is on promoting a healthy lifestyle and self care. The Central American Diabetes Initiative (CAMDI) is underway with the aim of improving national surveillance of diabetes and other chronic diseases. Collaboration between countries is being promoted through the National Commission for the Integral Attention of Chronic Non-Communicable Diseases and, with support from PAHO, CIIEPC (Centro Integral del INCAP para la Prevención de las Enfermedades Crónicas), and the CTTC (Technical Commission of Chronic Disease and Cancer) of the Council of Ministries of Health of Central America.

**Building blocks in diabetes education and control in Misiones**

In Paraguay, one in five adults has diabetes or impaired glucose tolerance, and diabetes accounts for over 12% of deaths. The prevalence of risk factors in adolescents is high, with over half leading a sedentary lifestyle and one-third obese or overweight.

Outlining Paraguay’s national diabetes programme, Dr Gilda Benitez Rolandi, Director of the National Diabetes Programme, Ministry of Health, said that interventions cover health promotion and primary prevention, education, medical care and treatment, and social assistance. One component is Paso a Paso (Step by Step), a primary healthcare tool for education and diabetes control that is being implemented as resources and capacity allow.

Misiones is a rural department of Paraguay with a population of 64 838 over 14 years old. Access to healthcare is limited by geography and cultural, social and economic barriers. Fewer than half of the population have access to health services, with minimal or no access to medicines. With the support of PAHO, Paso a Paso is being implemented in Misiones to develop primary care for diabetes, prevent and control diabetes and improve quality of life for patients; it is expected to reach 48 000 people over 20 years old. The programme includes primary and secondary prevention, education for all age groups, provision of glucose meters and medicines, screening and referral.

Evaluation of the project has shown that the programme has been effective. Over 3000 educational activities have been carried out, and health consultations have increased from 485 in 2004 to 2815 in 2007. The mean random glucose level fell from 270mg/dl in 2005 to 171 in 2006, with a fall in HbA1c from 11.3% to 7.2%. In 2009, HbA1c was <7% in 20% of patients with diabetes, and 7.1–8.5% in 24%. Misiones now has a comprehensive healthcare system and the necessary infrastructure, providing three levels of management of diabetes and cardiovascular risk factors.
This session was chaired by Professor Pierre Lefèbvre and Professor Jean Claude Mbanya.

The WDF report (global and regional initiatives)

Dr Anil Kapur, Managing Director of the World Diabetes Foundation, said that WDF was set up in March 2002 with funding from Novo Nordisk A/S of DKK650 million over 10 years. This has since been increased by DKK575 million and extended to 15 years. This is equivalent to approximately US$225 million pledged to improve the prevention and management of diabetes in developing countries.

WDF is a global advocate, acting to provide care locally. It believes the key to achieving long-lasting change is to unlock the potential that lies within all communities and countries. It acts as a catalyst to create partnerships and networks that link people and resources. The development of an integrated programme of diabetes care, prevention and strategic alliances in primary, secondary and tertiary sectors is key to the development of national programmes to tackle diabetes (Figure 15). Sustainability is a core requirement for WDF funding because it is essential that improved services are incorporated into the health system and continue beyond the WDF funding period. WDF is committed to openness and transparency: its code of conduct can be downloaded from its website (www.worlddiabetesfoundation.org).

As of May 2010, WDF had funded 236 projects in 93 developing countries, of which 182 are ongoing. This includes 28 projects in 30 countries in Latin America and the Caribbean, 92 in 34 African countries, and 102 in 26 countries in the Asia Pacific region. The total project portfolio to date amounts to $223.7 million, of which WDF has contributed $76.6 million. So far, WDF has helped to train 24 800 doctors, 17 800 nurses and 40 000 paramedics, many of whom had little or no previous expertise in diabetes care. Its support has strengthened or incorporated into the health system and continue beyond the WDF funding period. WDF is committed to openness and transparency: its code of conduct can be downloaded from its website (www.worlddiabetesfoundation.org).

Four national programmes are currently supported by WDF in Ghana, Kenya, Tanzania and Uganda. Each of these programmes includes capacity building and primary prevention and care. But other components include developing national policies and guidelines, and improvement of services such as gestational diabetes care and foot care.

The areas of focus for WDF are diabetic foot (preventing amputations), eye screening (detecting diabetes, preventing blindness), children with diabetes (prevention, education, treatment), mothers and diabetes (nutrition, prevention, education), the coming generation (primary prevention for children), and diabetes and tuberculosis.

WDF has supported over 30 projects on foot care or involving elements of foot care in 35 countries, promoting the Step by Step programme of training and education (details are available on the WDF website). So far, 3750 health professionals have been trained in foot care and 203 000 people have been screened for diabetic foot.

WDF supports over 40 eye care and diabetes-related projects with a potential of reaching 400 million people. Two of the projects have proved effective in replicating and adopting to other regions. First, people with eye problems may be identified at screening and awareness camps using a mobile unit that can transmit retinal images via satellite to a base hospital with a senior ophthalmologist. The second brings advanced diagnostic care services to the rural poor: a mobile diagnostic and treatment unit visits selected sites where, either trained local ophthalmologists, or those from the base hospital, can make a diagnosis and deliver care. Advanced mobile care units also include facilities for lab tests, ECG and foot examination. Almost nine million people have participated in WDF screening and awareness camps worldwide, with 4.3 million people being screened for diabetes. Some 416 000 people have been screened for diabetic retinopathy and 70 600 cases have been detected; of these, 38 500 have received sight-saving laser therapy or surgery.

WDF is supporting school-based programmes for awareness and prevention of obesity and type 2 diabetes for a total of 1.3 million children around the world. In addition, several more general projects have incorporated awareness components for schools. To date, 12 753 teachers have been trained to deliver healthy life messages, and 240 730 children and 77 727 parents have received programmes and activities on healthy lifestyle. In Africa and Asia, WDF is also supporting training for paediatric endocrinologists and the treatment of children with type 1 diabetes.

WDF’s advocacy and action for women started in a small way in Tamil Nadu, India, with a programme of screening for gestational diabetes. This was taken up by the government and there are many more projects in this key focus in the Caribbean, Africa and Asia.

With the WHO Stop TB Department and the International Union Against Tuberculosis and Lung Disease (IUATLD), WDF has helped fund systemic reviews and expert meetings to discuss the issue of the dual burden of diabetes and TB. It is hoped that these interventions will support future policy framing and guidelines development to raise awareness and address the double burden of diabetes and tuberculosis. In addition, WDF is funding projects in China and India to train health professionals working in TB to screen and manage diabetes, and in Malawi to develop a unified health system approach to TB and diabetes.

Dr Kapur said that Latin America is under-represented among WDF’s project portfolio. He explained that WDF...
can only provide funding when it is asked for, and at the moment there is a shortage of applications from this region. WDF currently supports 28 projects in 30 countries in the Central and South American region and the Caribbean, benefiting approximately 6.2 million people. Examples include e-learning throughout the region, training and foot care in Bolivia, education and nutrition in the Caribbean and Mexico, and capacity building in Brazil and Cuba. Many of these were presented earlier in the day. Total project funding is US$19.1 million, of which US$6.5 million comes from WDF.

The WDF Peer Exchange Programme promotes the sharing of best practice between centres of excellence in developing countries and projects needing skill development to strengthen current activity or future expansion. Projects are encouraged to submit applications for their staff to go on a peer fellowship of up to three months at the centres of excellence. Recent examples include a worker from Bolivia who visited a centre of excellence in India to learn about foot care, and three from Uganda who visited Tanzania to learn about diabetes clinics. A fellowship is worth a maximum of €8000 and the recipient institute receives €2000 to support peer training. So far, 28 peers have completed the exchange programme at an average cost of €6200 each.

WDF’s advocacy work includes four diabetes summits (Hanoi, Nairobi, Chennai and, now, Bahia). These summits bring together the people who work in WDF-funded projects, government ministries of health, agencies such as WHO and the World Bank, and many organisations working to improve diabetes care. WDF has organised two international conferences: Diabetes Economics, held in Riyadh in collaboration with the Health Ministers’ council for Gulf Cooperation Council States, the Saudi Arabia Ministry of Health, the World Bank and others; and the International Conference on Non-Communicable Diseases in Copenhagen, in collaboration with the Danish International Development Agency (DANIDA) with the support of the World Bank, Norad, and the NCD Alliance. Most recently, WDF organised two expert meetings on women and diabetes, in collaboration with the Global Alliance for Women’s Health, WHO and several UN permanent missions; and on diabetes and TB, in collaboration with IUATLD and the WHO Stop TB Department.

Finally, WDF is proud to support World Diabetes Day and to promote the Global Diabetes Walk to raise awareness of diabetes (www.globaldiabeteswalk.net).

Bahia Call For Action
Professor Lefèbvre said WDF should be proud of what it has achieved in the last seven years. It would like to do more in Latin America and he called for more funding applications, emphasising that the proposals must be sustainable, have co-funding and have the co-operation of the local ministries of health. He urged participants at the meeting to take advantage of WDF’s Peer Exchange Programme to obtain invaluable training from colleagues in other countries. Finally, he thanked the distinguished guests and speakers for their contributions to the meeting.

Professor Jean Claude Mbanya brought the meeting to a close. He said the summit had successfully brought together colleagues from Latin America and the Caribbean. It had been an enriching experience for everyone, giving them a chance to network, exchange ideas and learn from one another’s mistakes. He paid tribute to the staff of WDF who had organised the meeting and thanked WDF for its support.

Figure 15. An integrated programme of diabetes care
permanent programmes; and on diabetes and TB, in collaboration with IUATLD and the WHO Stop TB Department.

Figure 16. WDF projects, May 2010
Forty-five journalists from 14 countries in the region participated in the summit and, less than one month after the event, 196 newspaper articles, online articles, radio interviews, television coverage and podcasts had been published and broadcast. The number of articles and the coverage is witness to the fact that the topic ignited the interest of the journalists who were both grateful to learn more and to share such pertinent knowledge with their audience.

Journalist Iris Ramirez from the daily La Tribuna in Honduras said, 'For me it was really a very enriching experience because it helped me learn more about the condition. The knowledge transmitted by such eminent experts has done much for my work and I am very pleased to report on this subject to my readers of La Tribuna newspaper in Honduras. I have developed reports about diabetes, its consequences, and prevention, all of which have been well received by our readers. I’m still writing about gestational diabetes, and prevention of diabetes and planning on publishing more articles.' She was complemented by her colleague, journalist Marcela Rodrigues Silva, from the magazine Revista JT in Brazil, ‘I have learned to better understand the condition and have certainly gained more knowledge to write about diabetes in my coming articles. It was extremely valuable that an event like this was hosted in Brazil, because we are heading towards an epidemic and we have serious problems relating to nutrition and public healthcare in the country.’

During the summit, a visit to the Center for Diabetes and Endocrinology of Bahia (Cedeba) in Salvador was organised for journalists. Here they met groups of people with diabetes, and got a chance to talk to care givers and patients first hand. Apart from the experiences of the visit to Cedeba, the articles focused on the diabetes epidemic, the summit, investments in prevention, the link between diabetes and TB, gestational diabetes, malnutrition, hypertension and obesity.
The Diabetes Summit for Latin America was organised through a collaborative effort of the World Diabetes Foundation, the Pan American Health Organization (PAHO), Regional office of the World Health Organisation (WHO) and the Brazilian Ministry of Health between 30 June and 2 July 2010 in Salvador, Bahia, Brazil.

The summit was attended by multiple stakeholders from the region and addressed by the Honourable Minister of Health Brazil, Mr Jose Gomes Temporão, through a pre-recorded video message; the President of the International Diabetes Federation, Professor Jean Claude Mbanya; the Chairman of the World Diabetes Foundation, Professor Pierre Lefèbvre; the Senior Public Health Specialist Human Development Unit of the World Bank, Washington, USA, Dr Luis Orlando Perez; Dr Griffin Rodgers, Director, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), Bethesda, USA; and Dr Roger Glass, Director, Fogarty International Centre NIH, Bethesda, USA.

Dr Jorge Jose Solla, State Health Secretary Bahia, Brazil, welcomed and greeted the participants on behalf of the Governor of Bahia, His Excellency Mr Jaques Wagner.

The Assistant Director General, Non-communicable Diseases and Mental Health, WHO Geneva, Dr Ala Alwan addressed the summit through a pre-recorded video message, and the address of the Director of PAHO, Dr Mirta Roses Periago, was presented in her absence by Dr James Hospedales, senior advisor, prevention and control of chronic diseases, PAHO.

The participants recall:

- Resolution CSP26.R15 (2002) on the public health response to chronic diseases, which recognises the heavy economic and social burden of non-communicable diseases and calls for increased and co-ordinated technical cooperation from PAHO.
- Resolution WHA57.17, Global Strategy on Diet, Physical Activity, and Health (2004), which emphasises an integrated approach and inter-sectoral collaboration to improve diet and increase physical activity.
- Resolution CD47.R9 (2006), Regional Strategy and Plan of Action on an Integrated Approach to the Prevention and Control of Chronic Diseases including Diet, Physical Activity and Health, which called for integrated action to prevent and reduce burden of chronic diseases and related risk factors in the Americas.
- United Nations General Assembly Resolution 61/225, World Diabetes Day (2006), which recognises diabetes as a chronic, debilitating and costly disease associated with major complications that pose severe risks for families, countries and the entire world and designates 14 November, the current World Diabetes Day, as a United Nations Day to be observed every year beginning in 2007.
- Resolution WHA61.23, Prevention and Control of Non-communicable Diseases (NCDs): Implementation of the Global Strategy (2008), which urges member states to strengthen national capacity and increase resources for the prevention and control of chronic diseases.
- Resolution CE142.R6, population-based and individual approaches to the prevention and management of diabetes and obesity passed at the 142nd Session of the Executive Committee of PAHO 23–27 June 2008, Washington, DC, USA.

The participants recognise that:

- Diabetes and several related chronic NCDs are major public health challenges for the region.
- If appropriate public health action is not initiated, disability and deaths from heart disease, cancer, diabetes and chronic respiratory diseases will continue to grow and also occur prematurely.
- This trend poses a threat to the social and economic development of already resource-constrained countries in the region and threatens the achievement of the Millennium Development Goals (MDGs) by their end date of 2015.

The participants welcomed the UN Resolution 64/265 dated 13 May 2010 to hold a high-level UN General Assembly Special Session on NCDs in September 2011.

The participants recommend urgent action to address and mitigate this threat through the following measures:

- Initiate, prioritise, promote and fully resource the implementation of population-based and individual approaches to the prevention and management of diabetes and obesity, the plan document for which was adapted through resolution CE142.R6 at the 142nd Session of the Executive Committee of PAHO 23–27 June 2008, Washington, DC, USA.
• Strengthen and adjust health systems to address the prevention and care of chronic NCDs at the primary healthcare level.

• Develop and implement culturally appropriate programmes for education and awareness-raising of the common risk factors for NCDs, as well as programmes to reduce these risks through healthy diets, increased physical activity, smoking cessation and avoidance of harmful use of alcohol.

• Strengthen efforts to implement the Framework Convention on tobacco control.

• Promote ‘life cycle’ and ‘lifestyle’ approach for prevention of diabetes and related NCDs to accrue multigenerational benefits of the interventions.

• Strengthen surveillance systems to track and monitor the health and economic burdens of NCDs and their risk factors.

• Recognise that survival and optimum development of children with type 1 diabetes is dependent on daily injection(s) of insulin. Creating access to uninterrupted supply of insulin and related ancillaries for injection and monitoring is therefore not merely a matter of making a treatment available, but tantamount to the child’s basic human right to live.

• Ensure the inclusion of key medications in the essential drug list for rational and optimum care of common NCDs at the primary healthcare level and ensure availability and distribution of these medicines at all times.

• Recognise that social determinants of health are relevant for NCDs and that poverty and ignorance is fuelling the current NCD epidemic. Programmes to address poverty eradication, improving education and the empowerment of women support NCD prevention and must be pursued with greater vigour.

• Recognise the critical linkages between NCDs and development and ensure that NCDs are included in the successor goals to the MDGs after 2015.

• Urge governments within the region and globally to participate fully in the UN Summit on NCDs in September 2011 and agree on an outcome document with specific commitments on integration and strengthening of health systems to include NCDs and to substantially increase the share of funding for NCDs both globally and nationally.