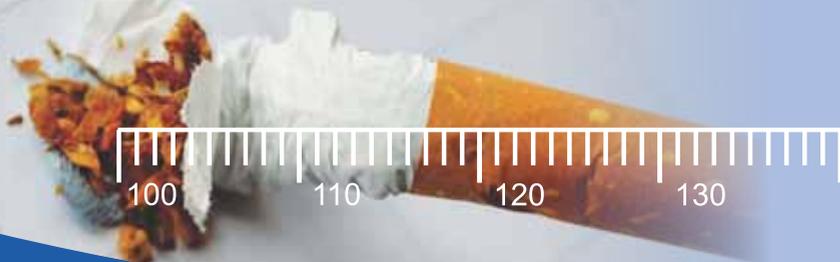


InterAcademy Medical Panel Conference

Proceedings Report Changing Patterns of Non-Communicable Diseases

14



Hosted by: Academy of Science of South Africa
Crowne Plaza Johannesburg – The Rosebank

14 to 15 August 2013

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The Academy of Science of South Africa (ASSAf) was inaugurated in May 1996. It was formed in response to the need for an Academy of Science consonant with the dawn of democracy in South Africa: activist in its mission of using science for the benefit of society, with a mandate encompassing all fields of scientific enquiry in a seamless way, and including in its ranks the full diversity of South Africa's distinguished scientists.

The Parliament of South Africa passed the Academy of Science of South Africa Act (*Act 67 of 2001*), as amended, which came into operation on 15 May 2002.

This has made ASSAf the official Academy of Science of South Africa, recognised by government and representing South Africa in the international community of science academies.





InterAcademy Medical Panel Conference

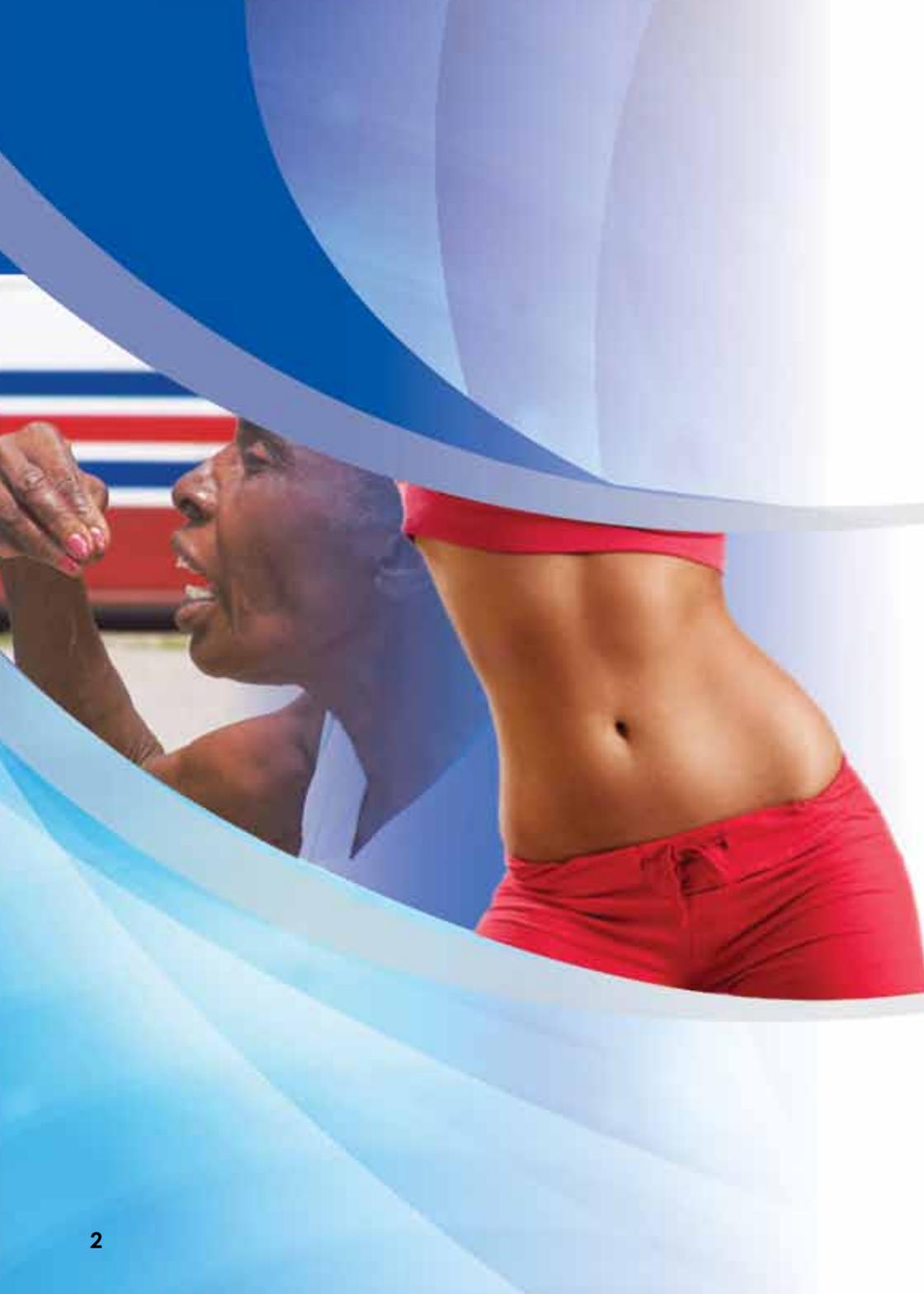
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iamp
the interacademy medical panel

 **ASSAf**
ACADEMY OF SCIENCE OF SOUTH AFRICA



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A BRE VIA- TIONS

Acro- nyms

Abbreviations and Acronyms

ACE	Awareness and Consciousness Education
ACEI	Angiotensin-converting-enzyme inhibitor
AIHD	African Institute for Health and Development
ALANAM	Latin American Association of Academies of Medicine
AORTIC	African Organisation for Research and Training in Cancer
APHRC	African Population and Health Research Centre
ART	Anti-retroviral therapy
ARV	Anti-retroviral
ASSAf	Academy of Science of South Africa
BCG	Boston Consulting Group
BMI	Body mass index
BOD	Burden of disease
BP	Blood pressure
CCW	Community care worker
CHD	Coronary heart disease
CHW	Community health worker
CMD	Common mental disorders
CNCD-Africa	Consortium for Non-communicable Disease Prevention and Control in sub-Saharan Africa
COHORTS	Consortium of Health-orientated Research in Transitioning Societies
COPD	Chronic obstructive pulmonary disease
CVD	Cardiovascular disease
DALY	Disability-adjusted life years
DASH	Dietary approaches to stop hypertension
DKA	Diabetic ketoacidosis
DoH	Department of Health
DPSP	Diabetes Patients Support Programme
DST	Department of Science and Technology
EA	Enumeration areas
EU	European Union
FAS	Foetal alcohol syndrome
FASD	Foetal alcohol spectrum disorders
FBS	Fasting blood sugar levels
FEAM	Federation of European Academies of Medicine
GBD	Global burden of diseases
GNI	Gross national income
GWAS	Genome-wide association studies

H3Africa	Human Heredity and Health in Africa initiative (H3Africa Research Network)
HART	Hypertension in Africa Research Team
HbA1C	Glycosylated hemoglobin
HBV	Hepatitis B virus
HDL	High-density lipoprotein
HIC	High-income country
HIV/AIDS	Human immunodeficiency virus infection/acquired immunodeficiency syndrome
HP	Health promotion
HPV	Human papillomavirus
HR	Heart rate
HTN/DM	Hypertension and diabetes management
IAC	InterAcademy Council
IAMP	InterAcademy Medical Panel
IANAS	InterAmerican Network of Academies of Sciences
IAP	Global Network of Science Academies
ICD	International Classification of Diseases
ICSU	International Council for Science
IFG	Impaired fasting glucose
IHD	Ischaemic heart disease
INR	Indian rupee
IP	Intellectual property
LDL	Low-density lipoprotein
M8Alliance	A group of academic institutions globally working on broader issues of medical research, medical education and health policy
MDG	Millennium Development Goal
mhGAP	Mental Health Gap Action Programme
mmol	Millimoles per litre
MRC	Medical Research Council
NASAC	Network of African Science Academies
NCD	Non-communicable disease
NGO	Non-government organisation

NHI	National Health Insurance
NIH	National Institutes of Health
NUHDSS	Nairobi Urban Health and Demographic Surveillance System
NWCR	National Weight Control Registry
OECD	Organisation for Economic Co-operation and Development
PC	Primary care
PHC	Primary health care
PK	Parallel pharmacokinetics
PMTCT	Prevention of mother-to-child transmission
PRIME	Programme for Improving Mental Health Care
PUMC	Peking Union Medical College
PURE	Population urban rural evaluation
ROC	Receiver operating curves
SADHS	South African Demographic and Health Survey
SANHANES	South African National Health and Nutrition Examination Survey
SAYAS	South African Young Academy of Science
SBP	Systolic blood pressure
STI	Sexually transmitted infections
TB	Tuberculosis
TCM	Traditional Chinese Medicine
TIPS	Indian Polycap Study
TWAS	The World Academy of Sciences
UK	United Kingdom
UKPDS	UK Prospective Diabetes Study
UN	United Nations
USA	United States of America
USAID	United States Agency for International Development
USD	United States dollar
WADDP	WITS Advanced Drug Delivery Platform
WHO	World Health Organisation
YPL	Young Physician Leadership

DAY ONE

14 August 2013

OPENING SESSION

(Facilitator: Prof Jimmy Volmink, Stellenbosch University, South Africa)

OPENING AND WELCOME REMARKS

(Prof Daya Reddy, President, Academy of Science of South Africa (ASSAf))

Prof Reddy acknowledged the distinguished guests at the conference namely:

- InterAcademy Medical Panel (IAMP) Co-chair, Dr Jo Ivey Boufford
- Rwandan High Commissioner to South Africa, His Excellency Vincent Karega
- Chairperson of the Parliamentary Portfolio Committee for Science and Technology, Dr Nqaba Ngcobo
- Director-General of the Department of Health (DoH), Ms Malebona Precious Matsoso
- Presidents or representatives of national academies of various African countries:
 - Ugandan National Academy of Sciences, Prof Paul Mugambi
 - Tanzanian Academy of Arts and Sciences, Prof Esther Mwaikambo; Benin National Academy of Science, Prof Eusebe Alihonou
- InterAcademy Panel/Global Network of Science Academies IAP Co-chair, Prof Volker ter Meulen
- Representatives of IAMP member academies
- Conference sponsors

Prof Reddy welcomed all delegates to the IAMP Scientific Conference and General Assembly, a three-yearly event that was last held in Malaysia.

Academies around the world had (in recent years more energetically and significantly) been addressing their primary responsibility on a collective basis through regional or global networks, drawing on a solid scientific base and scientific methodology to address issues of national global concern with a view to informing decision-makers and policymakers in government and elsewhere. For example, this conference was attended by members of the Network of African Science Academies (NASAC), IAP, which has 106 member academies, as well the IAMP, which has 70 member academies.

A further development was the establishment of a few young academies of science - the *Junge Akademie*, through the German National Academy of Science and the South African Young Academy of Science (SAYAS), which had been a close collaborator in the organisation of this conference.

The theme of this conference was a superb example of the various activities in which the academies had been involved. Non-communicable diseases (NCDs) constituted one of the most critical set of health challenges that faced the global community. According to the World Health Organisation (WHO), NCDs constituted some 60% of all mortality at the present time, and more worrying was the upward trend. It was clear that there was urgent work to be done in this area.

The timing and appropriateness of the conference theme were of unquestionable pertinence. NCDs provided a set of challenges that could not be successfully addressed through the isolated actions of various institutions and academies, but required collective wisdom, in this case of the group of medical academies.

Prof Reddy acknowledged ASSAf's relationship with the Ministry and Department of Health. ASSAf had a lengthy history of close cooperation with the DoH and looked forward to working closely with the Minister, the Director-General, as well as officials of the DoH in coming to grips with the health-related challenges in this country and globally.

The ASSAf consensus study report on *Improved Nutritional Assessment of Micronutrients* would be launched at the gala dinner on the evening of 14 August 2013. The report was the result of a study that came about because of an earlier study on HIV, tuberculosis (TB) and nutrition, conducted in 2007. The severe deficiencies in micronutrients in this country became particularly evident during that process, to the extent that the follow-up consensus study was launched.

A strong representation of African NCD specialists were among the delegates to this conference. A policymakers' booklet (drafted by NASAC and Leopoldina and not yet in its final form) had a solid African connection and was the result of a workshop that took place on the topic of changing patterns of health problems in sub-Saharan Africa. Delegates were urged to comment on or contribute to the draft document. The booklet would be discussed on 16 August during the first session of the programme, and once finalised, would be distributed to organisations such as the African Union, various regional organisations and national governments and departments.

Prof Reddy acknowledged and thanked the many sponsors that contributed towards making the conference a reality. ASSAf was honoured to host this prestigious and important event. A successful, stimulating and productive conference was anticipated. Prof Reddy extended his best wishes to delegates for the deliberations during the conference and the general assembly.

REMARKS BY THE IAMP

(Dr Jo Ivey Boufford, IAMP Co-chair)

Dr Boufford joined Prof Reddy in welcoming all attendees, delegates of the IAMP and various distinguished guests. She spoke on behalf of Prof Lai-Meng Looi, who was unable to attend the conference due to a serious illness in her family. The engagement of students and young professionals in the meeting was recognised, as they were the future group who could make dreams for global health come true. Prof Diab and her team were thanked for the organisation of the event and ASSAf was thanked for hosting the conference, as well as the general assembly.

There was not a more important topic in global health and in all regions of the world than the topic of this conference: NCDs, especially cardiovascular disease (CVD), diabetes, cancer, pulmonary disease and associated obesity. A briefing on a health issue was requested for the second time at the United Nations (UN) General Assembly in 2011. The only other time was in 2008, when a briefing on HIV/AIDS was requested. This was evidence of the importance of the topic for discussion at this conference, which was especially critical at this time in Africa as there was the potential to prevent unnecessary death and disability from these diseases through addressing issues such as tobacco, exercise, diet, which were shared risk factors for all NCDs, as well as specific risk factors that were unique to African countries. Many experts would share their research, practice and evidence for policymaking during this conference.

Dr Boufford introduced the IAMP, the co-hosts of this conference. The IAMP was established in May 2000 as a founding resolution of the Tokyo World Conference of Science Academies and was the youngest network to join the network of science academies, the IAP and the InterAcademy Council (IAC), the latter being the research arm of the global architecture of academies. The IAMP was a voluntary association of medical academies: some were independent and others were science academies with sections in medicine, and in the case of China, an Engineering Academy that had a section in medicine.

The IAMP now consisted of about 70 members, and three additional members were expected to join during the general assembly on 16 August. The IAMP has been hosted by The World Academy of Sciences (TWAS) in Trieste, Italy, since 2004 and was unique among the network of science academies as its sole focus was on health: human health, health science research, health professions education and action in communities and countries. The IAMP's mission is to create and support strong and vibrant academies and networks of academies to promote and support evidence-based efforts that improve health worldwide, especially in low-income countries.

The IAMP's objectives are to:

- Facilitate the provision of evidence-based advice to governments.
- Assist in the creation of academies where none exist, and to build the capacity of existing academies.
- Promote cooperation among academies of the world.
- Support member academies to improve health and strengthen health-related research and higher education in their countries.
- Support the development of Young Physician Leadership (YPL) worldwide.
- Organise events and projects, and issue consensus statements on issues of global health.
- Develop partnerships and collaborations with other health-related international and regional organisations.

IAMP governance was through elected co-chairs: one from high-income countries and the other from low-income countries. The executive committee was elected at triennial meetings, with five members from low and middle-income countries and four from high-income countries.

The IAMP addressed its objectives in a variety of ways through:

- Issuing statements on matters of global health importance.
- Working actively with YPLs, through programmes for YPLs who had chosen a career path in clinical medicine, in health professions medical education, in health policy and public health, and for young physicians who had evidenced a leadership commitment to change in their society. The third YPL cohort would start in October 2013.
- Working on a series of initiatives and long-term engagements, such as:
 - participation in the expert advisory committee for the disease control priorities project;
 - working as part of the Global Commission on Education of Health Professionals for the 21st Century, whose work was published in *The Lancet* during October 2010. A number of academies in Africa, Sri Lanka, Malaysia and Sweden were assisted to sponsor meetings that focused on the relevance of *The Lancet Commission Report* to their own academies and countries, and to initiate leadership with other partners in their countries and regions to promote a re-examination of how health professionals were trained to meet the needs of countries;
 - co-hosting meetings and summits on NCDs in Latin America, led by the Brazilian Academy of Science and in South Africa by ASSAf.
 - working with a number of partners: IAP, IAC, M8Alliance (A group of academic institutions globally working on broader issues of medical research, medical education and health policy.), and the International Council for Science (ICSU) that has recently expressed a growing interest in health, particularly urban health, NASAC, InterAmerican Network of

Academies of Sciences (IANAS), InterAmerican Network of Academies of Sciences (ALANAM) and Federation of European Academies of Medicine (FEAM).

One of the most important lessons learnt by those involved in the health professions and in health over the years was the importance of an understanding of what creates health, of individuals' and communities' responsibility in terms of behaviours and NCDs risk reduction. The special opportunity in NCDs was not only to look at the prevention and management of individual disease, but the ways in which communities could offer healthy choices and ensure that the healthy choice was the easy choice.

It was very important to have political leadership, as well as to work across agencies within government, with professionals in the medical and health area, in professional organisations and in communities. The only way that progress will be achieved is by aligning these interests towards acting for health. The IAMP was excited about the opportunity of this meeting and of the IAMP to help bring the voices of academies of medicine and science to the conversation.

Delegates were invited to visit the IAMP's new website: www.iamp-online.org.

Prof Volmink thanked the IAMP for the excellent work that was done across the world, especially in low and middle-income countries, both in capacity building (particularly through the YPL programme) and in taking up and promoting the issue of NCDs among academies of science across the world.

KEYNOTE ADDRESS

(Ms Malebona Precious Matsoso, Director-General, Department of Health, South Africa)

Ms Matsoso conveyed apologies from the Minister of Health who was not able to address the conference.

The HSRC recently released the results of the South African National Health and Nutrition Examination Survey (SANHANES-1). Most of the focus of the survey was on NCDs and local newspaper headlines following the release of the report read, "South Africans are sick, sad and fat". She congratulated ASSAf for focusing specifically on health at this moment in time, and thanked the IAMP for choosing South Africa as the host of this conference. Both the timing and the themes of the conference were opportune.

Delegates might have heard about South Africa's burden of disease and colliding epidemics, but most important was the fact that the country had worked collectively with partners in civil society and industry, and in particular, with international organisations to try to respond to the AIDS epidemic. This country

had come through a difficult process of conflict and disagreement, but it had become clear that partnerships and decisive action were essential in order to provide appropriate responses to the epidemic. It was anticipated that the emerging problem of NCDs would be addressed in this manner.

South Africa had certain obligations in terms of the United Nations (UN) Declaration of the Prevention and Control of NCDs, as well as the South Africa declarations that were passed more recently. In addition, the WHO member states were expected to report on progress in relation to targets and indicators. South Africa would have to follow the passion demonstrated by the Minister of Health in accelerating action required in order to meet the World Health Organisation's targets. The Minister had said, "We have no option but to prevent the growth of NCDs. If we do not, within a decade or two, our health services will be overrun with people suffering from NCDs and will not be able to cope. Our resources will simply not be able to handle the combination of both chronic care and HIV/AIDS. This is indeed a serious threat to the success of universal health coverage that all of us in South Africa would like to have".

Both ASSAf and IAMP have been involved in science that informed international and local interventions to combat communicable diseases, in particular HIV, and this work was currently extending to NCDs. Conference delegates should understand South Africa's experience and appreciate its encouraging resolve, response and collaboration that brought about improvements in combating communicable diseases and increased life expectancy over a short period of time. However, these gains would be reversed by complacency.

It is necessary to consider what more should be done to address communicable diseases and NCDs. The country needs to work with more partners, even if there is disagreement about the approach. Remarkable progress has been made in terms of tobacco advertising and control, and legislation would soon be released regulating alcohol advertising. South African regulations about tobacco control, including regulations that controlled smoking in public places, had produced results over the years although areas of difficulty remained, especially among young people. Regulations were passed about the control of salt content very recently.

Discussions were taking place with the Department of Arts and Culture and the Department of Sports and Recreation, as the alcohol industry sponsored a significant proportion of sport, arts and cultural activities. The Minister of Health's view is that alcohol advertising should not be associated with high performance in sport or the arts, and it was therefore necessary to consider other models of funding of sport and the arts, as well as the regulation of alcohol.

There was awareness about WHO data indicating deaths caused by CVD, diabetes, cancer and chronic respiratory diseases, as well as similar data pre-

sented globally and locally. Evidence relating to NCDs and their risk factors had been documented. Results of local studies conducted by the Medical Research Council (MRC) showed a reduction in the prevalence of some NCDs due to a reduction in smoking, and various behavioural-related studies have been conducted. Interventions in terms of salt content had produced results in other parts of the world. Regulation would have to address the issue of salt consumption through content reduction, as well as behavioural patterns and healthy lifestyles.

The DoH had developed two strategic plans to address the issues relating to NCDs and risk factors: a Mental Health Strategy and the NCD Strategy. The necessary tools, regulations and legislation were in place but the following matters still needed to be addressed:

- The performance of the health system: Ensuring investment in primary health care, prevention and the promotion of good health. The DoH had considered an integrated health care model for particular application in primary health care settings. The results of this model provide tools to integrate services and improve the performance of the health system.
- Human resources in health facilities: Recruitment, training and retention of staff. The DoH had partnered with WHO in the application of a workload-based assessment programme.

South Africa was fully committed to using evidence as a way of responding to health-related issues and worked in partnership with the M&A Alliance and various research institutions. Historically, the DoH made plans that were not based on evidence and information. The model of planning had changed to incorporate the use of data for purposes of planning, and included socio-economic factors that drive some of the programmes, as well as social determinants of health. A geographical district was used as a unit of planning. Profiling the district made it possible to determine the burden of disease, relevant socio-economic indicators and the performance and service delivery outputs of the health system in a specific district. The DoH's focus on the performance of the health system resulted from evidence showing that, although the burden of disease was decreasing, areas of poor performance remained constant. Models of an ideal and integrated clinic, taking into account the integrated chronic care model, were being considered by the DoH. Pilot studies were being conducted within the districts where implementation of the National Health Insurance (NHI) model had commenced and would show whether the health system was able to respond in an integrated manner.

The DoH conducted an audit on all health facilities (4 000 in total) to identify key domains and quality concerns, and had begun to address the necessary interventions. Scientific evidence was important in assisting the DoH to develop informed plans and interventions. The DoH would work with the academies to ensure the appropriate application of evidence and adequate response. Cut-

ting-edge science and the generation of such science should not be confined to treatment and interventions, but should also address reformation, optimal performance and cost-effectiveness of the health systems.

GLOBAL BURDEN OF DISEASES

(Dr Derek Yach, Vitality Institute, USA)

The work done over many years on the global burden of diseases (GBD), much of which was done by Christopher JL Murray and Alan D Lopez, has transformed the way we think about health in many and important ways. South Africa was one of the first countries to show interest in the early work done on burden of disease (BOD), and participated in the early workshops and produced national estimates of BOD.

Policy development before the GBD

Before the GBD there were ways of estimating priorities in health particularly in terms of economic investments. One of the observations made by Christopher JL Murray at the time was that figures relating to deaths caused by various diseases were inflated and there was no rational basis for the figures. It was felt that if the numbers were decreasing fast, funding support from donors could be lost. Many people are disgruntled with the BOD and give the most attention to disease categories where there have been improvements in health. Not all issues are clearly thought through in purely scientific terms.

Before the GBD there was epidemiology, which remains the mainstay in defining the relative and contributable risks that go into the basis of the BOD calculations and in defining causal relationships. The basic common epidemiological studies on causes and the basic surveillance data remain the basic building blocks of BOD work. Without these, the quality of data will not continue to grow as it has been over time. The first major use of the new estimates was with the World Development Report of 1993. The studies had an impact at the time they were published and have since been updated.

Consequences of the GBD for policy development

The Director-General of WHO (appointed in 1998) believed strongly in the role of evidence in policy and on studying the figures identified that there were some categories for which the figures were extremely high but the investment and activity was extremely low. Mental health, as well as other risks that had been submerged, such as tobacco, were shown to be the front end of all other chronic diseases and also started to become important. Without the work on BOD there would not have been a heightened focus on mental health or NCDs. It is anticipated that another set of diseases, possibly the muscular skeletal diseases with a strengthened focus on mental health will present in the next phase. BOD data show that although people are not dying because of mus-

cular skeletal conditions, they are starting to cause huge amounts of disability, pain and suffering in people's lives.

BOD data combined with economic data were used as a basis for deciding sound policy.

Major results of the GBD 1990-2010

The latest report (GBD 1990-2010) presents the work and input of 300 or 400 researchers from around the planet. Although there may still be imperfections, the quality is steadily improving and becoming based upon more of the surveillance and epidemiology from many countries.

Some the major findings of the report concern the number of successes seen over the last 20 years in terms of causes of death, for example:

- A decline of 46% in HIV/AIDS mortality.
- A dramatic decline of 42% in diarrhoea deaths.
- Big declines in ischaemic heart disease (IHD), mainly driven by declines in the Organisation for Economic Co-operation and Development (OECD) countries.

The report also showed that there has been no decline in diabetes and musculoskeletal disorders.

The spectrum that is faced over the next few years is not uniform. There are many successes, also in South Africa, particularly in the nutritional, diarrhoeal and respiratory categories of diseases. Worldwide, there are signs of a shift in the major causes of death, but IHD remains the first and stroke the second most common cause of death. The big changes over this period include the rise of HIV/AIDS and diabetes.

Before understanding the risks, it is important to recognise that the decision about the minimum risk against which all other risks would be compared is in some cases somewhat dubious. The minimum threshold levels chosen are put up as caveats and give a relative sense of the importance of various risk factors. High blood pressure (BP) is ranked first globally and second in Western Europe and in sub-Saharan Africa. Tobacco is ranked as the second global risk factor overall and the first in Western Europe and North America, a reminder that there are still in excess of seven million deaths per year and 1.3 billion smokers worldwide. Although the media discourse may have decreased, the public health impact is continuing to rise. The majority of other risk factors are related to chronic diseases. There is a convergence of risks globally between different regions, with some exceptions such as a higher degree of many of the nutrient deficiencies in sub-Saharan Africa. The most important issue is the combination

of NCD risks related to behaviour change or unhealthy behaviours, with a few environmental risks becoming important, such as ambient air pollution.

The major risk factors contributing to IHD, the major cause of death in the world, can be identified from the study. Poor adherence to chronic disease medication was not highlighted in the GBD report. A recent Finnish study makes a powerful point in this regard, showing that, of people who are on an anti-hypertensive medication, the relative risk of those with the lowest level of adherence was 4.5 times higher than those with a high level of adherence. Tobacco is the closest BOD risk factor to poor adherence to chronic medication, which is a preventable risk.

Public health has reached out to those in the clinical realm, indicating the obvious link between pure primary prevention and high-quality secondary prevention.

Implications for policy, research and action

The relationship between many of the chronic disease risks and developmental status shows that many of the risks increase as socio-economic development increases. The tragedy is that the majority of the world's population is on the ascending developmental climb, implying continued rises in risks. The policy challenge is to have development at low levels of risks. This must be addressed by health departments and heads of governments by putting prevention and promotion on the agenda at a far earlier stage.

Although many insist that change cannot happen, it ought to be remembered that what used to be normal and acceptable is today considered highly unacceptable and almost bizarre. This raises the question about the social norms that would have to change, taking into account that all of the BOD risks are behaviour-driven.

The Vitality Institute has an opportunity to address these issues. The Institute is initially focusing a commission in the USA on the prevention and control of chronic diseases and would disseminate this message and some of the learning worldwide with the support of the IAMP and national academies around the world.

MORTALITY TRENDS: IS SOUTH AFRICA UNIQUE?

(Prof Debbie Bradshaw, MRC Burden of Disease Research Unit, South Africa)

South African context

It is not only the modifiable risk factors but the social context of South Africa that drives the health transition. In terms of its demographics, South Africa has a population of approximately 52 million, a youthful population with growing

numbers of older persons, and more than 1.1 million births each year. There has been a significant shift towards urbanisation, with about 60% of the population currently living in urban areas. Even though South Africa is an upper-middle-income country, it has huge inequalities and varied living conditions. It is among the countries with the highest Gini coefficient in the world and has an unemployment rate of 25%.

With the huge changes in the country over the last 20 years, censuses from 1996, 2001 and 2011 show varying increases in households in terms of living in a formal dwelling and having access to piped water, flush toilets, refuse removal and electricity. The censuses also show improvements in the percentage of the population that received some form of education and a slight increase in the number of people who have an education beyond Grade 12. The proportion of people who completed Grade 10 between 1930 and 2011 increased significantly. However, the quality of education across the country remains unequal and an immense challenge. Census data relating to social determinants are more complex.

Terminology and health transition

The terminology 'NCDs' was used in the GBD studies for the conditions that are *not* infectious, maternal, perinatal, under-nutrition nor injuries, and includes conditions such as epilepsy, chronic obstructive pulmonary disease, renal disease and cardiovascular conditions.

At the point of the GBD studies, the WHO used two terminologies and the WHO programme used the term 'chronic diseases', which were slightly different from NCDs. *The Lancet* uses the term 'chronic NCDs'. Clarification of the terminology was important as the interventions differed. The MRC adopted the term 'chronic diseases of lifestyle' that associated the diseases with modifiable risk factors such as diet, smoking and physical inactivity.

Trends in mortality

In terms of health transition, Omran (1971) developed a descriptive model that outlined how through development, societies go through an era where mortality from infectious diseases reduces, to a period of degenerative conditions where trauma, diabetes, coronary heart disease (CHD) and cancers increase. Frenk *et al.* (1989) argue that data from Mexico show that middle-income countries in particular have a double burden that includes pre-transitional conditions and NCDs.

Rapid changes in mortality trends in South Africa have been evident over the last 15 years, largely driven by the impact of HIV and decreasing since 2006 primarily due to the roll-out of anti-retroviral therapy (ART), as well as prevention of mother-to-child infection. Life expectancy was at its lowest point in 2005

and has increased by six years from 54 years to around 60 years in 2011. A rapid surveillance system using data from the national population register also showed that child mortality increased from 1990 and the mortality of children under the age of five years started to decrease from 2000 due to ART to pregnant women, as well as the Prevention of Mother-to-Child Transmission (PMTCT) Programme.

The recent MRC study, *Second National Burden of Disease Study 1997-2009*, looks at trends based on imperfect data and the fact that only 90% of deaths are registered and that there is a high proportion of ill-defined causes and misclassification of AIDS deaths. It was necessary to make adjustments for under-registration of deaths and identify misclassified AIDS deaths. In addition, it was necessary to do a survey of the mortuaries to get information about the causes of injury deaths and the ill-defined deaths.

The study categorises the numbers of deaths according to four broad causes: NCDs, HIV and TB, other infections and maternal perinatal causes, and injuries. At the time the study commenced, South Africa was in the midst of the health transition. NCDs were the leading cause of death and were subsequently superseded by the HIV epidemic. The HIV/AIDS epidemic, as well as a decline in NCD mortality rates are evident if mortality rates are used (taking into account that the population was growing during the period 1997 to 2009), focusing on the age-standardised NCD mortality rates. It is unclear whether or not South Africa is unique in this respect.

The top ten leading causes of death in 1997 and in 2009 have not changed, although their ranking and their levels have changed. HIV/AIDS rates went up and came down, and non-HIV-related TB mortality appears to have decreased slightly. The efforts made by the TB programme were not clearly visible because of the HIV epidemic. Mortality rates in interpersonal violence have almost halved and road traffic mortality rates remain high relative to global figures. The assessment is that mortality rates in pneumonia and diarrhoeal disease remain unchanged.

Although the overall mortality rates in NCDs decreased during the period 1997 to 2009, there are subtle changes in terms of ranking and mortality rates. Cerebrovascular stroke was the leading cause in the earlier period and remains the leading NCD, but the mortality rate in cerebrovascular stroke had decreased. The ranking of IHD was higher in 2009 than in 1997, but the mortality rates have decreased slightly. The mortality rates in hypertensive heart disease and diabetes have increased. In terms of age-standardised NCD mortality rates by disease category and sex, cardiovascular disease is the highest, and slightly higher for males than for females. Age-standardised mortality rates for cancers show a decrease for males and a slight decrease for females. There has been an increase in diabetes in both males and females.

The patterns are interesting in the context of the different living conditions by population group in South Africa. Although cardiovascular disease in the African population has not changed markedly, substantial decreases are seen in the Indian and coloured populations, possibly due to lifestyle or access to health care. The health transition within the cardiovascular diseases shows different patterns by population group. Cardiomyopathy, hypertensive heart disease and stroke are high in Africans and low in other groups, while IHD is considerably lower in Africans than in whites and coloureds, but extremely high among Indians. Further intriguing information arises from a comparison of the cardiovascular causes of death by males and females. Smoking patterns explain the different prevalence of these diseases in males and females. However, cardiomyopathy is similar between males and females.

Modifiable risk factors

Data from the original risk factor study in South Africa in 2000, which looked at eight modifiable risk factors and their contribution to CVD, showed hypertension as the leading risk factor. The joint effect of the eight risk factors accounts for 65% of the CVD burden in South Africa. Much can be done if smoking, diet and physical inactivity are addressed and primary care to control cholesterol, blood pressure and diabetes is available.

The *Second National Burden of Disease Study 1997-2009* shows higher cancer mortality rates for males than for females. The trends show a decline in mortality in esophageal cancer for men and women, possibly related to urbanisation and access to a wider diet. A surveillance system in a rural area has identified that there has been no change in esophageal cancer incidence in the rural area.

Lung cancer incidences have decreased for males but not for females, although considerable efforts have been made in terms of tobacco control. A possible explanation is that females do not smoke as much as males and tobacco control may have a greater impact on men, or that the content of cigarettes has changed. Mortality caused by prostate cancer in men and breast cancer in women were on the increase. Mortality caused by respiratory diseases also showed some declines that are of interest. The burden for men is higher than for women, and there are signs that chronic obstructive pulmonary disease (COPD) was showing a decrease.

Concluding comments

- South Africa is in the midst of colliding epidemics. Mortality rates due to the high level of NCDs evident at the onset of the study, intensified due to the later HIV pandemic.
- NCD mortality rates are decreasing, but some NCDs are increasing, namely: diabetes, hypertensive heart disease, renal disease, prostate and breast cancer.

- Modifiable risk factor trends are challenging and suggest that there is a race against time as the emerging chronic diseases are all related to:
 - obesity, which appears to be on the rise;
 - hypertension, which is rising but control may have begun to improve (better data are required in this regard);
 - diabetes, which is rising;
 - high-density lipoprotein (HDL) cholesterol levels, which are on the rise;
 - smoking rates, which are decreasing but still high in some groups;
 - risky alcohol use, which is rising.
- Data on the non-fatal burden are required. Mental health and musculoskeletal conditions, and the whole picture of ill-health (not only mortality trends), need to be addressed in future studies.
- There is a rising tide of deaths from NCDs in South Africa, largely due to growing populations, as well as ageing of the population. CVD is responsible for more than half the deaths from NCDs, and the other half of deaths are caused by cancers, respiratory diseases, diabetes and other NCDs.
- In some ways, South Africa is unique. The health of the population is extremely poor in relation to the country's level of development, and there are colliding epidemics, social determinants and the struggle to respond to these. In other ways South Africa is not unique and has similarities with other countries in Africa.

DISCUSSION: Q&A

Prof Charles Olweny: Prof Bradshaw talked about changes in leading causes of death in South Africa between 1997 and 2009. Cancer is noticeably missing from the list of the top ten causes. What is the explanation? Was it because all age groups were included in the figures presented? What is the explanation for the decline in cancer mortality rates between 1997 and 2009?

Response, Prof Bradshaw: Cancer does not feature among the top single causes of death because the other conditions are even higher than cancer. When the cancers are grouped (and all ages are included), cancer is ranked the second NCD, then respiratory conditions followed by diabetes. The declining trend in cancer mortality was surprising to the researchers. There are data to show that tobacco consumption has declined in South Africa. Legislation to control tobacco has played a role in this. Esophageal cancer has also declined but we do not know what causes this cancer.

Arjuna Aluwihare: I do not believe that NCDs exist. Twenty-five years ago when we talked about violence and trauma being spread by the media, we were scoffed at in the WHO Advisory Committee for Health Research. Today this is not a joke. Is HIV a communicable disease or not? Are the changes in behaviour patterns responsible for the spread of HIV? This applies to cancer and

various other conditions, as well as lifestyle matters. Much good work has been done in South Africa and by the WHO. Why do we not canvas for the name change from 'non-communicable disease' to 'neo-communicable disease' to convey a sense of urgency? These neo-communicable diseases are spread by the electronic media, print media and the peer pressure of social media.

Response, Dr Yach: About a decade ago, a public relations company asked people on the street what they understood by the term non-communicable and chronic diseases. People thought chronic diseases were just dreadful illnesses and they thought NCDs were things that should not be spoken about. At the time, the Director-General of WHO wanted to call them communicated diseases.

Response, Ms Matsoso: It is appropriate for these kinds of debates to take place in the WHO.

Dr Charles Agyemang: It was interesting to see that CVD is decreasing in South Africa. The different mortality rates between genders, showing that women are doing better than men, are striking. I have been doing work among African migrants living in Europe and elsewhere. It appears that hypertension control is very good among women but in men, for some obscure reasons, it was very bad. Control rates in some migrant populations are much lower than in rural African countries. I was wondering whether you have observed the same in relation to the control rate in South Africa.

Response, Prof Bradshaw: I did not present all the data from the study. Perhaps the recently released SANHANES results may help. We definitely do see a gender difference. Men do not like to present to health services. Hypertension in women is often detected because of natal care. Women have more access to health care. In terms of the decline in cardiovascular disease, in 2003 South Africa also introduced food fortification where micronutrients were added to certain staple foods. The full impact of this is unknown.

Dr Eva Kantelhardt: In respect of data from the GBD report, how much data in the study came from rural areas in low-income countries?

Response, Dr Yach: What Prof Bradshaw highlighted for South Africa was the realistic perspective for many of the low-income countries of the world. The data for the very lowest income are still very sparse, particularly in terms of registration of cause of death. Data on the prevalence of risks are much better.

Prof Volmink summarised the session's proceedings as follows:

- The big challenge of NCDs in low-middle-income countries is a reality that will have to be addressed.

- Although there are a lot of data there are still some uncertainties in some areas. However, there is a weight of evidence that guides decisions on how to address the problem. It is necessary to reach a position that would enable countries to act on the evidence and implement programmes to prevent NCDs. Dr Yach's question, "If so much of NCDs is preventable why are we not preventing?", should be kept in mind throughout this conference.
- It is clear that individuals and isolated groups cannot address the issue of NCDs and that substantial partnerships comprising scientists, politicians, practitioners, industry, NGOs and faith-based organisations globally will be necessary.
- A clear synthesis of the steps to take the matter forward would be developed during this conference.

SESSION ONE: POVERTY AND NCDs

(Facilitator: Prof Benson Estambale, Kenya National Academy of Sciences, Kenya)

POVERTY, INEQUITY AND NCDs IN RURAL SOUTH AFRICA

(Prof Steve Tollman, MRC/University of the Witwatersrand, Rural Public Health and Health Transitions Research Unit, South Africa)

The question of how to understand health, well-being and development in rural South (or southern) Africa, faces a variety of challenges. One of the biggest challenges is accessing the data that explains what is happening in a particular rural setting. Work done in the early 2000s on cause-specific mortality, revealed a strange picture. At the time that the HIV epidemic had already gained momentum, it was found that in women over the age of 50 who lived in poor, rural north-eastern South Africa, there was a balance in the increase in cause of death from HIV, TB and related causes to those associated with BP, diabetes and related issues. This changed the perspective of the research team.

The full mortality series of rural South Africa from 1994 to 2009 (based on verbal autopsies) shows an initial substantial increase followed by a positive and suggested decline in communicable disease-related mortality, and the growing mortality from NCDs in the rural north-east of South Africa. The presentation focuses on cardio-metabolic conditions rather than the extreme broad spectrum of conditions.

Relevant data are collected in the rural north-east of South Africa that borders on Mozambique, and from establishing, through health and socio-demographic information systems, the ability to understand the nominators in the early 1990s, enrol a population and follow the population, their households and their communities through time, evaluating outcomes and tracking exposures upstream, in order to generate valid, empirical, dynamic information on such communities.

In considering social, as well as biological determinants, it is necessary to look at migration as this drives the regional economy. Migration patterns over the years from 1994 through to 2011 in this part of South and southern Africa show that male migration among older working ages remains as high as it always was. More younger men and rising numbers of women, particularly younger women, are joining the migrant labour force. There is no question, through the social transfers in South Africa, that rural communities can show progressive improvement in the assets of households, notwithstanding any mortality pattern. This raises questions about how mortality or any other outcome, relates to exposures that are not only biological (such as diet or exercise) but are more upstream (such as migration, socio-economic status). It was found that in the specific rural setting, there are changes over time in the association between socio-economic status and cardio-metabolic, non-communicable and other kinds of conditions. Over the past 15 to 20 years, the lowest socio-economic status produced the highest HIV TB mortality. The same pattern is not expected to become evident under non-communicable causes of death. In poor, rural settings these are not homogeneous, but are highly heterogeneous. There is a high wealth differentiation among seemingly poor communities, reflected in NCDs mortality as a whole, where the association is that those who are better off appear to have lower mortality and poorer households have worse mortality.

Having considered the mortality transition and some of the connections with social determinants, these have effects along the life course and they affect younger, working age and old people differently along the life course. It is necessary to have data, the tools and the approaches to closely study this issue, in order to be able to build an effective health care system and prevention programmes.

Researchers have shown that, in the specific geographical area of the study, stunting remains 20 to 30% amongst one to two-year old boys and girls. The same community at the same time is showing obesity and overweight among adolescent girls, rising to about 25%. The levels of stunting are comparable to figures from research done in Soweto 15 to 20 years ago and the levels of obesity and overweight are close to current figures from Soweto. Changing risk factors are tracked over time, and show for example, steady increases in levels of abdominal obesity and hypertension. The information contributes to an overall understanding of the overall pictures gained from the research done by Prof Bradshaw and her team. This picture is complex, as co-morbidities in southern and east Africa will be part of the landscape for decades to come. Even among people older than 50 years, the average HIV prevalence was close to 20%. The impact of this prevalence over time is unclear at this stage. Certain risks, such as smoking and alcohol, are biased towards men and the risk fac-

tors are moderately prominent and higher among men, yet the difference with regard to physical measures is particularly prominent in women.

Questions are asked about the inter-relation between male, adulthood, labour migration and BP. The pilot work suggests that there may be a relationship between migrant labour and BP. In terms of the well-being and mortality of older people, the responsibility taken for sustaining households (given the crisis in the parental generation) is very significant. Concepts of well-being begin to capture some of the musculoskeletal conditions. There is no doubt that there is a positive relationship between global understanding of a person's well-being and subsequent mortality. Women who are responsible for households in their later years feel much better when they receive a pension; food security of households improves and more girls attend school for longer. Interventions not only from within the health care system but also those that have an important health effect from outside the system are important. Mortality data, grouped according to acute and chronic conditions, show a major rise of the burden of chronic conditions that the health care system will have to address in an integrated manner.

The natural environment has shown to be a critical buffer in terms of the effect that the premature mortality of a breadwinner has on a household, particularly the poorest households. This is important in understanding the link between serious health outcomes, livelihoods and sustainability.

Some take-home messages are:

- There is a critical dynamic and ongoing transition in the rural north-east of South Africa affecting exposures and outcomes, and social and physiological interactions.
- Effects along the life course are significant and need to be understood, with co-morbidities among older people as a feature.
- It is essential to ensure that tools, instruments, approaches are strengthened in order to provide the information that will help researchers to establish the burden, evaluate the interventions and understand their overall impacts.
- Health sector and multi-sector responses will be required.

MONITORING NCDs IN URBAN SLUMS

(Dr Steven van de Vijver, African Population and Health Research Centre (APHRC), Kenya)

Background on APHRC and urbanisation in Africa

The APHRC was founded in 2001 with support from the Rockefeller Foundation in order to stop the brain drain of African scientists. The centre initially had a dozen people and currently has more than 120 employees from ten different African countries. The main focus of the centre is research, not only in health but also education, population dynamics, urbanisation, ageing and develop-

ment, with strong components of research strengthening and policy communication. The research is aligned with the policies in Kenya and aimed towards influencing national, as well as regional policy.

Health challenges and system research are focused on the following three elements that are closely related to NCDs:

- Infectious and NCDs and their inter-linkages.
- Critical health systems, needs and challenges.
- Global environment change and its health impacts.

The African continent has the highest urbanisation rate, increasing from around 10 to 15% of the African population living in cities in the 1950s, to approximately 50% in 20 years' time. African cities, such as Kampala, Mbuji-Mayi and Niamey had shown 50 to 57% growth within ten years. Urban populations are expected to triple and reach 1.23 billion in 2050. Most people moving from rural areas enter the cities' slums. Up to 72% of the African urban population currently lives in slums and the Gini coefficient in some cities has increased to 0.73.

Nairobi Urban Health and Demographic Surveillance System (NUHDSS) and related projects monitoring NCDs

NUHDSS was established in 2002 as the first longitudinal platform in urban Africa. The system monitors two informal settlements, Korogocho and Viwandani in Nairobi, Kenya, surveying 75 000 slum dwellers. Household visits are carried out every four months to collect data on fertility, mortality, migration and livelihood, as well as causes of death, using the verbal autopsy technique. Several studies are conducted from the NUHDSS, including various NCD projects.

The CVD project started in 2008. This was a cross-sectional survey of more than 5 000 people. The results showed that the prevalence of hypertension was 18.4% and diabetes 4.4% and the large majority of slum dwellers were unaware of having a risk factor, such as hypertension and the condition was not controlled or treated. The risk factors were relatively low, although dietary habits and high salt intake were problematic.

The operations research project was born from the CVD study. The main aim of the study was to provide a referral mechanism for high-risk CVD patients identified through the risk factor study. Adherence proved to be a challenge, with 87% of the hypertension patients dropping out of the management programme, particularly in slum settings where there is no cultural understanding of chronic diseases.

Following the previous two projects, an implementation research project was designed to develop and evaluate a cost-effective model for CVD prevention for the urban poor, focusing on adults above 35 years of age, within the setting

of the NUHDSS. The project looked at the whole model of care, from awareness to screening, treatment and long-term compliance. The theoretical outcomes of the model to date have proved to be very interesting.

Standard data collection in the NUHDSS involves verbal autopsies. The main aim was to study mortality data in order to describe the BOD profile in the informal settlements. The trends from 2005 to 2011 indicated a significant rise of NCDs and injuries and a decline in communicable diseases.

Several projects are ongoing, one of which is the AWI-Gen Project, a multi-site project that will start within the next months. Its aim is to evaluate and compare genetic and genomic associations of body composition and cardiometabolic risk in African populations.

Challenges and uniqueness of monitoring NCDs in slums

There are many challenges related to monitoring NCDs in the slums, and many of the factors are interrelated. Extreme poverty is the main cause of the challenges and influenced other aspects such as mobility, a lack of social cohesion and security.

Unique factors in NCD monitoring in urban areas include:

- the balance between implementation and observational research;
- limited access to the health care system;
- limited economic opportunities.

Conclusion

It is important that the work to collect data on the urban poor of Africa continues, particularly as the population in these areas is rapidly increasing and is neglected in the research and literature. Currently there is only limited ongoing data collection, and this is insufficient to find solutions. More data are needed in order to develop adequate interventions to combat the rise of NCDs among the urban poor in Africa.

POVERTY AND NCDs: LESSONS LEARNED

(Dr Charles Agyemang, University of Amsterdam, Netherlands/Kwame Nkrumah University of Science and Technology, Ghana)

There is no doubt that the global health system has achieved successes and figures show that many Millennium Development Goals (MDGs) have improved. However, there are still huge disparities in relation to mortality. People living in the African region are more likely to die 20 years earlier than those living in Europe. This demonstrates the evidence of global inequalities and health challenges in Africa. Some of these challenges are:

- many communities are affected by communicable diseases;
- the growing epidemic of NCDs;

- the double burden of disease is compounded by a nutritional transition typified by co-existence of malnutrition and over-nutrition.

An interesting study was done in 1929, which looked at 1 000 Kenyan men in the areas around Lake Victoria. It was found that their BP was very low, there was no increase in BP with age and there was minimal heart disease of any kind. The researchers attributed the findings to the lack of stress of the traditional lifestyle. Much has changed since then. A recent study on the prevalence of hypertension by age and sex in an urban poor population in Kenya shows an increase in hypertension with age in both males and females. This is attributable to industrialisation and urbanisation, and the related economic, social and environmental changes that lead to increased income and wealth that in turn lead to an increased risk of CVD.

According to WHO figures, almost half of all NCDs mortalities in 2008 were caused by CVD. More than 80% of mortalities from CVD occurred in low and middle-income countries, of which 29% were among people under 60 years of age. The higher prevalence of CVD in poorer communities contributes to a cycle of poverty. According to projected figures, the current high levels of deaths from CVD in low and middle-income countries compared to high-income countries, is expected to continue and even accelerate.

The risk factors for CVD (behavioural, metabolic and other risk factors) are well known, particularly in low and middle-income countries. Hypertension is the major risk factor in Africa and the relationship between hypertension and mortality is quite clear. In sub-Saharan Africa, approximately 90% of haemorrhagic strokes, as well as 50% of ischaemic strokes, are due to hypertension. The population attributed fraction for stroke mortality of hypertension is 50%. About half a century ago, high BP was rare in Africa. Many African countries are now faced with CVD while still battling with unfinished agendas of communicable diseases. These health transitions pose huge challenges.

There are similarities between figures relating to the causes of death in England and Wales from 1860 to 1960 and the estimated age-standardised mortality rates by cause in sub-Saharan Africa from 2000 to 2030.

In terms of the relationship between poverty and NCDs, socio-economic inequalities in CVD incidence and mortality have been shown across many countries. CVD and the related risk factors were originally more common in rich people in the high-income countries. However, this pattern has reversed over the last 60 years or so and currently poor people have more CVDs compared to rich people in Western countries.

The 'diffusion theory' of the epidemic of IHD is explained as follows: CVD started with the rich, because they were the first who could afford behaviours that increase the risk of CVD. The epidemic spread to the poor due to rising living standards. When the epidemic started to decline, the rich benefited first because they were the first to adopt behavioural changes. Consequently, the well-known inverse gradient emerged, which is also evident among migrant populations in high-income countries.

The reduction of NCDs requires the following interventions:

- Early detection and primary prevention.
- Education and training of health professionals.
- Increased availability of, and adherence to treatment.
- An evaluation of the effectiveness of NCD therapies in different world regions.
- Commitment from governments.

DISCUSSION: Q&A

Dr Denis Xavier: I was intrigued with the intervention in the slums of Kenya that costs 1 USD per year per person, and would like to have more information.

Response, Dr van de Vijver: This is an innovative project that we worked on together with the Boston Consulting Group (BCG). We tried to integrate public health approaches, ideas and experiences from the corporate world with the assistance of BCG. An extensive theoretical study was conducted and we calculated that, to implement the whole model, including training of community health workers and payment of staff in clinics, would cost 30 000 USD per year to serve 30 000 people who live in the community. The majority of the people are below 18. The outcomes of the theoretical model were very promising and the Ministry of Health in Kenya is very interested in this project for implementation in other slum settings. The key aspect of the project is the involvement of community health workers (CHWs) and decentralisation. It has produced possible solutions that are affordable. The details of this model are available.

Prof De-Pei Liu: Did Dr Agyemang mean that the diffusion theory is about the transition of NCDs from rich people to poor people?

Response, Dr Agyemang: What we see is that in many poorer communities, being rich means that you are different to most other people. The richer people are able to buy fast foods, as this is a show of social status. As time goes on, when they become aware that what they are eating is not good for them, they change their diet. However, the poor people get trapped and it is difficult for them to change their behaviour, particularly as many people in Africa are uneducated.

Prof Charles Olweny: In terms of the relationship between labour migration and BP, Prof Tollman showed that in migration, BP went up on a national, micro level. Has this been shown on a global level? Do the diaspora have higher BP than their compatriots who remain in their countries?

Response, Prof Tollman: The issue of immigrant populations in different parts of the world is well known and well described. However, most studies about migration and related BP that exist come from the Indian continent and not sub-Saharan Africa and tend to be cross-sectional studies, showing simple association between BP or other kinds of physiological risk and behaviours of different kinds. The work I showed was simply suggestive. It is preliminary work that I hope that we will be financing to work more at scale so as to understand and categorise internal migration according to various kinds of stratifiers. One could hypothesise about the issues of distance. I do not think that one would necessarily conclude that distance from home is necessarily associated with a rising trend in BP. Overall, this points to the need for longitudinal studies on this issue, and we must learn from immigrants and related experiences elsewhere. Certainly in this part of the world, I find very little consideration of how we develop the working models that will take large migrant labour populations (male and female) and draw them into health care, so that those who already have raised BP and rising BP can be addressed, as well as the prevention.

Response, Dr Agyemang: It is very well known that there is a relationship between migration and health. Some of the studies I have done compare Ghanaian rural and urban populations, as well as those that migrated to the Netherlands. People living in rural settings have much lower BP and those in Amsterdam have high BP. A study in Kenya followed people who had moved from rural areas to cities and found that their BP increased within a few weeks of their relocation.

Prof Charles Olweny: How do Dr van de Vijver and Dr Agyemang define poverty?

Response, Dr van de Vijver: There is an ongoing discussion on the definition of poverty, slums and so on. Slums are regional boundaries and are seen as places where there is no access to water and sanitation, public facilities or electricity. Slums are heterogeneous and we do not know what the Gini coefficient is in slums, but expect to be as high as it is in cities. Some rich people do live in slums. It is necessary to do more in-depth research in this regard and look at pockets of people that are neglected.

Response, Dr Agyemang: Poverty is very relative and is a difficult concept to define. We defined poverty by looking at the national average income and those people whose incomes were below the national average were regarded as poor.

Robert Souhami: Prof Tollman showed the power of the epidemiological approach in which you have a defined cohort within a certain district followed longitudinally. If one wants to study the effect of precise interventions, whether therapeutic, health care systems and administration or other intervention, do you think in the future that your method of using longitudinal cohorts in observational studies will be adequate to determine the power of an intervention, or do you think some interventions will need to be randomised?

Response, Prof Tollman: I think that, where one is trying to accumulate evidence, prospective observation over time can be valuable in its own right and valuable collaterally. I think the Brazilians have tried to do this a lot at a scale much greater than I presented. On the other hand, with the interventions described, I would want a randomised trial. One of the challenges would be how to achieve the scale, either of randomisation of individuals, or randomisation of clusters. South Africa can learn from Thailand, Mexico and Brazil where there can be custom randomisation at a reasonable scale to find an effect (such as the work done by Dr van der Vijver and colleagues in slums of Nairobi), and the kinds of relationships with larger scale district and provincial government, where you can move to a scale and evaluate at that level. I do not think that one can, or should rely on the observational. I think that there are ways in which one might undertake experimental (randomised) or quasi-experimental of different kinds of designs. Work in Sweden targets lower socio-economic groups in a county with vascular risk factors over an extended period of time, using a mix of observational interventions, but not specifically cluster randomisation, and still producing formal findings over a long period. We can learn an enormous amount on the observational and sometimes need to depend on this where there are major national interventions. On the other hand, building up the basis of randomised designs will inform us enormously.

Prof Naomi Levitt: An intriguing study was published about three years ago. It was well conducted and traced 200 people from rural Tanzania to Dar es Salaam. The research found that there was a change in the eating patterns, and in anthropometry in the people who migrated. Their BPs dropped. I am trying to understand Prof Tollman's data, translate it and compare it to the data from Tanzania, and understand why there is a difference between the two.

Response, Prof Tollman: We are at such an early stage of these studies to try to understand them. They are not definitive and have tiny sample sizes. The take-home message is that these studies should be done. We are not going to fully understand if we only rely on physiological risk factors. We need to understand their associations with the more upstream risk factors, particularly in the highly transitioning environment we all live in. It was no surprise that the presentation of the GBD 2010 findings was titled, 'Rapid Health Transitions'. The fastest health

transitions are arguably in sub-Saharan Africa. We should apply our collective capability to this issue.

Prof Benson Estambale: There is a lack of infrastructure or tools to collect data that is required for NCDs. Poor health systems need to be improved. Further studies are required on some of the issues raised, such as NCDs related to migration, awareness of NCDs, and NCD and poverty.

SESSION TWO: SCIENCE AND PREVENTION

(Facilitator: Prof Thomas Zeltner: Swiss Academy of Medical Sciences, Switzerland)

THE FIRST 1 000 DAYS AND LATER ADULT NCD RISK (Prof Shane Norris, MRC/Wits Developmental Pathways for Health Research Unit, South Africa)

'The first 1 000 days' is a colloquial term initiated in 2010 by the First 1 000 Days Coalition in the US, in response to data that were published showing under-nutrition and growth faltering in infants. Data from 54 demographic health surveys consistently showed severe growth faltering and high prevalence of stunting by age two.

Much evidence over a 20-year period from both animal studies and epidemiological work has shown that developmental programming (the aspect of under-nutrition and/or any other adverse exposures that happen during key developmental periods through foetal or infant development), can have consequences for organ development and organ function that play out in later risk, particular for chronic disease and other NCDs.

The conceptual framework for developmental programming highlights the later risks associated with particular chronic insults which infants are exposed to by age two. If a foetus or infant is exposed to a particular chronic insult over a long enough period the biology of the foetus or infant, which tries to adapt to the insult, fails. The consequence of this failure is alteration in terms of key organ development and function, which has been shown to lead to certain risk factors for NCDs.

Results of a survey conducted in the late 1980s and early 1990s in a long-term United Kingdom (UK) cohort, showed the first signs of this developmental programming. In terms of birth weight and impaired glucose tolerance among a cohort of men of 60 years old, a relationship between low birth weight and high impaired fasting glucose (IFG) was evident, which gave impetus to the idea

that something happens during pregnancy that programmes physiology and has long-term consequences of some sort.

Many more recent observational studies, which in a meta-analysis together with the older cohort studies, highlight the relationship between low birth weight and a significantly higher risk of type 2 diabetes. In more recent cohort data, particularly from populations that are highly transitioned, such as in India, there is a 'U shape' relationship. Low birth weight is still associated with a high risk of type 2 diabetes later on in life, but a high birth weight is also associated with type 2 diabetes. This is important as it highlights the population transition. On the one end there is under-nutrition and its subsequent consequences, and on the other, there is the consequence of over-nutrition as more women are overweight or obese by the time they fall pregnant, altering maternal glucose metabolism and changing the physiology, particularly that of the foetus, resulting in the classic clinical condition of macrosomia. From an epidemiological point of view, it is not necessary to have a clinical defined macrosomic case to show this relationship.

In summary, this highlights the importance of pregnancy and aspects of both maternal health and foetal growth and development in terms of programming physiology, which plays out in risk factors. Low birth weight and high birth weight are now considered risk factors for type 2 diabetes. In addition, low birth weight has been shown to be associated with many other NCDs.

Data from the New Delhi cohort, with participants of 30 years of age, show that those that had impaired glucose intolerance or diabetes, were initially slightly underweight at birth and showed almost a classic pattern of growth faltering, with under-nutrition in their earlier years, followed by over-nutrition as they aged. The combination of under-nutrition in one developmental state and over-nutrition at another point of development tends to carry much more significant risk, particularly in terms of diabetes. This association does not only become evident in adulthood. A similar pattern was shown in eight-year olds in another Indian study. This highlights an important element that pregnancy is a key developmental stage, and infancy or childhood is another potential key developmental stage, with severe implications for low and middle-income countries.

The Consortium of Health Orientated Research in Transitioning Societies (COHORTS) comprises five birth cohorts around the world, all of which have extensive longitudinal data from birth into adulthood. The data from the five cohorts were used in order to understand more in terms of the first 1 000 days. The first set of analyses explored weight gain at different points in the life course. The outcome variable selected was either impaired fasting glucose or type 2 diabetes

in adulthood and birth weight, weight gain between birth and age two, weight gain between age two and age four, and the weight gain between age four and adult were examined. Conditional weight was used so that the data could be put into a model and parameters were not co-linear in order to avoid any statistical bias. The model highlights the first inclination of what potentially plays out in terms of risk. As expected, a lower birth weight z-score carries a negative association of about 9% risk for every standard deviation lower than the average in that population. In the pooled analysis, this means that every 500g less than the average across the cohorts carries a 9% risk for impaired fasting glucose or type 2 diabetes in adulthood. No significant difference or association was noticed in terms of the weight in infancy and between the age of two and four. However, if rapid weight gain occurred in later childhood to adulthood, there was a positive association with an increase and about a 32% risk of developing IFG or type 2 diabetes.

A variety of factors was looked at in a more sophisticated analysis of the data and a paper to this effect was recently published in *The Lancet* (Adair *et al.*, 2013). A diagram (Figure 1) summarising the key findings of the paper illustrates relative weight gain independent of linear gain, across the life course, and NCD outcomes of blood pressure or IFG in adulthood; in the early period there is almost no risk if there is weight gain, but the more weight gained in the period of mid-childhood through adolescence, the more risk was conferred in terms of BP outcomes and IFG. An outcome to measure human capital was added to the model, which showed that weight gained at any point of the life course does not necessarily improve schooling, a proxy for human capital cognitive development. The scenario is different when looking at linear growth and linear growth independent of weight gain. If more is gained in length or height in the early period of childhood, it has a positive effect on schooling. This concurs with the literature, which suggests that better nutrition during infancy relates to better linear growth and is positively associated with cognitive development. If more length is gained than expected in any of the periods across the life course, there would be no negative or positive effects on BP. Therefore, length gain, whether excessive or as expected, is not associated with nor will confer any risk for NCDs, and excessive weight gain, particularly from early childhood onwards, carries a risk for NCDs. This highlights two key elements:

- Greater weight gain in the first two years post-natal in low and middle-income countries is unlikely to increase diabetes and hypertension risk.
- But, after two years, faster weight gain relative to height is associated with increased adiposity, and increased diabetes and hypertension risk.

These data differ from data in high-income countries.

The key elements are highly relevant for South Africa. The statistics for South Africa, updated from the recently released SANHANES point to:

- One in five babies will be born with low birth weight and maternal under-nutrition during pregnancy, which results in low birth rate. There are very little data on macrosomia, typical of countries in transition.
- One in four infants will be stunted.
- One in four young children (two-four years) will be overweight/obese.
- One in two older adult women will be obese.
- One in two women (40+) will have hypertension (Soweto).
- One in seven women (40+) will have type 2 diabetes (Soweto).

It is important to look at NCDs from a life-course perspective. A significant window of opportunity to begin prevention of NCDs is presented during early stage development, particularly in terms of maternal health during pregnancy and infant health in the first two years, to ensure a healthy trajectory and minimal risk of NCDs in later life.

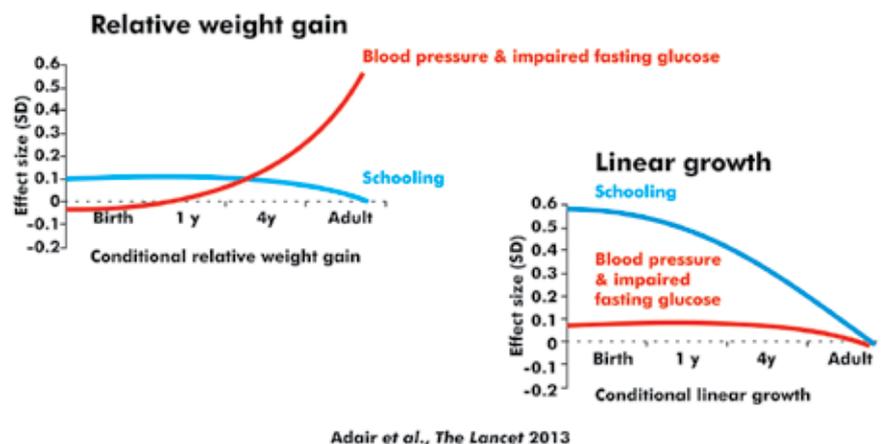


Figure 1: Relative Weight Gain Independent of Linear Gain

IMPACT OF LIFESTYLE CHANGE IN THE PREVENTION AND MANAGEMENT OF OBESITY (Prof Vicki Lambert, University of Cape Town, South Africa)

Scope of the problem

The problem of overweight and obesity is pandemic, and the problem in South Africa is similar in magnitude to the pandemic in North America, some parts of South America and Australia. The global prevalence of inactivity is even more concerning. One of the aspects that comes through strongly in the literature is that obesity is actually a problem of energy balance. The global prevalence of obesity has been estimated at 31.1%. South Africa features prominently with

a very high risk of inactivity as recently confirmed by SANHANES. Moreover, it is important to understand that in terms of the contributable fraction associated with physical inactivity, the number of deaths could be greater than that for smoking.

The secular trends in overweight and obesity in South African adults according to the South African Demographic and Health Survey (SADHS) survey of 1998-2003 did not show significant increases. However, secular trends based on SANHANES 2013 show an increase in obesity prevalence in women, and that 28% of men and 45% of women are unfit. Secular trends in obesity in South African youth from 2002 to 2008 show the obesity rates have more than doubled among male adolescents and rose from 5.0% to 7.5% among female adolescents. This trend is particularly concerning when over the same time period, vigorous and moderate physical activity in these same youth were on the decline, and inactivity and television viewing were on the increase.

Another way of looking at the problem is that inactivity and obesity in Africa can be considered to be developmental issues. Data from the WHO database that looks at the prevalence of physical inactivity and the prevalence of obesity in women in different African countries were graphed along the gross national income (GNI) per capita, and in men similarly looking at the GNI in the prevalence of inactivity. This approach shows that the prevalence of inactivity is on a developmental trajectory.

Another consideration is the issue concerning gender, food security and early life experiences. A survey of adults in the Khayelitsha community in the Western Cape looked at determinants of adult obesity in men and women. The study looked at childhood hunger index, current household income, levels of education, depression, body image, health status, marital status and roles in household decision-making. The two remarkable features of these data are that none of these factors influenced the prevalence of obesity in men while the impact of a childhood experience of hunger or early childhood under-nutrition, as well as a current role in household decision-making, and income and body shape satisfaction, contributed to the problem of obesity in women.

Ecological factors upstream of lifestyle interventions

In her presentation, Prof Bradshaw referred to the chronic diseases of lifestyle as one way of considering chronic NCDs. However, while lifestyle may be the typical way of life of an individual, group, or culture, not all aspects of lifestyle are voluntary. Surrounding social and technical systems can constrain the lifestyle choices available to the individual and the symbols she/he is able to project to others and the self. One of the most interesting studies currently taking place in Africa begins to help understand the impact of the built environment on lifestyle choices. One of the characteristics of the built environment being studied is known as 'walkability'. Street connectivity, residential density, aesthetics and

safety are properties that characterise a walkable community in the global north. Neighbourhood attributes have been characterised in Nigeria, looking at the odds of being overweight where there are no commercial destinations in a neighbourhood and where there is an absence of aesthetics or beautiful surroundings, the presence of litter and bad smells, lack of safety due to traffic and lack of safety due to crime. The odds of being overweight are 1.5 when considering these ecological and environmental determinants, which have nothing to do with lifestyle choice.

The city of Bogota, Colombia, a country that has a Gini coefficient similar to South Africa, adopted a 'cicloruta' or 'ciclovia' some years ago. Streets in the city centre are closed on Sundays and public holidays, an alternate rush hour traffic control was adopted based on license plate numbers and a Transmilenio rapid transit system was introduced. The ciclovia has impacted significantly on the carbon footprint and on car dependency, increased property values and decreased crime, and addressed the prevalence of travelling by non-motorised transport during peak time.

Other important secular trends that have little to do with lifestyle are the changes in occupational physical activity that have occurred over time. These trends were modelled over five decades in the US, looking at the changes in total metabolic equivalents in both men and women over a 50-year period. It can be argued that lifestyle, which was a change in physical activity may be directly attributed to the change in obesity prevalence in North America.

Another factor that may influence the prevalence of obesity is the food distribution system. The food environment as an ecological framework can be viewed as part of lifestyle, with multiple influences on what people eat, including individual factors, the social environment, physical environments and macro-level environments. A private sector initiative in South Africa provides discounts on certain identified 'healthy food' items. Higher intakes of these foods and lower body mass index (BMI) of people who activate the discount have been reported. A further financial incentive to drive the 'food lifestyle' provides VAT exemption for specific foods. However, this is a regressive policy that rewards those who can afford to buy and store the food (such as milk) that is exempt.

Behaviour change, different health promotion settings and the overall impact of these on obesity

Weight loss targets and settings, and theories underpinning weight loss are considered in addressing lifestyle interventions for the prevention and management of obesity. One of the ways to learn about behaviour change and success in weight management is from the National Weight Control Registry (NWCR), an observational study (since 1994) of persons who have achieved long-term weight loss maintenance. The study shows that there are different clusters of behaviour.

A pilot study composed of 15 weekly meetings focused on the extent to which theory-based interventions were successful. It showed that the psycho-social components, particularly attitudes and perceived behavioural control that theory-based interventions seek to address impact on the weight loss that people experience in the programmes. When the same principles (the '5 As': Assess, Advise, Agree, Assist, Arrange) were applied in primary health care settings and physicians' consultations with patients were monitored, it was found that physicians' assessment or advice improved patients' confidence for weight loss. The '5 As' were also applied in targeting physical inactivity in a South African worksite setting of people who were at risk. A reduction of BMI was found over a three-month period in relation to a standard of care control.

A randomised control trial in the UK involved primary health care settings partnering with the private sector and showed that participants who were referred to the commercial weight loss programme lost twice as much weight, and were twice as likely to lose more than 5% of initial weight, than those receiving standard care.

A longitudinal study in patient-based settings, looking at intensive lifestyle intervention versus diabetes support and education showed overall prevalence of more than 10% reduction in body weight or failing to lose weight, in support of intensive lifestyle interventions, which result in more frequent treatment sessions and an overall higher level of physical activity. A meta-analysis shows that overall changes in weight with lifestyle interventions in individuals with type 2 diabetes are modest, between two and four kilogram.

A systematic review of controlled trials of lifestyle interventions in adults with a BMI < 35 kg/m² with at least two years of follow-up, produced significant improvement between groups with mean difference weight change ranging from -0.5 to -11.5 kg. In summary, lifestyle interventions are very intensive and their overall effects are modest.

In terms of physical activity, it is recommended that more focus be placed on population-based strategies, such as the following:

- Comprehensive, school-based interventions.
- Policies and systems that promote active transport.
- Urban design that provides equitable and safe access for recreational physical activity and active transport by walking and cycling.
- Physical activity integrated into primary health care settings.
- Public education including mass media to change the social norms regarding physical activity.
- Community-wide programmes involving multiple sectors and settings that mobilise and integrate community resources and participation.
- Sports programmes that promote 'sports for all' and encourage participation across the lifespan.

Conclusions

- There is a need for integrated and population-based strategies for the primary prevention of obesity, particularly in low and middle-income countries, in part, by addressing issues of social and environmental justice.
- There is the need to adopt a multi-sectoral approach building on existing organisational infrastructure; and a 'settings' approach.
- The problem of preventing and managing obesity requires an 'energy balance' perspective (energy intake and expenditure).
- Policy, programmes and practice need to combine to address choice 'disability' to make the healthier choices easier.

EVIDENCE FOR REGULATORY STRATEGIES FOR OBESITY PREVENTION

(Dr Gary Sacks, Deakin University, Australia)

There is a mismatch between the NCDs problem and government responses. The BOD from poor diet and physical inactivity is around 10% compared to tobacco, which is at around 6%, and the response in terms of public health NCDs prevention tends to be less than 1% of the health budget for most countries, with very little political action from the perspective of obesity prevention.

Role of policy for obesity prevention

Energy imbalance and changes in behavioural patterns result in obesity. People eat too much and do not exercise enough. Environmental drivers of obesity include food supply and marketing that promote high-energy intake. More distant to the environment are the systemic drivers, involving economic systems that encourage high consumption and economic growth. Policy interventions target environmental drivers. Health promotion (HP) programmes and social marketing tend to focus on behaviour and medical options are targeted towards physiology.

Overview of cost-effectiveness evidence

The evidence for fiscal and regulatory options for obesity prevention is based on multiple reasons for acting in this area. In terms of the problem of obesity, there is an imperative to act, often referred to as the precautionary principle. Even in the absence of evidence, there is an imperative to take some form of action.

Protection of children from unhealthy marketing, particularly in respect of marketing junk food, consumers' right to information and public support for particular policies can be seen as reasons for government to take action. There are different grades of evidence, as well as other admissible evidence, such as parallel evidence and mathematical modelling.

It is important to recognise that it is difficult to obtain empirical evidence of the effectiveness of policy actions. Evidence of effective obesity solutions include:

- Modelled results using best available evidence and input from experts and policymakers (such as the Awareness and Consciousness Education (ACE) approach, OECD modelling).
- Overall patterns that emerge in terms of:
 - policies: low cost, wide reach, often cost saving;
 - programmes: moderate cost, low reach, can be cost-effective;
 - treatment: high cost, low reach, some cost-effective.

Case studies and examples

Some examples of policy areas that influence food environments are:

- Marketing of food to children.
- Nutrition labelling.
- Food taxes and subsidies.

Marketing of food to children

Few countries have implemented mandatory restrictions on unhealthy food marketing to children. The UK has put in place some restrictions particularly in terms of children's television-viewing time, resulting in children seeing about 34% less advertising of unhealthy food. Modelled evidence indicates that mandatory restrictions are likely to be highly cost-effective.

In many countries, the food industry adopts a self-regulatory approach to reducing marketing to children. However, self-regulatory codes are highly complex, full of loopholes and provide few or no sanctions for breaches. There is clear evidence that they still result in high levels of exposure of children to unhealthy food promotions.

Nutrition labelling

Front-of-pack traffic-light labelling has been shown to be easy to understand and preferred by consumers, including those in low socio-economic groups. There is no empirical evidence of changes to behaviour in respect of food purchases. Modelled evidence shows that a policy with regard to food labelling would be cost effective if 2.5% of consumers made a small shift towards healthier products. Traffic light labelling is likely to lead to product reformulation, as food companies would aim to have more 'green lights' than 'red lights' on food packaging.

The strongest evidence that traffic-light labelling is likely to work is that the food industry reportedly spent €1 billion in a campaign to block health warnings on food labels, in response to the European Parliament's intention to draft legislation on the use of traffic-light labelling.

Food taxes and subsidies

A starting point for policy action on food pricing is to align current food taxes and subsidies with public health goals.

There is strong evidence that price is a major factor taken into account by consumers and is an important policy lever of government. Although there is promising evidence of effectiveness, there is still uncertainty around effects, particularly regarding product substitutions. There are only a few real world implementations, and fewer evaluations of food taxes. Some of the states in the USA have a tax on soft drinks with the intention of raising revenue, but the taxes are too insignificant to influence behaviour.

Denmark introduced tax on saturated fat in 2011, but this was withdrawn in 2012. The impact of the tax on consumption had not yet been evaluated. The Danish government cited high administration costs as one of the reasons the policy was withdrawn. The food industry was a strong opponent of the policy, and it is speculated that lobbying contributed to the removal of the tax.

The message to policymakers is:

- A strong policy response is needed to tackle the drivers of obesity and other diet-related NCDs.
- Regulations and fiscal policies focused on population-wide prevention are likely to be affordable and highly cost-effective, particularly:
 - restrictions on marketing of unhealthy food to children;
 - interpretive front-of-pack labelling;
 - taxes on unhealthy foods or subsidies of fruit and vegetables.
- Mechanisms need to be put in place to restrict the influence of the private sector on the policy development process.

DISCUSSION: Q&A

Prof Charles Olweny: I was intrigued with the low and high birth weight in relation to type 2 diabetes, particularly in relation to data from Indian populations and the 'U shape' curve presented by Prof Norris. Has this observation been duplicated in other populations?

Response, Prof Norris: We are starting to see macrosomia and the relationship that macrosomia has to IFG emergence in high-income countries. Maternal obesity in high-income countries (USA and UK) that results in macrosomia has been seen for macrosomic infants starting to show early signs of IFG. The 'U shape' curve is starting to be seen in other populations.

Prof Charles Olweny: In terms of the concept of the cyclovia in Latin America, I believe the concept was introduced in Nigeria (to alleviate traffic congestion), but it did not work as most people devised plans to bypass the system.

Response, Prof Lambert: The roll-out of the rapid transport system in the Western Cape was specifically positioned in an area where there was a lot of car-dependency already, to provide those people with an alternative form of transport. We are finding through interviews that people get 30 minutes of physical activity if they use public transport. It is possible that using public transport might reduce the travelling time of those people who are more disadvantaged.

Dr Mary Amuyunzu-Nyamongo: The problem with policymakers is that, immediately a motion is introduced in Parliament, it is discussed at a meeting and 100 different corrections are then introduced to the policy document. This is what happened in relation to tobacco and alcohol policies. Are there any best practices or quick fixes for this situation?

Response, Dr Sacks: This is exactly what governments around the world are facing. It is difficult to give any advice in this regard. The role of academics and NGOs in this area is to hold governments to account and the food industry to account for their role in influencing policy. It is important to collect data on lobbying that takes place and on the actions taken by governments, and to put pressure on governments to take more action. Academics and NGOs should give independent evaluations of matters presented to government policymakers.

Prof Debbie Bradshaw: How does exclusive breastfeeding fit into the patterns found in the analyses of COHORTS studies?

Response, Prof Norris: The COHORTS group did a pooled analysis on breastfeeding and looked at its relationship with later NCD outcomes. We could not find an association between breastfeeding and NCD outcomes, and this has been replicated in other sites. Uptake of breastfeeding was very high in most of the settings, but exclusive breastfeeding was not very high. The reason for not finding an association could be due to the measurement of breastfeeding at the time in the cohorts.

Savera Kaliden: Soul City (an NGO in South Africa) has been lobbying, as part of the Health Promotion Development Foundation Network, for a levy on alcohol and tobacco that is redirected to set up a health promotion foundation. We have the same problem of access to policymakers who are also influenced by industry. It would be good to hear how this advocacy can be taken forward. The evidence needs to be disseminated in the public domain.

Dr Charles Agyemang: It is becoming increasingly clear that birth weight is based on ethnic differences. How is this factored into account in the work presented by Prof Norris?

Response, Prof Norris: In terms of the pooled analysis of data from the five cohort studies, a birth weight z-score and WHO standard are used. The pooled set of data was compared to a standard and we use a z-score and not a definition of low birth weight. The interesting aspect of the analyses done is that if you look at the data by site or pooled, the same relationships hold across the five countries in different settings, ethnicities and social conditions.

Prof Ali Dhansay: In terms of Prof Norris' presentation and earlier discussions, we need to be clear on how we communicate terminology around NCDs and what we communicate in this regard. For example, the use of the words "up to two years of a child's life" or "1 000 days of a child's life" should be clearly conveyed. By conveying a message of the window of opportunity for intervention, we should not exclude the opportunity for more interventions later on.

Prof Ali Dhansay: Earlier this year there was a lot of debate around the possible protective effect of early stage overweight in older adults, especially in relation to type 2 diabetes. Would Prof Lambert comment on this?

Response, Prof Lambert: We are in the process of looking at a meta-analysis of the traditional relationship and risk factors for NCDs in cohorts of 65 years and older. Preliminary evidence shows relationships are often quite different in terms of cholesterol, BMI and others. I think that this will be supported.

Mario Stefanini: Little attention has been paid to science education as an approach to primary intervention, in particular health science education and awareness as a compulsory subject in primary schools. Children should be given a good education background in health prevention. Are there any activities in this direction?

Response, Prof Lambert: One of the cost-effective strategies is school-based and whole of school interventions for obesity as well as inactivity.

Response, Dr Sacks: There is a place for health science education in schools, but be careful of putting the onus on the individual. The work I do looks at the policy options to change the environment in which people live to make healthy choices easier, rather than focusing on placing the burden on the individual.

Prof Karen Hofman: Prof Lambert mentioned the importance of autonomy in the context of individual behaviour change issues. What evidence is there particularly for vulnerable and disadvantaged individuals in urban and rural poverty? Should any money be spent on trying to get individuals to change their behaviour rather than addressing other effective policy interventions?

Response, Prof Lambert: This highlights one of the gaps in evidence. There has been some work done in vulnerable groups but there is insufficient evidence.

Arjuna Aluwihare: Unlike the so-called communicable diseases, in terms of NCDs, a change of behaviour or legislation has a lead time of ten to 20 years before producing a beneficial effect. We are now looking at the ill-effects of what happened ten or 20 years ago. I commend Dr Sack's presentation and the urgent imperative to get policymakers involved in NCD policy, changing legislation, enforcing food labelling and coping with the food industry. The lead time is a very important factor. We cannot wait for evidence before implementing changes that are sensible on a common-sense basis or we will continue to see deaths from preventable NCDs for another ten or 20 years.

Prof Demetre Labadarios: We need to realise that we are dealing with a multifactorial issue. Each factor must be unpacked and we must find out what has been done elsewhere, without necessarily accepting that others' work will apply to South Africa. Most importantly, we should avoid an approach of overclaiming or over-playing separate factors as no single factor will actually make an impact.

Prof Thomas Zeltner: This session is particularly interesting in terms of the messages to be taken to policymakers:

- There is very good evidence that normative interventions are probably highly effective.
- We do not have all the scientific evidence in all areas. However, the scientific community is busy working on the issues and is willing to help disseminate the evidence.
- We need to help protect good scientific evidence from being discredited, through more advocacy and vigorous responses from the scientific community. Science needs to help politicians to make the correct decisions.

SESSION THREE: TARGETING INDIVIDUAL RISK BEHAVIOURS

(Facilitator: Dr Shahira Elsaied, Egyptian Young Academy, Egypt)

ALCOHOL AS A RISK FACTOR FOR NCDs

(Prof Bronwyn Myers, Medical Research Council, South Africa)

Alcohol consumption in southern Africa

Alcohol consumption is a problem in sub-Saharan Africa. South Africa has some of the highest per capita levels of alcohol consumption globally. Although about 55% of men and 70% of women report abstinence from alcohol use, many current consumers of alcohol consume very large volumes.

It is not only the level of alcohol consumption that presents a problem, but also the patterns of drinking. South Africa has a pattern of heavy episodic drinking. More than 30% of drinkers are binge drinkers and there are high levels of alco-

hol use disorders (abuse and dependence). A recent psychiatric prevalence study reported a lifetime prevalence of alcohol or drug-use disorder of about 13%, with increased levels in some provinces such as the Western Cape.

Societal factors include drinking culture, alcohol policy and the drinking environment impact patterns and norms around alcohol consumption. Population group factors, such as poverty, gender and age also influence patterns of alcohol consumption. The volume of alcohol consumed, patterns of drinking, particularly heavy episodic drinking, as well as the quality of alcohol consumed, impact on the incidence and the degree of disability associated with NCDs and mortality rates. Poor-quality, home-brewed alcohol that is extremely dangerous and has negative outcomes, is consumed in rural and poorer communities in South Africa.

A range of chronic NCDs is directly attributable to alcohol use, including the alcohol-related conditions of withdrawal and dependence, alcoholic liver disease and foetal alcohol spectrum disorders (FASD), which are often not factored into estimates of NCDs.

There are more than 200 ICD-10 three-digit disease codes where alcohol is a known component cause of many NCDs. Evidence suggests that there is a dose response relationship between risk of onset of disease as well as death from the NCD, and the total volume of alcohol consumed. Four examples of NCDs where the dose response relationship has been shown are:

- Alcohol and some cancers: There is sufficient and good evidence of a causal link between alcohol use and a detrimental effect on a broad range of cancers. Currently, there is insufficient causal evidence of alcohol's impact on another set of cancers. In terms of the dose response relationship between the volume of alcohol consumed and relative for breast cancer amongst women, binge drinking increases the risk of developing breast cancer.
- Alcohol and diabetes: The evidence shows that moderate alcohol consumption is associated with a reduced risk of developing type 2 diabetes in men and women. However, the protective effect of alcohol is greatest at around two drinks per day for men and women. The relative risk of developing type 2 diabetes increases dramatically if this limit is exceeded.
- Alcohol and cardiovascular and circulatory diseases: The alcohol industry tends to report the beneficial effects of drinking and there is causal evidence of beneficial effects of moderate amounts of consumption on IHD, ischaemic stroke, hemorrhagic and other non-ischaemic stroke by increasing HDL, preventing blood clots and increasing rate of breakdown of blood clots. However, the beneficial effects depend on drinking patterns and the volume of consumption. There is also causal evidence of the detrimental effects of alcohol on hypertensive heart disease, depending on patterns

and volume of alcohol consumption. The dose response relationship is more evident for women in this case.

- Alcohol and digestive diseases: There is sufficient evidence of a causal link of the detrimental effect of alcohol and cirrhosis of the liver, chronic pancreatitis, gall bladder and bile duct disease, as well as other digestive diseases. There is a dose response relationship between mortality associated with cirrhosis of the liver and the volume of alcohol consumed. This relationship is much more evident for women. The gender differences are possibly because of the differences in body composition because women metabolise alcohol differently to men and because some effects of alcohol are sensitive to the presence of oestrogens.

Quantifying the link between alcohol and NCDs (excluding injury and violence)

Despite the limitations of the available evidence, it is possible to begin to quantify the link between alcohol and NCDs. The available evidence suggests that alcohol accounts for between 6% and 7% of all disability-adjusted life years (DALYs) in South Africa. However, these estimates date from 2000 and do not consider the contribution made by alcohol to interpersonal violence and unsafe sex.

A decomposition of the contribution of alcohol to the BOD in South Africa underestimates foetal alcohol syndrome (FAS) burden and indicates that:

- 32% of alcohol's contribution can be attributed to the risk for infectious disease, particularly HIV/AIDS and TB;
- 41% is related to alcohol's contribution to injuries;
- 27% is related to alcohol's contribution to NCDs.

Broad policy implications for South Africa

The most important take-home message is that despite some limitations, the bulk of evidence shows that alcohol use is:

- related to a considerable number of chronic diseases and conditions;
- contributes to a substantial amount of the burden of NCDs.

A paper on alcohol abuse and alcoholism that will be published soon, estimates that a 10% reduction in alcohol consumption will result in a 7% reduction in deaths from NCDs and attributable to alcohol, and a further 7% reduction of alcohol attributable DALYs related to NCDs. This is a conservative estimate as it excludes the impact on neuropsychiatric disorders and injury. It suggests that strategies to reduce the volume of alcohol consumed at a population level would have a considerable impact on overall strategies and plans for reducing the burden associated with NCDs.

South Africa's National Department of Health's Strategic Plan for Prevention and Control of NCDs (2012-2016) is forward thinking, and targets reductions in

alcohol by setting an ambitious goal of a 20% reduction per capita consumption by 2020. It includes some of the WHO's 'best buys' intervention strategies for alcohol reduction, such as banning alcohol advertising. The Minister of Health's strong stand against alcohol advertising has produced a backlash from the alcohol industry.

A supportive policy environment is crucial to reducing the burden of NCDs that is particularly related to alcohol use. The challenge will be to ensure that these policies and population-based measures for reducing alcohol are successfully implemented.

CULTURAL PERCEPTIONS AND THEIR IMPACT ON NCDs RISK FACTORS

(Prof Jegede Ayodele, University of Ibadan, Nigeria (Presented by Dr Oladoyin Odubanjo, Nigerian Academy of Sciences)

Although 'the magic bullet' for certain NCDs and chronic diseases has been known to the world for some years, it remains difficult to eradicate the diseases because of confounding issues of culture in certain countries in particular.

In 1990, 47% of DALYs worldwide were attributable to communicable, maternal, neonatal, and nutritional deficits, 43% to NCDs, and 10% to injuries. By 2010, the figure had shifted to 35%, 54%, and 11%, respectively. These figures do not account for the health and economic burdens of the wide range and prevalence of mental health conditions, which are seen by many as leading NCDs.

Sub-Saharan Africa is most impacted by the projection that NCDs will outpace reductions in infectious diseases, contributing to a rising 'double-burden' of disease. Despite evidence of links between NCDs and development, these diseases and their risk factors are not included in the MDGs. The underlying causes of NCDs are preventable risk factors such as tobacco use, unhealthy diets and physical inactivity, mediated by societal and environmental factors coupled with globalisation and rapid urbanisation. There is need for a paradigm shift in the intervention strategies from the individual level lifestyle focused policies and interventions to a culture context that influences individual behaviours.

The presentation aims:

- to discuss cultural perceptions of NCDs;
- to demonstrate a link between cultural perception and risk factors.

Values are defined differently by different people and reflect a person's sense of right and wrong or what 'ought to be', and influence attitudes and behaviours. Values are rooted in the worldview of people, as a tree is rooted in the earth, and determine how individuals reason and behave.

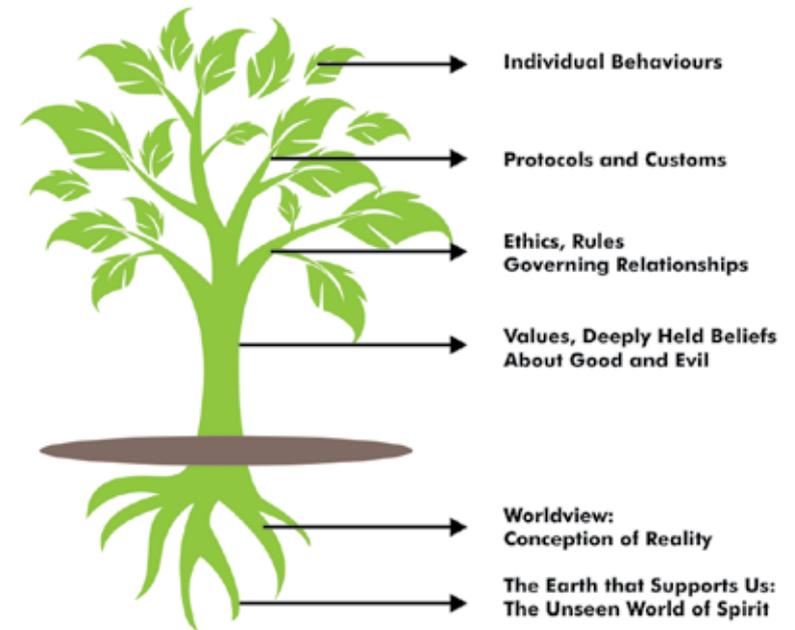


Figure 2: African Worldview and Value

Culture reflects people's values and is an important determinant of how diseases are interpreted or managed because:

- culture is an essential building block for constructing personal understandings of health and illness;
- culture is central to the priority actions usually targeted for reducing the disease burden.

Therefore, considerations of culture are important for the comprehensive package comprising:

- primary prevention;
- effective leadership or governance;
- health care interventions;
- enhanced surveillance.

A study that explored the perception of the Yoruba people of south-western Nigeria about NCDs and their implications aimed to:

- determine respondents' level of awareness of NCDs;
- assess respondents' knowledge of the causes of NCDs;

- find out the NCDs risk factors;
- examine the implications of cultural perception for risk factors.

Results of the survey showed the following:

- A high level of awareness of NCDs.
- The information was obtained from the media, friends and other sources other than medical practitioners, based on hear-say.
- Perceived causes of NCDs included spiritual and cultural causes.
- Implications of perceived causes of NCDs on their risk factors, such as higher alcohol consumption and tobacco smoking and the belief that diseases have an underlying spiritual cause.

Generally, studies have shown that cultural values play an important role in shaping how individuals perceive and relate to diseases. Certain cultural practices, such as the use of stock cubes high in salt content and monosodium glutamate in cooking, cannot be separated from cultural factors influencing nutrition-related beliefs and attitudes towards the use of salt in food preparation.

In the context of NCD management and control, numerous policies and prevention campaigns have been put in place to reduce cultural practices. To reduce the burden of NCDs, primary prevention, such as the reduction in salt and sugar consumption, is considered a top priority. It is important to take into account the cultural dynamics that frame everyday management and self-care practices in order to ensure the success of interventions.

In conclusion:

- Although there is a high level of awareness about NCDs, levels of knowledge and understanding of NCDs remains low.
- Cultural perceptions of the causes of NCDs still rank high in terms of the implication for their risk factors.
- Generally, mass media campaigns are the most accessible mechanisms to spread awareness of NCDs and the risk implications of certain cultural practices.
- NCD prevention, management and control programmes may be futile unless factors driving cultural patterns and practices are addressed.

The way forward involves:

- Engagement of the political process: Political leaders, policymakers and programme managers need to be engaged to understand the implications of culture in order to improve governance concerning the control of NCDs.
- Priority setting in resource allocation: More resources should be allocated to cultural studies that will provide in-depth information about the cultural bottlenecks relating to the prevention and control of NCDs, instead of spending huge amounts on the treatment of NCDs.

- Collaboration: There is a need for collaboration between behavioural and biomedical scientists in the fight against an increasing prevalence of NCDs.

DISCUSSION: Q&A

Robert Souhami: Most advice given about alcohol and most epidemiology concerning the associated disease effects have to do with the daily consumption in grams of alcohol – a measurable factor. However, the graphs shown by Prof Myers clearly indicate threshold effects below which there is very little damage. This suggests the amount of alcohol and the rate that it is metabolised has a certain level above which it is toxic and below which it is not. One sees this with binge drinking. Is there any reliable evidence to suggest that for a given amount of alcohol consumed per day, the manner in which it is consumed is relatively safe or relatively harmful? This could be an important message.

Response, Prof Myers: South Africa (and WHO) has safe-drinking guidelines, which suggest that it is safer to eat food while drinking and intersperse drinks with water. The main message should be to limit the volume of alcohol consumed on a daily basis and use the safe-drinking guidelines.

Prof Charles Olweny: Prof Ayodele mentioned that about 50% of people perceived NCDs to be due to spiritual causes. Do these people seek spiritual solutions to the causes of NCDs? It was also mentioned as a conclusion that there should be collaboration between behavioural and biomedical scientists. There is also a need to interact with the traditional healers as they have a basic knowledge of these diseases.

Unknown person: A large number of women register for antenatal care in hospitals but their babies are not delivered in hospital. Many of them end up in faith-based institutions where they believe that people are praying to ward away evil spirits that might attack them in childbirth.

Dr Mary Amuyunzu-Nyamongo: Alcohol is one of the key risk factors for NCDs. In terms of estimates of alcohol consumption in Africa, some alcohol is illicit or brewed at home and it is difficult to estimate how much is being consumed. I worry about the sources of such information. In five years' time the global community will expect Africa to report on actions taken in respect of reductions in alcohol consumption, but what will we report?

Response, Prof Myers: South Africa has some of the best data in sub-Saharan Africa on alcohol use. It is still difficult to quantify home-brewed alcohol and to quantify patterns of alcohol use because people do not count the number of drinks they consume and drink from buckets, for example, making it difficult

to measure quantities consumed. Our national prevalence surveys are not repeated often enough for us to be able to measure trends and we have to rely on point-of-sale to work out the figures. There are lots of gaps in the data. Better evidence and novel ways of estimating quantities consumed are needed.

Prof Demetre Labadarios: Data from SANHANES show that more than two-thirds of the population consumes alcohol with food. If it is taken into account that most people eat foods high in sugar and there is inactivity, then alcohol (the second most-dense energy source in the diet of those who consume it) becomes a significant factor.

Dr Mary Amuyunzu-Nyamongo: We cannot underestimate the role of culture in the perceptions people have towards health, diets and alcohol consumption. At the same time, we should consider that culture is not static but dynamic and people can change their minds. How do we integrate local knowledge in health education? This is a challenge for health promoters.

Dr Shahira Elsaied:

Prof Myers showed that government policies are important but subtle methods of education are required in order to change misguided cultural perceptions about NCDs risk factors.

SESSION FOUR: CANCER

(Facilitator: Dr Carmencita Padilla, National Academy of Science and Technology, Philippines)

CANCER IN AFRICA

(Prof Charles Olweny, Uganda Martyrs University, Uganda)

Cancer is an uncontrolled, purposeless growth of tissues, which if left unchecked will lead to the destruction of affected tissues and organs, and eventually to death. Cancer is classified according to:

- type of cell (basal cell, squamous cell);
- anatomic site (breast, prostate, bowel, brain);
- biologic behaviour (benign or malignant).

Cancer can be classified as:

- carcinoma if it involves skin, lining of organs;
- sarcoma if it involves connective tissues;
- leukemia if it involves blood primarily;
- lymphoma if it involves lymph nodes primarily.

Causes of cancer are:

- genetic causes;
- physical causes;
- biological causes;
- lifestyle causes, such as smoking, diet, sunbathing.

After the age of five, there are three important causes of death globally: heart disease, accidents and cancer. The commonest cancers in males in Africa are prostate, liver and Kaposi's sarcoma, while in the USA, lung and prostate cancers are most common. The commonest cancers in females in Africa are breast, cervical and liver cancers. Lung, breast and colorectal cancers are the most common in the USA.

Cancer control is defined as the application of existing knowledge covering the whole spectrum of approaches designed to prevent, cure or actively manage cancer. It aims to reduce morbidity and mortality due to cancer and to improve the quality of life of cancer patients and their families.

Available knowledge about cancer control is that one-third of all cancers are preventable, one-third is curable and one-third can benefit from appropriate palliation. Cancer treatment is an expensive, high-technology process. Few resource-strapped countries can afford the necessary infrastructure and equipment. Therefore, emphasis must be placed on prevention. Primary, secondary, tertiary and quaternary stages of prevention begin with avoidance of causative agents and vaccination against known diseases, moving to early interventions and treatment of established diseases through to prevention of pain and or suffering.

Tobacco is the largest preventable cause of cancer in the world today and is responsible for 30% of cancer deaths in developed countries, rising rapidly in developing countries. It is the commonest known cause of cancer and is the only product that kills 50% of its regular users. Other known causes of cancer include hepatitis B virus (HBV) and human papilloma virus (HPV), for which vaccines are available.

Cancer cure is defined as the attainment of normal life expectancy and when treated, cancer patients are dying no faster than age/sex-matched controls. Curable malignancies include leukemias, lymphomas and solid tumours. Available methods for treating cancer are:

- surgery;
- radiotherapy;
- chemotherapy;
- immune modulation;
- combined modality approach.

A study followed 290 patients with Burkitt's lymphoma in Uganda over a ten-year period. The complete response rate was about 81% and 50% relapsed, but 25% of all treated patients were alive and well five years later.

Another study looked at childhood Hodgkin's disease in Uganda, where all 48 cases were treated with chemotherapy drugs. The overall survival rate was 67% and the conclusion was reached that early stage Hodgkin's lymphoma was curable by drugs alone.

Radiotherapy is one of most cost-effective ways to treat, cure and palliate cancer, but only 24 out of 53 countries in Africa have radiotherapy facilities. Ethiopia has two radiotherapy machines for a population of more than 60 million and Uganda has one Cobalt machine for a population of 34 million. Once cured, cancer patients enjoy a quality of life similar to that of the age and sex-matched controls and enjoy significantly better quality of life than age, sex, admission date-matched patients with cardiac disease.

Cancer registries are essential in order to measure incidence of cancer. Of the 48 cancer registries contacted in 2007 for information for publication of an article, only 16 submitted data of which four submitted data that were acceptable for publication (Algiers, Bamako, Harare and Kyadondo registries). The Kyadondo registry, led by Prof Wabinga and his team, is electronic and records only histologically confirmed cases. The African Organisation for Research and Training in Cancer (AORTIC) was founded in 1983 in Lome, Togo and is dedicated to the promotion of cancer research and training in Africa. AORTIC's current office is in South Africa and the organisation's conference will take place from 21 to 24 November 2013 in Durban, South Africa.

The messages to policymakers concerning cancer in Africa are to:

- ban cigarette smoking;
- vaccinate against HBV;
- vaccinate girls against HPV;
- establish and maintain cancer registries;
- set up radiotherapy centres and establish essential oncology drugs lists in all countries.

BREAST CANCER IN COUNTRIES WITH LIMITED RESOURCES

(Dr Eva Kantelhardt, University of Halle, Germany)

The global cancer burden is increasing and is expected to reach 16 million by 2020, with 1 million cases per year in the developing world, primarily south-east Asia and sub-Saharan Africa. There has been a slow increase in the number of cases of cervical cancer between 1980 and 2010.

Breast cancer epidemiologic data

A paper on breast and cervical cancer published in *The Lancet* in 2011, presented a systematic analysis of the incidence changes in 187 countries be-

tween 1980 and 2010 (Forouzanfar *et al.*, 2011). Very few data sets were available from Africa and from south-east Asia.

The cumulative incidences of breast cancer in the world show that North America, Europe, Australia, and the southern parts of South America are highly affected and that other areas have lower incidences of breast cancer. The five-year prevalence of cancers estimates that the majority of cancer cases in the world are related to breast cancer.

The African Cancer Registry Network was formed in 2011 and currently includes 20 population-based registries, most of which are located in urban areas. The number of new breast cancer cases per year is greater than the number of cases of cervical cancer. It is estimated that there will be 50 000 deaths from breast cancer, 53 300 deaths from cervical cancer and 148 000 maternal deaths per year in Africa.

In summary:

- High-income countries have the highest incidences of breast cancer.
- Breast cancer cases have more than doubled in 30 years.
- Breast cancer is the primary prevalence in almost all countries of the world.
- Breast cancer is a considerable cause of death in Africa.
- The number of data sets from Africa is increasing steadily.

Epidemiologic data from Ethiopia

Data collected in 2012 as part of a collaborative project on breast cancer in urban and rural settings show that:

- Urban setting: A population-based cancer registry was set up for a total population of about three million in Addis Ababa. The crude incidence of cancer was found to be 140 among females and breast cancer had the most prevalent of the crude disease-specific incidence as well as age-standardised disease-specific incidence.
- Rural setting: Surveys were done in three rural sites where the incidence of breast cancer was reported to be 4%, 2.1% and 1% respectively. Rural women are not overweight and they do not consume alcohol or smoke.

A comparison of disease-specific mortality data from the death registry in Germany and from verbal autopsies in rural areas of Ethiopia shows increased levels of NCDs in Africa, particularly circulatory diseases and cancers.

Clinical data from breast cancer cases treated in Addis Ababa at the oncologic referral centre in Ethiopia between 2006 and 2010, relevant to distant metastasis-free survival (since no information on deaths was available) showed that most patients were under 40 years of age and had advanced-stage breast cancer when presenting for treatment. Most of the patients were operated on and received chemotherapy and endocrine therapy in a timely manner. Con-

trary to previous literature, a survival rate of 74% was found after two years, decreasing to 46% after five years. Distant metastasis-free survival rates in rural and urban settings were found to be similar. As in European and North American settings, there was a lower survival rate among young patients and patients with higher stages of the disease. Preliminary data from rural and urban Ethiopia, urban Sudan and urban Germany show that quite a number of patients are hormone-receptor positive, indicating possible ethnic and continental differences, a subject for another study.

A comprehensive therapy and cancer control programme is crucial, especially in countries with limited resources. There are numerous unresolved questions in the etiology of cancer, relating to issues such as lifestyle, genetics, ageing and screening. There are a number of global treatment options and substantial basic research has been done, but all the clinical trials for product development have been done in North America and Europe. It is essential to undertake clinical trials in different settings. This process should not be left to the emerging markets of pharmaceutical companies, but should be addressed through public-private partnerships.

In terms of breast cancer in countries with limited resources:

- In urban setting: breast cancer is the most prevalent cancer.
- In rural setting: breast cancer is the third-most prevalent cancer.
- The stage of cancer has an influence on survival rates.
- There are differences in breast cancer biology.
- More evidence is needed about breast cancer.

DISCUSSION: Q&A

Robert Souhami: 1) Cancer registration in Europe is very patchy and it is difficult to compare cancer rates in Europe because of failure of registration in many countries, except for Nordic countries. This is clearly true in Africa as well. This creates a huge problem in convincing politicians and health service administrators about the need for the development of relevant services. The likelihood is that incomplete data mean a gross underestimation of the real size of the problem. I suggest that the existing registries could be used for longitudinal studies. 2) It is a shocking statistic that only 24 of 53 African countries have some infrastructure to handle a problem of this magnitude. The cancer treatment 'kit' is expensive, but the economic burden of cancer has not been included in this cost. From a political point of view and in terms of financing, it is very important to get data that are economically sound to support reasons for the development of the necessary infrastructure. This would need to be done if one is to liberate resources to start the process of building infrastructure in countries that do not have it.

Prof Fola Esan: In terms of the treatment of cancer in Africa, especially in Nigeria, policies make it impossible to get good treatment. Instead we see 'knee jerk' reactions. We recently saw the death of a political leader from mismanaged breast cancer because of the spiritual nature of the cause of cancer. The government's response was to set up a cancer centre, but equipment to do mammograms was not regarded as a necessity. Another issue is that many countries have difficult policies about obtaining opiates to be able to treat people in severe pain. Doctors cannot prescribe the necessary medication because government policy is to keep these controlled medicines out of reach. We ought to find a way to circumvent this kind of issue by educating policymakers so that the necessary medication can be provided.

Response, Prof Olweny: I agree entirely with the point raised concerning palliation. One-third of all cancers can be effectively palliated. I believe that good medicine could be practised in Africa if only five drugs were available, namely: aspirin, chloroquine for malaria, iron to treat anaemia, a broad spectrum medicine to treat parasites and a broad spectrum antibiotic. There is a similar list for the good treatment of cancers. The idea of an essential drugs list is very critical and morphine should be made available for pain. This message should be communicated to policymakers.

Prof Charles Nhachi: In terms of the problem of too few cancer registries, is it possible to recommend guidelines for compilation for registries. What is used in Uganda?

Response, Prof Olweny: In 2007, a publication called *Cancer on Five Continents* was going to be published but there were only a few cancer registries, and only four of the existing registries had data worth publishing: one from Uganda and another was from Zimbabwe. Work is being done on developing guidelines for cancer registries.

Prof De-Pei Liu: With reference to Prof Olweny's slide indicating that one-third of cancer is preventable; WHO data show that 80% of cancer is preventable. What is the reason for the low percentage of cancer prevention in Africa?

Response, Prof Olweny: One-third of all cancers are preventable, one-third can be cured and one-third could benefit from appropriate pain-relief treatments. The 'one-third' is a global figure. However, in some countries there are more preventable cancers than in others.

Prof De-Pei Liu: It is necessary to have policies for national cancer control programmes and government and NGOs should collaborate in these programmes. How many African countries have national cancer control programmes?

Response, Prof Olweny: Very few African countries have national cancer control programmes in place.

Dr Carmencita Padilla:

- Data on cancer are incomplete. There cannot be sound data without complete data. Cancer registries are important. The few existing registries could be used as longitudinal registries.
- There is a need for an essential drug list that applies to all diseases, and a recommendation should be made concerning an essential drugs list for cancer.
- There are numerous cancer prevention programmes that can be tapped into.
- Don't drink, don't smoke, do sports and maintain a normal weight.
- The IAMP could come up with policies that can be implemented by all the academies in their various countries.

DAY TWO

15 August 2013

SESSION FIVE: CUTTING-EDGE SCIENCE: DEVELOPING COUNTRY APPLICATIONS AND INNOVATIVE POINT-OF-CARE INTERVENTIONS FOR NCDs

(Facilitator: Prof Volker ter Meulen, IAP: Global Network of Science Academies)

CHALLENGES TO PERFORMING GENOMIC STUDIES ON NCDs IN AFRICAN POPULATIONS

(Prof Michèle Ramsay, University of the Witwatersrand/National Health Laboratory Services, South Africa)

Understanding the combined role of genetic variation and the environment and how these contribute to susceptibility to complex diseases is a worldwide challenge. This presentation focuses on possible added challenges in Africa that should be considered. In the context of the increase of NCDs, particularly more recently in developing countries, it is important that Africa benefits from the genomic revolution in terms of understanding the molecular and environmental aspects of these complex disorders on the continent. Studies often look at worldwide population trends and do not often focus on the benefit to the individual.

Identification of genetic contributions to NCDs (complex and multifactorial diseases): Interactions between genetic variants and environmental factors contribute to the risk for developing NCDs

In terms of genetic contribution, the spectrum of diseases ranges from Mendelian traits where one genetic mutation causes the phenotype, to infections where genetics play a smaller role (e.g. host susceptibility) and the environment plays a much bigger role. NCDs are in the middle of the spectrum, where both genetic variation, as well as the environment, play an important role. The genome stays static and the environment changes. As it changes, many people become exposed to high-risk factors for developing NCDs and develop NCDs, whereas others, despite an adverse environment, seem to continue to thrive: an aspect that can be looked at as a population phenomenon.

Some populations have an increased risk for particular NCDs given a certain environment because of their evolutionary history and this is related to the genomic diversity within the population. The factors that shape genetic diversity in a population include demographic history (population migration, admixture, size and geographic location) and genome evolution, including processes, such as mutation and recombination. Genetic drift also shapes population diversity and natural selection plays an important role in terms of likelihood for

survival. Genetic variation contributes to susceptibility for NCDs and the ability of populations to adapt to a changing environment.

It is interesting to observe the prevalence of susceptibility alleles (variants at particular positions in the genome) and their effect in respect of the genetic contribution to diseases at a population level. For example, alleles for Mendelian traits are very rare, but the effect on the phenotype (causality) is very high. This is not the case in complex traits. Many different genetic variants together with the environment cause the phenotype in complex diseases. The effect of the contribution of the individual alleles is usually low. Two study designs are commonly used for association studies for complex diseases: Case-control studies or continuous variation in a population cross-sectional sample. With advances in technology and lower costs, these studies are often done by using a genome-wide association study (GWAS) to try to identify the genetic variants from across the entire genome that contribute to these traits. Most of the genome-wide association signals are for relatively common variants, but usually their effect is very small. It is necessary to develop more sophisticated computational algorithms to understand the additive or interactive effects of many different variants and the environment in terms of NCDs.

There is much scepticism about the success of GWAS. The proponents of GWAS suggest that this approach is successful because it has found over 2 000 robust associations with more than 300 complex diseases since 2005. Others would criticise the GWAS approach because of its limitations and question the clinical utility of the findings in terms of their predictive value. The drivers of the clinical utility of genetic variants are important to understand in terms of personalised medicine for the future. These drivers include:

- Genetic tests need to significantly improve disease prediction over known clinical and environmental risk factors.
- The importance of early detection in relation to effective treatment needs to be assessed.
- Availability of alternate treatments must be considered.
- Accessibility and affordability of genotyping should be assessed in a specific context.
- Clinicians' acceptance of the test in a clinical setting should be evaluated.

Despite the fact that several NCD risk factors, including obesity, HDL-cholesterol levels and triglyceride levels, have been shown to have high heritability, the results from GWAS explain only a small proportion of the heritability. These studies, in their current design, are therefore limited in terms of leading to a better understanding of genetic contributions to diseases like diabetes and hypertension. Additional factors to consider are the contribution of rare genetic variants to NCDs and the role of epigenetic variation.

Challenges for genomic science in Africa: Scientific challenges in working with highly genetically diverse populations are compounded by practical and logistic constraints

African populations have a unique genetic architecture, with much more genetic diversity and less linkage disequilibrium and shorter haplotype blocks. This has practical implications for experiments, as association studies require many more markers to be effective in African populations. However, when an association is found, causal variants will be sought in a smaller region of the genome, facilitating its discovery. It is important to note the broad variation across different African populations in terms of their genomic structure, implying that an association with a genetic variant in one African population may not translate to another African population. In addition, GWAS approaches based on non-African data are not ideal for African populations. Research on African populations is limited and there is a lack of good prevalence figures for NCDs in many African countries. It is necessary to replicate or validate findings from the limited number of current studies on other populations. Inter-ethnic variation is evident in lipid profiles, which in general shows that with increasing African ancestry there is a decrease in triglycerides and increase in HDL cholesterol, suggesting important genetic factors. Another study, which compares African American with Hispanic Americans, found that in general, African Americans have lower triglycerides. Although many of the associated genetic variants found in European populations correlate in African populations, some do not and some are uniquely associated in African populations.

Study design is also important. Mendelian randomisation is often used in European populations as a tool for using genetic variation as a proxy for specific traits, and requires independent validation of associations in different African populations. The use of GWAS can be contrasted with whole genome sequencing approaches. Although GWAS is less costly, it is not ideal for African populations and whole genome sequencing would be more appropriate.

Toward a better understanding of NCD genomics: NCD genomics is vastly understudied in African populations and requires international and continent-wide strategies to generate knowledge and understanding

Current concerns about genomic science in Africa include:

- the shortage of genomics research expertise;
- limited basic laboratory infrastructure;
- the relegation of African scientists to the role of sample collectors;
- limited impact on African capacity development;
- insufficient local funding and government support.

The Human Heredity and Health in Africa initiative (H3Africa Research Consortium) is a partnership between the National Institutes of Health (NIH) and the

Wellcome Trust to build capacity for genomic science in Africa and facilitate a contemporary research approach to environmental and genetic determinants of disease in Africa. H3Africa's footprint covers many regions of the continent and many more projects will be supported through this programme into the future. The Southern African Human Genome Programme that has a strong health agenda is a South African initiative funded by the Department of Science and Technology (DST) to support genomic science on the sub-continent.

Changing patterns of NCDs: Genomic research in Africa

- More African-led genomic research into NCDs is required.
- It is necessary to understand the complex interactions between genomic variation in African populations and how these respond to changing environments.
- This research will require long-term investment and will not produce early results.

WITS ADVANCED DRUG DELIVERY PLATFORM (WADDP) FOR NCD TREATMENT (Prof Yahya Choonara, University of the Witwatersrand, South Africa)

Prof Choonara presented an overview of work done by WADDP to address more effective pharmaceutical services and bring pharmaceutical production to South Africa. Due to sensitive intellectual property (IP) issues of the work presented, the details of this presentation cannot be published as yet.

DISCUSSION: Q&A

Prof Volker ter Meulen: It is interesting that markers to identify the development of possible tools are being sought worldwide. In the USA and Europe, there is direct-to-consumer testing and a test kit can be bought from the internet. This is a concern to those working in human genetics. The European Academy of Science Advisory Council has made a statement to this effect. What is your view and experiences in Africa of this approach?

Response, Prof Ramsay: Direct-to-consumer marketing of test kits, particularly tests that have a very poor predictive value, is also a concern in Africa. The *South African Medical Journal* recently published a paper which presents the viewpoint of the Southern African Society for Human Genetics, providing guidelines on these tests should be viewed and indicating how misleading they might be. The whole field needs to mature before any useful and clinically appropriate tests for NCDs can be offered.

Dr Charles Agyemang: 1) In 2012, the EU funded about four projects that looked at the epigenetics and other aspects of migrant populations. One of

the projects looked at epigenetics of African migrants living in three European countries and compared this to Africans in rural and urban settings in Africa. There are several projects involving genomic studies in African populations and opportunities for collaboration. There is much to be learnt about NCDs from the migrant perspective. 2) Sometimes heritability is thought to be genetic, but it also has to do with behaviour patterns in families.

Response, Prof Ramsay: 1) The migrant issue is fascinating as it is nature's experiment because the genome does not change, even though the populations move to another environment. This is an opportunity to examine the environmental contributions to a particular trait. 2) We often talk about the missing heritability and why many of the genetic components that we think should contribute to the trait are not being seen. Epigenetics and behaviour within families may be some of these components. There is a worldwide debate about this issue and how best to design experiments to understand the missing heritability.

Unknown person: Both speakers mentioned the importance of infrastructure and capacity in Africa to do high technology research. Who funds this research and how could this high-tech infrastructure be created in the rest of Africa?

Response, Prof Choonara: Funding for the infrastructure comes from co-development with industry, the DST, the National Research Foundation (NRF), other local funding bodies, and from outside the country.

John Musuku: How do you address the issue of ownership of genetic material from various countries?

Response, Prof Ramsay: This issue is being debated. My personal view is that ownership should always be vested with the person who gave the sample, we are the custodians of the samples. One of the objectives of H3Africa is to do intra-continental research, that is between different African countries, which will necessitate moving DNA samples or blood samples between countries. We are looking at legislative frameworks because different countries have different views about sending samples out of their country. The NIH has obliged H3Africa researchers to send samples to a central repository within Africa so that they can be widely accessed in a managed scenario. Consent must be obtained from participants for broad use of the samples and the data. Intellectual property (IP) does not necessarily apply to genome variation, but IP does apply once there is phenotype information together with genome variation, which is then commercialisable. This will have to be addressed on a case-by-case basis. It is important to have a plan and to recognise that this is a complex matter.

NON-LABORATORY-BASED CVD RISK ASSESSMENT **(Prof Naomi Levitt, University of Cape Town, South Africa)**

There are a number of levels at which there are opportunities to reduce the burden of NCDs. Prevention or reduction of the burden of CVDs in particular can potentially occur at different levels of chronic disease development: the primordial level to prevent the development of risk factors, the primary level to prevent the progression to symptomatic diseases and the secondary/tertiary levels to reduce chronic suffering and death. The question is about how to identify those people who are most at risk of morbidity and premature mortality, and about early identification of people who either have the disease, precursors of the disease or susceptibility to the disease, so that they can be further evaluated and potentially managed.

There are many different requirements for screening and it is necessary to recognise that early treatment improves prognosis and that treatment must be available. However, screening is not a benign process and is associated with risks and false results, and unsuspected results induce anxiety.

Hypertension is extremely common and there are two different ways of treating people with hypertension. There are certain factors affecting the decision about which patients should be treated. For example, should a 44-year old man with hypertension who is a non-smoker, non-diabetic, has cholesterol of five, a very good HDL and BP of 149/85 be the one to receive the treatment, or should it be a 60-year old man who is a smoker, non-diabetic, has cholesterol of six, HDL of one and BP of 139/84? In most cases neither would receive treatment. CVD risk is not increased additively, but exponentially. Many recent guidelines use a cardiovascular risk assessment tool in order to best identify who should be treated. There is unequivocal evidence showing that treating those with a higher cardiovascular risk is much more cost-effective.

Traditionally, cardiovascular risks are formed by applying an assessment tool using age, sex, diabetes, low-density lipoprotein (LDL), HDL, tobacco and BP. The problem with this tool is that laboratory tests are required to measure LDL and HDL levels in blood that are necessary in order to measure the risk factor score. There are excellent data that show that LDL and HDL can be replaced with a BMI. Research in Europe found that when the blood-based risk scores were compared to the non-blood-based risk score, the receiver operating curves (ROC) for predicting cardiovascular disease are superimposable. It was found that when using the non-laboratory-based risk scores, patients were correctly classified as high or low risk at various cut-off levels of five-year risk. The lipids blood test can therefore be replaced with an easily measurable marker that can be done in clinical practice. The risk prediction chart for CVD using non-laboratory values differs only in that BMI replaces lipids.

The applicability of the European research in the South African context formed part of a study that compared the Framingham Risk Score and the non-blood-based cardiovascular risk score in 11 large South African cohorts. The study showed a 94% agreement between the blood-based risk score and the non-blood-based risk score identifying people along the continuum with no risk, moderate risk and high risk. Overall, 20% of people in the groupings were regarded as having increased cardiovascular risk.

A study showed that some non-blood-based tools can be used to determine cardiovascular risk without a clinical visit and can be applied by community health workers and nurses i.e.:

- history;
- sphygmomanometer/electronic;
- stethoscope;
- height and weight;
- risk-scoring sheet.

However, applying the tool requires numeracy skills in order to calculate BP recordings and BMI. This problem was resolved in a subsequent study by developing a simple mobile phone application for the non-blood-based tool to determine cardiovascular risk. Community health workers received the relevant training and within a short period of time, they were able to administer the non-blood-based risks using a mobile phone application.

The early identification of people at high CVD risk and the appropriate management of CVD would ensure that more people could live longer, healthier and better quality lives.

COST-EFFECTIVE DRUG COMBINATIONS FOR CVD **(Dr Denis Xavier, St John's Research Institute, India)**

St John's Research Institute has conducted different observation studies, as well as clinical trials in CVD over the last 14 years, and has experience of over 60 000 patients that have been recruited in the various studies. The institute collaborated with many universities around the world. The institute's NIH Centre of Excellence conducted studies of knowledge translation to improve chronic diseases outcomes.

The need for combination drugs in CVD

In terms of the CVD global epidemiology, CVD is the leading cause of mortality with 80% of occurrences in developing countries. There is no plan in place to counter CVD. Risk factors are widely prevalent, as less than 5% of middle-aged individuals have optimal levels of risk factors as shown in the Framingham study. The INTERHEART study, an international case-controlled study where controls

are age and gender-matched, showed that 99% of controls had at least one risk factor. In other words, cardiovascular risk factors in middle-aged individuals are ubiquitous.

A study conducted by the NIH Centre of Excellence in collaboration with the WHO in the early 2000s, looked at what drugs are used for secondary prevention of CVD in ten low and middle-income countries with close to 9 000 patients who present at hospitals for follow-up treatment. If there are no contra-indications, all the patients must use aspirin, beta-blockers, angiotensin-converting-enzyme inhibitor (ACEI) and statins, but the findings showed very poor rate of use of the drugs.

The Population Urban Rural Evaluation (PURE) is a large cohort study comprising almost 155 000 subjects over the age of 35 in 628 communities, in 17 countries of diverse incomes (low and middle income, high income, upper-middle income and low income), and involves a ten-year follow-up. Data relating to the use of key drugs with CHD show very low levels of use of the four essential drugs (that are not new, are cheap and generic) for secondary prevention of CVD. A *Lancet* paper on the research stated that the low usage of evidence-based treatments presented a breakdown in the health system.

It is important to implement what is already known in order to reduce the global burden of CVD. Lifestyle and environmental modifications must be made and the treatment and prevention gaps must be reduced were necessary by making simple therapies more widely used more accessible. It is evident from the PURE study that cost, access and inequity drive the huge disparity.

Polypill and potential benefits

In June 2003, a paper about research done on a pill that prevented 80% of heart attacks was published in the *British Medical Journal*. This polypill is a combination of three categories of drugs: statin, aspirin and BP-lowering drugs at low dose to reduce side-effects. The paper also stated boldly that all people over the age of 55 should be given the polypill. Several global controversies surrounded the polypill over the period that followed.

The potential, demonstrated benefits of the polypill are:

- Large benefits are possible, with few side effects.
- Lower costs (packaging, handling, distribution, prescription, fewer physician visits).
- Better adherence (physician/subject/guidelines).
- Low medication errors.
- Improved access and equity (provide polypill through existing non-physician medical personnel).
- Global impact.

Completed studies

The Indian Polycap Study (TIPS) was designed in 2005 asking the following questions:

- Can a polypill be formulated with five drugs?
- How will it act when given to individuals at low or average risk?
- Will it be well tolerated?
- Can it reduce risk factors and CVD substantially?

The components of a polycap are:

- Antiplatelet (ASA): 100 mg/d
- Statin (Simvastatin): 20 mg/d
- ACE-inhibitors (Ramipril): 5 mg/d
- Beta-blocker (Atenolol): 50 mg/d
- Diuretic (Hydrochlorothiazide): 12.5 mg/d

The objectives of the study focused on whether the polycap would be similar to its components:

- in reducing BP when compared with its components containing 3 BP-lowering drugs;
- in reducing heart rate (HR) when compared with Atenolol;
- in modifying lipids when compared with Simvastatin alone;
- in suppressing urine thromboxane B2 versus ASA alone;
- in its rates of adverse event when compared with its equivalent components.

The study design involved:

- randomised, double-blind, partial factorial trial;
- the polycap versus eight other formulations;
- superiority and inferiority comparisons;
- active treatment for 12 weeks;
- impact on BP, HR, lipids, urine thromboxane B2;
- safety and tolerability;
- parallel pharmacokinetics (PK) study.

There were multiple questions in a simple trial of about 2 000 patients. The organisation of TIPS included 53 centres in India, the Indian Coordinating Centre in Bangalore and the International Coordinating Centre at McMaster University, in Canada. TIPS used 2 053 subjects who were middle-aged people with at least one CVD risk factor. Only nine arms of the 36 different arms were used in the study to give an idea of how the drugs would compare. The trial demonstrated a 62% reduction of CHD and 48% reduction of stroke. The first TIPS study concluded that:

- The polycap is similar to the added effects of each of its three BP-lowering components.

- There is greater BP-lowering with incremental components.
- ASA does not interfere with the BP-lowering effects.
- The polycap reduces LDL to a slightly lower extent compared to simvastatin alone.
- The polycap lowers thromboxane B2 to a similar extent as aspirin alone.
- There are no significant drug-to-drug interactions. Polycap is well tolerated.
- Overall, the polycap could potentially reduce CVD risk by about half.

The current cost of Polycap-1 in India is about INR 15.0 per capsule transferring to about USD 0.25 per capsule or USD 7.5 per month. This cost includes factors such as packing and marketing. The individual brand components of Polycap-1 cost up to ten times more and generic medicines cost three to five times more than the cost of the Polycap-1. Bulk purchases and sales to government are significantly cheaper.

TIPS-2 involved 518 eligible patients randomised in studying Polycap-2, for secondary high-risk prevention using full doses in patients with stable CVD or elevated risk factors to evaluate two doses of Polycap-1 compared to a single dose. It was found that the double-dose polycap significantly reduces risk factors compared to the low-dose Polycap-1.

TIPS-3 is a long-term, clinical and international study that has started in India, China and the Philippines with about 900 subjects and would extend to other countries during 2013 and 2014. It is a randomised double-blind placebo-controlled trial for the evaluation of the polycap, low-dose aspirin and vitamin D supplementation in primary prevention. Subjects are men of older than 55 years and women older than 60 with a slightly increased risk score. Results of the study are expected by 2018.

Modelling cost-effectiveness

Data from South Africa (TA Gaziano, LH Opie, MC Weinstein) to model cost-effectiveness of CVD drug combinations, looking at primary and secondary prevention were published in *The Lancet* in 2006, before the completion of the polypill trials and concluded that combination drugs should be widely used.

Conclusions and next steps

- TIPS-1 and 2 followed a systematic approach looking at primary, high risk and secondary prevention of CVD. TIPS-1 and 2 demonstrated tolerability and efficacy in primary and secondary prevention.
- TIPS-3 is an ongoing, large, international study looking at clinical events in primary prevention, and would inform impact on clinical events and cost-effectiveness in CVD and other disorders, as well as uptake of the strategy in communities.

- Broader engagement of stakeholders was necessary, especially government and civil society.
- Urgent interventions were required in relation to lifestyle modifications, environmental and societal changes.
- Combination drugs for which data are emerging need to be considered in CVD treatment.

DISCUSSION: Q&A

Robert Souhami: 1) The question about whether you treat the hypertension in the two cases presented by Prof Levitt is different from the way you lower the risk in general. When risk is multi-factorial, risk is very important epidemiologically, but unpacking risk in an individual is a different thing. This comes down to judgements of various kinds. If programmes are implemented based on risk then there must be people who understand how to unpack the risk and do the right thing for the right person. This is particularly important in cancer where the questions of risk and the understanding of the public of what is meant by risk are so crucial. 2) I feel strongly, particularly in cancer, that we should stop talking about relative risks and talk about absolute risks because doubling the risk of a rare cancer may be unimportant. However, doubling the risk of a common cancer is a very serious issue, as the absolute risk rises greatly under those circumstances. Clinical scientists have an obligation to make it clear that the interpretation of absolute risk is different from the interpretation of relative risk. This is a problem for population-based science. 3) The poly-pharmaceutical matter is interesting because medical students are taught not to give out many pills because of negative pharmaceutical interactions. The point made by Dr Xavier and others is that this is not the way to think if a population basis is considered. The problem is the combined effect of low doses of drug formulations and not the pharmaceutical interactions. There is a problem in persuading doctors to forget what they learned in medical school.

Response, Prof Levitt: 1) The cases that were presented represented the absolute dichotomy. There is very good evidence that, for example, if you decide whether or not to use a statin in someone with hypercholesterolemia, there is a 20-fold reduction of myocardial infarction and cardiovascular events depending on whether or not you stratify them by overall cardiovascular risk. If the question is asked about who we should be spending money on, is it going to be the individual who has mild hypertension or the individual who has multiple risks, it would fall into the category of the multiple risk. This is not the population-based approach. The population-based approach I referred to was about using community-based workers to go into a community to identify people who are, for example not currently attending health services, and those who would most benefit from being identified. In the study we did, we asked people's age, gender, whether they had a diagnosis of diabetes, measured their BP, their

weight and their waist and were able to calculate a risk score. There were ten people out of 1 000 whose BP was more than 180/110 who were not attending the health services. If one can identify people at a community level, it would be excellent. The next phase would be to identify people within a health service where there is no opportunity to have the risk score utilised. 2) People do not understand increased CVD. The most important issue is to find out if there are any factors that are modifiable. If you look at the risk score you are not able to modify age and gender, but there are some potentially modifiable factors. People should be educated and enabled to attend to the modifiable risk factors.

Response, Dr Xavier: 3) We are taught in medical school not to give irrational combinations. What we have attempted using rational thinking, is a combination that has been demonstrated to be both efficacious and well-tolerated. We were pleasantly surprised that the level of tolerance was as good as the study found it to be. The polypill has been on the Indian market for the about five years and the biggest barrier for its uptake is not the patients but the physicians. We have multiple sessions to discuss with physicians but they have all kinds of comments and are unable to grasp the concept of the combination pill. Patients are asking for this polypill and it is suitable for 95% of patients. A paradigm shift is essential if we are to address the CVD global epidemic.

Dr Steven van de Vijver: 1) Prof Levitt spoke about diabetes screening. How is this measured on the mobile phone application? 2) Why is the polypill not yet on the WHO's essential medicine list? 3) Does the polypill need an adjustment for African populations?

Response, Prof Levitt: 1) The screening for diabetes on the mobile phone application consists of a straight question about whether or not the patient has a known history of diabetes.

Response, Dr Xavier: 2) An application was submitted to the WHO about three months ago. About 150 signatories were received from different parts of the world. There is a lot of interest from the WHO and we have been encouraged by the WHO. 3) I cannot answer this question with evidence. However, knowing how these drugs behave in populations around the world, I do not think there would be a need to adjust the polypill for African populations.

Arjuna Aluwihare: To my knowledge, there are no data on what happens when physicians spend more time with individual patients and their families and pass on to them the responsibility for preventing, controlling and managing the NCD by non-pharmacological methods. I feel that our profession is sometimes not prepared to spend the time to understand individual patients and to enlist their cooperation in the management of their own problem.

Unknown person: It is important to be able to use a risk score in the community to screen those who can benefit from laboratory treatment, especially in Africa. Part of the problem is that medical training teaches doctors to treat the disease and not the patient. We need a paradigm shift in terms of the mindset and what we teach our students.

SESSION SIX: PREVENTION AND MANAGEMENT OF DIABETES

(Facilitator: Prof Fola Esan, Ekiti State University, Nigeria)

INTEGRAL MANAGEMENT OF DIABETES AND NCDs

(Dr Mary Amuyunzu-Nyamongo, African Institute for Health and Development (AIHD), Kenya)

Introduction to AIHD and the Consortium for Non-Communicable Disease Prevention and Control in sub-Saharan Africa (CNCD-Africa)

AIHD was established in June 2004 and is based in Nairobi. The institute's main focus is on implementing evidence-based programmes through research, training and advocacy on health and development issues that are contextually relevant to the African continent. The institute is also involved in policy dialogue and formulation on key health and development issues including NCDs and social protection.

AIHD hosts the CNCD-Africa, a member-driven umbrella body comprising multiple disciplines, sectors and partners in sub-Saharan Africa, and a conduit for information providing a platform for networking and collaboration. CNCD-Africa has been very active in the formation of the NCD Alliance in Kenya and has entered into formal partnerships with the Minister of Health in Kenya. Projects include the School NCD Prevention and Control Programme and Diabetes Patients Support Programme (DPSP).

The AIHD partnered with the Kenyan Ministry of Health and the United States Agency for International Development (USAID) in hosting World Health Day 2013. The institute values partnerships with government, particularly with the Ministry of Health, as a means to successfully fulfil its mandate as a NGO.

Integrated management of NCDs

Integration is important, not only with NCDs, but also with communicable diseases. Existing structures and programmes should be used to ensure that patients have access to treatment. An integrated, patient-centred care delivered at the primary health care (PHC) level has the potential to reduce the epidemiological burden and societal impact of NCDs. In contexts of limited resources, consolidating efforts would ensure that the patients benefit from 'one

point-of-care' service delivery. A mixture of vertical and horizontal approaches (known as the diagonal approach) can benefit from disease-specific funding while countering negative consequences of vertical programming.

Example from Lugazi Hospital in Uganda of integrating NCD management with-in ongoing national programmes

Lugazi Hospital, initially a HIV/AIDS clinic, developed a patient empowerment programme and reorganised the delivery of health care services to focus on a patient-centred integrated care model at the clinic level. This new approach resulted in:

- Increased patient skills to understand and manage their conditions.
- The redesign of the care system by starting a Hypertension and Diabetes Management (HTN/DM) clinic within the HIV clinic. The HTN/DM became known as the 'chronic care clinic' where all patients with chronic conditions accessed health care services.
- Improved data systems, as patients who are on different treatments were able to be monitored more comprehensively.

After a few months of running the programme, once the efforts were consolidated and there was assurance that the facility provided comprehensive health care services, there was an escalation in the number of patients enrolled for treatment, keeping appointments and with normal fasting blood sugar levels (FBS). This demonstrates that using simple methods, such as training health care providers and empowering patients, it is possible to realise immediate and positive shifts in efficiencies.

Some of the key challenges to integrated NCD management are:

- The lack of integrated policies and guidelines for NCDs.
- Silo management of ill-health and the lack of coherence in service.
- Limited capacity of health workers to deal with some of the NCDs.
- Inadequate infrastructural capacity to undertake even simple procedures (some facilities do not have functioning BP machines).

Some of the key challenges faced by patients and caregivers, beyond the health system are:

- Inadequate information about NCDs, particularly in relation to diabetes, which disempowers patients. Caregivers are not informed and they tend to 'over-care' making the patients feeling worthless.
- Reactions by health providers lead to psychosocial trauma, especially in emergency situations where patients are not briefed or counselled, leading to shock and confusion and sometimes denial.
- Conflicting information, concerning diet, healthy behaviours and expectations.

- The cost of care:
 - insulin is not free;
 - transport to health facilities;
 - inadequate and costly screening kits inhibit regular monitoring of blood sugar levels.

DPSP

The programme was launched in 2012 by AIHD with the support of Sanofi, and focuses on providing hope and support systems through:

- Information dissemination.
- Offering patients monthly open days and support groups, drawing on experience from the HIV patient care model.
- Providing home-based care.
- Offering nutritional counselling.
- Stakeholder engagement.
- Policy advice.

It is interesting to note that diabetic patients attending the open days have expressed concern that their voices are not being heard, that they suffer in silence and do not have access to free drugs, as in the case of HIV/AIDS patients. It is important to provide opportunities for patients to express their views and provide opportunities to hear about their needs and to help them to be able to support one another.

Challenges and opportunities for DPSP

- Funding: Sanofi has supported the initiation of the programme but the demands have increased and currently surpass the current funding.
- Systemic gaps: There continues to be a gap between grassroots voices and initiatives, and national health systems.
- Evidence suggests that DPSP can ensure efficient knowledge transfer and proper management of diabetes and other NCDs at the community level.

REALISTIC TARGETS FOR THE CARE OF PEOPLE WITH DIABETES IN SUB-SAHARAN AFRICA

(Prof Jean-Claude Mbanya, Hospital Central in Yaoundé, Cameroon)

Part of the problem in the care of people with diabetes is that targets are set in order to diminish the cardiovascular outcomes of diabetes. People develop a cardiovascular risk at several intervals during the process from non-diabetic to diabetic state, so much so that by the time they have diabetes the cardiovascular risk has multiplied about five times.

Every time glycosylated hemoglobin (HbA1c) decreases by 1%, the chances of CVD are decreased by 18%, CHD by 13%, fatal coronary heart disease by

16%, stroke by 17% and peripheral arterial disease by 28%. The 1% decrease is extremely important.

One of the legacies of diabetology is that over the years it has been demonstrated that cells have metabolic memory. If diabetes is controlled up to a certain level, cells have a legacy effect. The UK Prospective Diabetes Study (UKPDS) did a randomised intervention to achieve either intensive or conventional targets, which was stopped at the trial end in 1997. The 10-year post trial monitoring from 1997 to 2007 showed relative reductions in risk in patients who had been treated to intensive goals, compared with conventional targets, and demonstrated that earlier introduction of combination therapy could reduce exposure of patients to the risk of diabetes-related complications associated with periods of hyperglycaemia.

There have been several large outcome studies in diabetes have been conducted over the last five to ten years to demonstrate the difference between maintaining HbA1c at about 6.5% or HbA1c above 7.5%. It was shown that if HbA1c is maintained at the lower target (below 6.5%) there are chances that CVD would be reduced. There is a threshold in which the decreases in HbA1c are beneficial to diabetic patients. National guidelines for glucose control targets indicate that HbA1c should be less than 7% and sets targets of 6.5 mmol/l for fasting hyperglycaemia and 9 mmol/l for post-meal hyperglycaemia. It is necessary to personalise targets because patients have variability in terms of age, duration of diabetes and co-morbidities related to diabetes. Targets should be based on the type of patient.

However, management of diabetes is not only about meeting glucose control targets. Diabetes has a comprehensive risk factor profile. All the risk factors are taken into account, especially in people with type 2 diabetes, in setting glucose targets. The STENO-2 study showed that if targets to reduce HbA1c, systolic blood pressure and LDL cholesterol levels are achieved, the risk of both microvascular and macrovascular complications of diabetes are reduced by up to about 50%. Treating the whole patient and setting targets for a broad spectrum of CV risk factors are more important than the glucose control targets alone. It is also important to set BP pressure targets in diabetes control. The ADVANCE study showed that combined intensive glucose control and blood pressure lowering produced additional reductions in clinically relevant outcomes.

The reality is that in most parts of the world, diabetes is not being controlled according to the guidelines and targets. The average HbA1c measurement is consistently above 7% and as high as 9% in North America where 36% of people have a HbA1c higher than 10%. It is evident that treatment is currently failing many people with diabetes.

The DiabCare Africa Study looked at diabetes control in 2 352 patients from six sub-Saharan African countries, and found that most patients did not achieve the HbA1c target of less than 6.5% and only 21% of patients treated for hypertension attain minimum targets of BP control. BP control in ten diabetes care centres of Guinea and Cameroon shows a considerable variability that is due to access to medication and proper health care. In addition, the study showed that targets were not met for lipids, noting that lipid measurement is not routinely affordable and generally performed not more than once annually. Proteinuria measurement is not routinely performed and was extremely low in some areas. It is unrealistic to set targets that are not measured.

It is unnecessary to set specific targets for diabetes control in sub-Saharan Africa because there is no evidence to support the targets. However, 1% decrease in HbA1c is accompanied by gains in terms of CVD mortality. The essence is to ensure that patients are followed on an individual basis and maintain HbA1c as near normal as possible. However, if diabetes control targets are to be considered in sub-Saharan Africa, the following should apply:

	Normal	Target
HbA1c	<6.0%/42 mmol/mol	<7.0%/53 mmol/mol
Fasting/pre-meal capillary plasma glucose	5.5 mmol/l (100mg/dl)	6.5 mmol/l (115mg/dl)
Post-meal capillary plasma glucose	7.8 mmol/l (140mg/dl)	9.0 mmol/l (160mg/dl)
Blood pressure	<130/80 mmHg	<140/80 mmHg
Lipids • LDL-C • HDL-C • TG <150 mg/dL)	<100mg/dL (2.6 mmol/L) >50mg/dL <150mg/dL)	CVD <70mg/dL (<1.8mmol/L) >50mg/dL <150mg/dL)
✓ Need for constant screening (BP routine visits, LDL-C annually or 2 yearly) to follow shifts. ✓ Goals should be individualised based on diabetes duration, age/life expectancy, comorbid conditions, known cardiovascular disease or advanced microvascular complications, hypoglycemia unawareness and individual patient considerations.		

Figure 3 : Potential Diabetes Control Targets for sub-Saharan Africa

MODELS OF CARE: TANZANIAN EXPERIENCE

(Dr Kaushik Ramaiya, Tanzania Diabetes Association and Practicing Clinician, Tanzania)

The major issues in relation to diabetes and NCD were:

- Health systems and defining health systems that are responsive to infectious disease and acute emergencies to chronic disease care.
- Community awareness and perceptions.
- Government policy environment that currently focuses on infectious diseases, mainly HIV and TB, while neglecting NCDs.

The prevalence of diabetes in different communities in Tanzania was identified in long-term studies that were started in the 1980s, when the prevalence of diabetes in the rural population was less than 1% and less than 2% in urban Dar es Salaam, which increased to 5% ten years later. An increased prevalence of diabetes was found among people from the rural areas who joined the clergy and those who became business executives. Similar increases were evident in relation to hypertension. These figures were an indication of parallel increases of socio-economic development and prevalence of diabetes.

Preliminary data from the recently completed Tanzania STEPS Survey 2012, a population-based study of 5 680 adults aged between 25 and 64, highlight an increasing burden of diabetes and its complications, as well as other NCDs in the following figures:

- Current smokers: 14.1%
- Heavy episodic drinkers: 20.4%
- Mean number of days fruits consumed: 2.5 days (In a typical week)
- Mean number of days vegetables consumed: 4.5 days (In a typical week)
- % with low level activity: 7.5%
- % not engaging in vigorous activity: 32.4%
- Overweight: 26%
- Obese: 8.7%
- Hypertension: 26%
- Impaired fasting glycaemia: 10.6%
- Raised fasting blood glucose: 9.1%
- Hypercholesterolaemia: 26.0%
- Hypertriglyceridaemia: 33.8%

Acute and chronic complications in type 1 diabetes was studied in children attending clinics in Dar es Salaam and showed that at onset, 75% of cases presented with diabetic ketoacidosis (DKA), and:

- 89.80% had at least one episode of DKA
- 55.67% had symptomatic hypoglycaemic attacks

- 29.3% had microalbuminuria
- 22.68% had retinopathy

Complications and co-morbidity rates among patients who presented at diabetes clinics in all parts of the country showed:

- Hypertension: 45%
- Heart disease: 15%
- Stroke: 7%
- Visual impairment: 71%
- Neuropathy: 74%
- Foot complications: 17%
- Renal disease: 10%
- Erectile dysfunction: 73%

The above figures represent the extent of the burden of diabetes in the Tanzanian health services.

The study also looked at the efficiency, affordability and accessibility of health systems and health services within the setting of public hospitals that were supposed to offer chronic disease care free of charge. It was found that most patients paid cash (out of pocket) for health services, revealing a major challenge to access of care. The health systems audit showed certain gaps in the training of health care providers in terms of screening for different complications in patients who presented at diabetes clinics.

Patients indicated numerous challenges related to access to health care. Health services utilisation by people with diabetes was found to be very high.

Several actions were taken in order to address the findings of the study, namely:

- Restructuring of the overall spectrum of diabetes care, including community awareness, prevention, and diagnosis, training and setting up clinics.
- Restructuring the public sector health care system involving: tertiary (teaching and referral hospitals), secondary (regional and district hospitals) and primary care.
- A diabetes service was established at each of the four referral hospitals and in each of the 22 regional hospitals in the country.
- Training and the basic tools were provided to health care providers, mainly clinical officers, nurses and diabetes educators. Training included a five-day course followed by three-month diabetes certificate education course, as well as opportunities to participate in an international exchange programme for postgraduate training. A diploma in diabetes education has been introduced recently.
- Diabetes education sessions have been conducted at each diabetes clinic, which also conduct weekly education sessions for patients.

- Different services were established at different levels and some clinics were set up in containers due to the lack of space in hospitals.
- Clinic support included:
 - Sphygmomanometer
 - Stethoscope
 - Glucometer
 - Height and weight scale
 - Ophthalmoscope
 - Snellen chart
 - Consumables (laboratory and drugs)
 - Diabetes register

In addition to the actions to address diabetes care in the public sector, health care providers in 65 private health facilities received training to manage diabetes and its complications as part of a public-private partnership. To date, more than 163 doctors, more than 404 nurses, 76 specialised diabetes educators and five paediatric endocrinologists have been trained. A manual has been developed for primary health care workers, which consists of comprehensive training in CVD, type 2 diabetes, obesity, early detection of cancer and other NCDs.

The Tanzania Diabetes Association has embarked on a national diabetes programme that will strengthen the national and regional referral hospitals and ensure the establishment of diabetes and NCD clinics throughout the country. Health care providers from community therapeutic care, HIV, TB and reproductive and child health clinics will be incorporated in the training programme. Community sensitisation will be increased and primary prevention programmes will be conducted in schools.

DISCUSSION: Q&A

Dr Steven van de Vijver: Support groups are an essential element of adherence. How do you make the groups work; what is the incentive to participate in a group and can they be made sustainable?

Response, Dr Mary Amuyunzu-Nyamongo: This is the challenge with all support groups. There is evidence that shows that if you make the groups smaller and more accessible, they will be more sustainable. We have tried to encourage the patients to form groups with others in their neighbourhood rather than travelling to another neighbourhood. When we have open days we try to incentivise people by ensuring that there are interesting speakers and that helpful and relevant information is disseminated. We try to give transport to people from informal settlements to facilitate accessibility. The only way that the support groups can be sustained is to make them smaller and localised.

Dr Steven van de Vijver: What is the experience of adherence in the Tanzanian setting?

Response, Dr Ramaiya: In our clinics, we find about 55 to 60% adherence in patients with hypertension. Adherence of diabetes patients is between 40% and 60% depending on whether they have funds to buy drugs. Smaller branches of the Diabetic Association have been established and they have a revolving fund. When medicines are not available from the hospital, they are available from the branches instead of having to buy them from the pharmacy. This is more cost-effective and encourages patients to adhere to medication.

Prof Hoosen Coovadia: The combination of health services is a critical component of South Africa's own vision for the future. I had difficulty with one of the graphs in Dr Amuyunzu-Nyamongo's presentation and this reflects my concern about evidence for success. The graph had a sequential account of the number of patients ever enrolled (the highest number), patients keeping appointments (the second highest number) and patients improving (the lowest number). This indicated that there was a substantial attrition, as of the enrolled patients, fewer are retained and even less show improvement. Is this a correct interpretation of the figures?

Response, Dr Amuyunzu-Nyamongo: The evidence is based on a preliminary report done by the NCD Alliance, and was taken from an HIV clinic that did not really do NCD management. Hopefully the curves will change over time. The graph shows that you can see immediate results from integration.

Dr Oladoyin Odubanjo: The core of the problem is that it is necessary to look at the patient as a package. This means that time must be spent with the patient. This is a challenge for health practitioners, particularly as they think of profitability or, as is the case in sub-Saharan Africa, there is a dearth of health workers. Constructive time spent with patients is the key to unlocking many chronic diseases. How can a balance be found in this regard?

Response, Dr Amuyunzu-Nyamongo: Given the limited time available to health practitioners the actual context needs to be recognised. We should ask how else we can provide support to the health system and to the patient beyond the health system. This is where support groups have shown to be useful to HIV patients. It is necessary to work with communities, local people and households to ensure that the care required but not available in the health system, can be availed at the household level. This is one way to approach the matter in the African context.

Dr Oladoyin Odubanjo: Dr Ramaiya spoke about training diabetologists across Tanzania. I am glad you also spoke about training general practitioners. Do you

think that comprehensive training should be given to general health practitioners or should specialised training be given to diabetologists?

Response, Dr Ramaiya: Most of our district and regional clinics are run by nurses and clinical officers. There has been a major focus on training health care providers in primary and secondary care. Specialists are trained at the major referral hospitals where tertiary care takes place.

Prof Naomi Levitt: We have used a retinal camera to assess the presence of retinopathy and through the Priceless Project we found that saving an eye costs less than a disability grant for a person for a year. The method is clearly very cost-effective. Is it not a better option to use the camera rather than to teach people how to look at eyes?

Response, Dr Ramaiya: An eye camera will be installed in the four referral hospitals in Tanzania as part of the national diabetes programme. We have also started piloting the use of the retinal camera in a mobile van.

Prof Naomi Levitt: As clinicians, we interact with the patients. When we look at policy, we look at the broader issues. Is it generally more cost-effective to stratify people into those who have the poorest glycaemic control, the poorest BP control and the most lipid abnormality and focus treatment on this group of individuals? There is a dilemma when faced with policy on the one hand and the individual patient on the other.

Response, Prof Mbanya: Screening is important, but a policymaker has to set specific targets and find methods to identify those people that are high risk and bring them to the clinic for treatment using a population approach in terms of education and awareness to ensure that people 'know their numbers'. This is a difficult question and even more so in resource-limited settings.

Dr Charles Agyemang: The Tanzania diabetes programme appears to have considerable support from government. How do you get the government to support programmes in Kenya, in order to ensure sustainability of the programmes?

Response, Dr Amuyunzu-Nyamongo: We have to ensure that our policymakers become key stakeholders in programmes, especially for communities. One of the elements of community activism is working with grassroots institutions and civil society groups to ensure that they call on the government to become key partners. We try to work with our partners, including government, the Ministry of Health and other groups, to ensure that someone else is addressing matters that are not addressed by the government. Evidence must be provided to government in order to begin to engage on the matters. Civil society groups and

partners in health should continue to engage in evidence policy and evidence programming. Hopefully through evidence, we can ensure that government recognises the importance of working with communities and working with patients to make a difference in their lives.

SESSION SEVEN: PREVENTION AND MANAGEMENT OF HYPERTENSION-RELATED NCDs

(Facilitator: Prof Byung Soo Kim, National Academy of Sciences, Republic of Korea)

HYPERTENSION IN AFRICA

(Prof Albertino Damasceno, Eduardo Mondlane University, Mozambique)

Hypertension is new in Africa

A classic paper published in *The Lancet* in 1929 on a study done in Kenya reported that of 1 800 patients, not one had raised BP. However, trends in age-standardised mean systolic blood pressure (SBP) between 1980 and 2008 showed an increase in SBP in men, and in 2008 SBP was much higher in men in Africa than the world mean and men in North America. These trends were also true for women. The global atlas of the more recent prevalence of raised BP in the population of 25 years and older shows that the African continent has the highest prevalence of raised BP.

A 1990 study of epidemiology of hypertension in Africa observed the initiation of a rise in BP in Kenyan Luo migration to urban areas and follow up at three, six, 12, 18, and 24 months after migration. A cohort of controls living in a rural area who were matched for age, sex, and locality were also observed during the same periods. It was found that the mean SBP of migrants was significantly higher than that of controls throughout the study and that the migrants' mean urinary sodium/potassium ratio was higher than that of controls throughout the study. Weight and pulse rate were also higher among migrants than in those that stayed in rural areas. The study conclusion read as follows: "This suggests a marked change in diet of new arrivals in Nairobi, with higher salt and calorie intake and a reduced potassium intake. The higher pulse rates in the Nairobi participants also suggest that increased autonomic nervous system activity could contribute to the higher BP Levels."

A paper by Prof Jean-Claude Mbanya published about ten years ago showed that the longer one lives in the city the worse it is for one's health.

Some of the factors that contributed to the differences in trends between 1929 and 2013 were:

- Much of Africa is undergoing an epidemiological transition.
- The huge urbanisation process created an acculturation and completely changed the previously healthy way of living.

- Increasing prevalence of obesity and diabetes, a sedentary life, high alcohol and salt intake and tobacco consumption, and a more stressful life.

Cooper *et al.* (1997) stated in their paper on hypertension in blacks said that "Rural Africa remains one of the social environments that is kindest to the human cardiovascular system". Nowadays, even some of the rural areas are succumbing to the advance of 'civilisation'.

A study published in *The Lancet* in 2012 shows different levels of the awareness, treatment, and control of hypertension between and within countries, and that some of the lowest levels of awareness are in African countries. National surveys in most countries show that about 70% of people have never measured their BP, around 10% to 15% are under treatment and less than 10% of cases are controlled. These figures are worse in men than in women and worse in the rural areas than in the urban areas.

There are several consequences of this situation, namely:

- **Stroke:** The only population-based survey on stroke incidence was done in Tanzania. The study compared age-specific stroke rates for people aged 45 years or over in the village of Hai, in Dar es Salaam and among black people in northern Manhattan in the USA. A far higher incidence was found in Dar es Salaam than in Manhattan or Hai. Other studies have shown that the stroke incidence rates in blacks are more than double that of whites living in the same geographic region.
- **Acute heart failure:** A recently published paper shows that hypertension was the most common cause of acute heart failure among 1 006 patients.

It can therefore be said that:

- NCDs are new challenges.
- Most lower-income countries do not have a national policy for the control of NCDs.
- There is lack of basic human and material resources at a PHC level.
- There is a scarcity of drugs and the quality of the generics is questionable.

Some time ago a study was done on hypertensive and normotensive patients that were admitted to hospital during a random week during which time they were given a high salt intake diet of 300 mmol of salt and a low salt diet of 40 mmol. They were controlled with a 24-hour urine collection during the period of admission and on the seventh day a 24-hour inventory BP was done. It was noticed that the change from a high salt intake to low salt intake resulted in a mean decrease of SBP of up to 10 mm Hg. It has also been proved in the Dietary Approaches to Stop Hypertension (DASH) study that when DASH is used with low salt intake there is a much higher decrease of SBP in the black population compared with white population, whether they are hypertensive or nor-

motensive. A paper published recently in the *New England Journal of Medicine* shows that if the entire population of the USA decreased salt intake by 1 gram per day, SBP would be reduced by between 1.2 and 1.87 mm Hg. Reductions in SBP in the black population with hypertension would be between 1.8 and 3.03 mm Hg. Reduced SBP would result in a decrease in the incidence of IHD, stroke and total mortality. Better results were shown in the black population than in the white population. Salt intake, particularly the salt content in food, should be decreased as a means to decrease the BP of the African population.

A recently published paper showed that, although 32 countries around the world had national initiatives in respect of salt reduction, there were no such initiatives in Africa. South Africa's Health Minister has set a timeframe for reducing sodium content of certain foods by law with the aim of reducing the mean population intake of salt from a current level of 8–10 g per day to less than 5 g per day.

Conclusions:

- Hypertension is common.
- Hypertension is an important public health problem.
- Hypertension competes with other more symptomatic diseases for the limited health budget.
- Salt control and alcohol control could be effective as prevention measures.

HYPERTENSION IN SOUTH AFRICA: TIME FOR PREVENTION (Prof Alta Schutte, North-West University, South Africa)

Treatment versus prevention

A slight re-analysis of the results of Prof Damasceno's study on hypertension prevalence, awareness, treatment and control in Mozambique, indicates that of all hypertensives in Mozambique only 8% are receiving treatment and 3% are successfully treated. Dissimilar rates are evident in developed countries such as the UK, where 27% received treatment and 11% were successfully treated in 2005.

What should we focus on in prevention?

Although treatment is necessary, prevention will play a more important role, particularly due to the high costs of treatment, but especially the low control rate. Specific modifiable risk factors are important to address, as evidenced in several cross-sectional studies, and include:

- Obesity
- Salt restriction
- Smoking
- Alcohol intake
- Increased intake of fruit and vegetables

- Physical activity
- Early life exposures
- Poverty

However, there is a need for more longitudinal studies on NCD risk factors in Africa, as raised in several papers, one of which concluded that the prevalence of NCDs and their risk factors is high in some sub-Saharan settings, that there is a lack of vital statistics systems and that more cross sectional, longitudinal and interventional studies could provide a better understanding and inform health care policy to mitigate the oncoming NCD epidemic.

Contribution of conventional risk factors to the development of hypertension over five years

The Hypertension in Africa Research Team (HART) from the North-West University is involved in a study conducted in the North-West province of South Africa, as the African leg of the PURE study, examining the Impact of Societal Influences on Chronic NCDs in lower, middle and high-income countries, which includes 2 000 individuals who were followed during the period from 2005 to 2010.

A multidisciplinary team took a wide range of measurements in 1 000 rural and 1 000 urban black South Africans aged older than 30 years. The data provided an excellent opportunity to explore and compare risk factors for hypertension development and to determine which conventional CV risk factors are associated with a five-year change in BP. Arterial structure and function were also measured to add more depth, and the importance of finding novel ways to address risk factors was recognised.

BP data were collected from 1994 individuals in 2005. There was a wide distribution of BP within which about 50% of the individuals were hypertensive and about 478 of the individuals had optimal BPs. Specific attention was paid to the latter group whose BP was less than 120/80 mm Hg. This group was followed over five years and during this time some became hypertensive, some passed away and others moved from optimal to normotensive ranges. Behavioural risk factors were considered as possible reasons for the conversion of optimal BP to hypertensive status in some of the individuals. Researchers were particularly interested in comparing the baseline data of individuals within the normotensive ranges with that of individuals who became hypertensive, looking at the differences in the conventional risk measurements when they became hypertensive. The similarities between the two groups included:

- Age (~46 yrs)
- Gender distribution (~66% women)
- Location (~60% rural)
- Level of education (~40% no education)

- Employment (~65% unemployed)
- Self-reported experience of stress at home
- Macronutrient dietary intake
- Physical activity index

The population was from a very low socio-economic group, and a high percentage of the group was unemployed. It should be noted that some of the measurements may not have been sufficiently sensitive for this large epidemiological study.

The groups also had similar biochemical measurements for:

- Total cholesterol
- Serum glucose
- HbA1c
- C-reactive protein
- Uric acid
- Estimated creatinine clearance

The differences between the groups were that the hypertensive group had a higher level of adiposity, smoked more, had a higher gamma-glutamyl transferase level (used as a proxy for alcohol intake), tended to have a higher HDL cholesterol level (associated with high alcohol intake) and slightly higher BP. The normotensive group had a higher percentage of HIV-infected individuals.

In terms of the statistical analysis, changes in BP, pulse pressure and central systolic BP were consistently associated with changes in waist circumference (as abdominal obesity) and gamma-glutamyl transferase over five years. HbA1c was important in relation to the central SBP, which represents the arterial stiffness in the large arteries. Waist circumference and gamma-glutamyl transferase also showed independent relationships with subclinical atherosclerosis. Replacing gamma-glutamyl transferase with self-reported alcohol intake in the model strengthened the results to show that alcohol had a significant role in the conversion of optimal BP to hypertensive status in individuals.

By simply focusing on conventional risk factors, the importance of especially alcohol intake and abdominal obesity is confirmed in contributing to cardiovascular changes over five years. The study did not include good measures of salt intake, which could have played an important role in contributing to cardiovascular changes. To highlight CVD prevention, the results of the five-year study specifically support legislation on alcohol taxes and advertising of unhealthy foods, especially in young individuals.

In order to translate the information on alcohol intake to a PHC level, the larger PURE group (for which follow-up data were available) was used to compare the various self-reported estimates of alcohol intake with known biochemical mea-

sure that are sensitive markers for alcohol intake, considering their relationship with the change or increase in BP over a five-year period. Various regression models were used to compare each of the markers and their predictor value with the change in SBP and brachial diastolic BP, and of the all the markers, only self-reported alcohol intake (a no/yes answer) was significantly associated with both SBP and brachial diastolic BP. This was repeated when using the more advanced measures of central SBP and central pulse pressure. There was also an association with self-reported volume and duration of alcohol intake.

Thus, only self-reported alcohol intake is consistently and independently associated with the five-year change in BP of black South Africans with low socio-economic status. Given the honesty of the participants, self-reported alcohol intake may arguably be the most accurate indicator of alcohol use, when considering that biochemical variables are known to be influenced by age, obesity, liver damage and gender. There is therefore a benefit in using self-reporting in low-resource settings where biochemical markers are an expensive option in the public health sector, and not readily available in low-resource settings.

In conclusion:

- Over five years, 24% of Africans with optimal BP developed hypertension.
- When exploring and comparing an array of risk factors, alcohol intake was the most consistent variable independently predicting change in BP, as well as subclinical atherosclerosis.
- The surge in hypertension prevalence in sub-Saharan Africa seems largely caused by modifiable risk factors.
- Public health strategies should focus aggressively on lifestyle changes, such as reduced alcohol intake.
- The early identification of excessive drinking through self-reporting may contribute in reducing the burden on the national health system regarding high incidence of non-communicable diseases.

CARDIOVASCULAR DISEASE RESEARCH IN CHINA

(Prof De-Pei Liu, Peking Union Medical College, China)

A Chinese national study from 1973 to 2009 found a rapid increase in chronic diseases, especially cancer and CVD. An epidemiological survey conducted by the Peking Union Medical College (PUMC), including 169 871 Chinese adults over the age of 40 years, found cancer, CVD and cerebrovascular disease to be the top three killers in both men and women, and hypertension, smoking, exercise and nutrition to be the key lifestyle-related factors influencing common diseases. The recent GWAS in the Han Chinese population identifies four new susceptibility loci for coronary heart disease. Four of the eight susceptibility regions are very similar to European populations and the other four are newly discovered regions from the Chinese population.

Basic research

Recent advancements in CVD research in China have concluded that atherosclerosis is a complex disease with interactions between the genome and the environment. There are four stages of disease development and a level of prevention relating to each of these stages.

Stage of disease	Level of Prevention	Examples of prevention of CVD
1. Risk factors	1. Preventing risk factors	Metabolic syndrome and individual risk factors, and hypertriglyceridemia, hyperhomocysteinemia associated with atherosclerosis.
2. Sclerosis development	2. Preventing pathological changes	Calorie restriction and SIRT1: Two studies in the USA showed that calorie restriction reduced incidence of age-related diseases to different extents and that it is more effective in middle-aged and old-aged monkeys. Research done in China shows that SIRT1 regulates vascular smooth muscle cell (VSMC) and endothelial function. Calorie restriction and SIRT1 inhibit inflammation in macrophages.
3. Myocardial infarction	3. Preventing occurrence of diseases	Plaque stability: Rabbit and mouse models for plaque stability showed that overexpressions of paraoxonase gene cluster and of ACE2 gene increases plaque stability.
4. Re-occurrence and complication	4. Preventing re-occurrence of diseases	Hypertension: Long-term efficacy of traditional Chinese medicine, Xuezhikang (extract of red yeast Chinese rice with multiple components) could decrease the recurrence of CVD.

Traditional research

Traditional Chinese medicine (TCM) involves four levels of prevention, namely:

- Preventing disease before occurrence.
- Treating disease as early as possible.
- Preventing disease development.
- Preventing disease re-occurrence.

It is necessary to translate TCM into clinical studies. One such example concerns the development of the drug, DL-NBP, isolated from L-NBP in Chinese herbal medicine, which is effective in treating epilepsy. The use of L-NBP to treat brain ischaemia, which is similar to epilepsy, was proved in a clinical study. The research was driven by requirement and a hypothesis and used the translation

model known as 'B to B to B', which involves the integration of basic research, clinical research and new drug innovation.

TCM is a mechanism to bridge the gap between basic science and clinical practice and involves the integration of basic research, clinical research, cohort studies and epidemiology, and drug development by biomedical engineering using emerging technology.

Prevention and control

National developmental strategies for prevention and control of CVD focus on four areas:

- Forward-shift strategy: Concepts, input, and research subjects and areas.
- Downward-shift strategy: Prevention priorities shift to communities in urban and rural areas.
- Pattern shift: The comprehensive integration model of environment, society, psychology, engineering, biology.
- Systematic integration: Within and beyond disciplines and systems, taking a holistic, three-dimensional view to research lifestyle and disease process.

National research for CVD aims to address the following:

- An emphasis on early warning and primary prevention of CVD, and guidelines for preventing and controlling of high blood pressure and related disease.
- The establishment and application of new technology such as bioinformatics, molecular imaging and genomics.
- Disease screening, prevention and control for CVD.

Cooperation between various CVD research projects that focus on mechanisms for prevention, drug targets and new drug innovation, is consolidated through a network. China cooperates with the USA in respect of the GenSalt study, a genetic epidemiology network of salt sensitivity in high BP.

The Chinese government's commitment to NCD research and prevention is confirmed in the 12th Five-Year Plan (2011-2015), which looks to increase the average life expectancy at birth by one year within the next five years. To date, the project has shown gradual decreases in salt intake and smoking rates.

Future CVD research

System biomedicine reveals disease development mechanism. Although there are many departments in hospitals, very little is known about the sub-clinical syndrome caused by physiological dysfunction, neural and psychological dysfunction, lifestyle, behaviour and the environment and the reactions between these factors.

The '3P-9P-3P' model is proposed to guide the development of translational medicine in addressing the key objective of prolonging a healthy life span. The model involves protecting and promoting health, predicting diseases, addressing early warning signs of diseases, preventing diseases throughout the whole Chinese population and eventually the global population, through participation and personalised treatment and medicine.

DISCUSSION: Q&A

Prof Stephen Tollman: I am struck by how little we have talked about HIV. There seems to be little understanding about the interaction between HIV at a population, clinical and physiological level. As Prof Schutte indicated, HIV affects a number of things pathophysiologically, including lipid distributions, waist circumference and so forth. Could HIV and its effects be playing a much bigger role in the contrasting findings and will co-morbidity become important on our collective agendas in future?

Response, Prof Schutte: This aspect was not discussed in my presentation. HIV was an important factor in the regression models of the PURE study. A PhD student of mine focused on HIV in the study and 300 participants in the original group were HIV-infected. In these HIV infected individuals, hypertension did not occur more frequently. In fact, HIV seemed to be a preventative factor. However, other inflammatory markers, lipids and obesity measurements were affected. A sub-group that started with ART showed even more so, as expected. HIV and the treatment thereof should definitely be taken into consideration in all studies in South Africa.

Dr Steven van de Vijver: In terms of the impact of HIV and trends in hypertension (shown in Prof Damasceno's presentation), it is interesting that the trend in southern Africa decreased from the 1980s to the mid-1990s and then increased. Is that part of the HIV epidemic or is it due to a general change in lifestyle or aggressive treatment?

Response, Prof De-Pei Liu: Hypertension has decreased slightly in recent years. I am not very familiar with HIV, but recently HIV has decreased slightly. China had some problems with regard to HIV infections related to blood transfusion. This problem has been resolved.

Response, Prof Albertino Damasceno: There are lower incidence rates of HIV in West Africa. I do not think that the decreasing followed by increasing trends in hypertension are related to HIV. The relevant *Lancet* paper did not give an explanation for this change.

Dr Steven van de Vijver: What are your ideas and suggestions about salt substitute programmes on this continent?

Response, Prof Damasceno: China has a lot of experience in respect of salt substitutes. Papers have been published suggesting that by adding more potassium than sodium could decrease BP. There are some problems with salt substitutes in relation to chronic renal function. The reduction of salt intake is easier to implement in some countries, such as South Africa where bread that is sold in supermarkets is baked in just a few bakeries. In most other African countries, each city has about 100 producers of bread, making it extremely difficult to control the salt content of the bread, one of the major sources of salt in the diet. Stock cubes, used in most cooking, are another major source of salt in the diet.

Prof Karen Hofman: Is the link between alcohol and hypertension mediated through obesity?

Response, Prof Schutte: We know that alcohol intake could be mediated through obesity but in these populations where the men have a high alcohol intake, many of them are lean. Alcohol intake is not necessarily mediated by obesity in all cases, but increases in hypertension are seen through the sympathetic nervous system activity and possibly other mechanisms, such as liver damage.

Prof Naomi Levitt: I found the link between alcohol and hypertension fascinating. I wonder if alcohol is not merely a proxy for a sense of coherence or coping. Such an analysis of the data would be interesting.

Response, Prof Schutte: This would be interesting. The psychological factors tend to be neglected. I do believe that there is a close association between coping, a sense of coherence and alcohol intake, as seen in other studies. There are no data to prove this and further analyses are necessary.

Robert Souhami: If it is true that one is looking at evolutionarily mediated effective sodium conservation in the African continent population, is it the case that the response to sodium-losing drugs is different in the black African population compared with the white population? Is there evidence that there is a physiological difference in sodium handling?

Response, Prof Damasceno: What is known is that the BP response to diuretics seems to be bigger in the black population relative to the white population.

Robert Souhami: Although alcohol is shown as a predictor for subsequent hypertension, does it explain quantitatively all that you see in terms of hypertension that developed?

Response, Prof Schutte: It was not only alcohol that predicted the change in BP but also gender, HIV infections and abdominal obesity. Alcohol, however, was consistent in all different measurements. This is the reason why alcohol was highlighted.

Dr Charles Agyemang: 1) There is a huge diversity in terms of prevalence rates of hypertension across the African continent. These diversities within the continent are often neglected. Should we not look within countries and then compare hypertension rates in each country? Most of the studies on treatment for hypertension have been based on the African-American populations and it seems that these studies are directly translated to the entire African continent. However, there appears to be a wide spectrum of genetic differences between African-Americans and Africans. Should Africa not develop its own guidelines in relation to hypertension? 2) In terms of ethnic differences and genetic markers for hypertension in Africa, some of my work in Europe has shown that when comparing the African population to the white population, the prevalence of hypertension is extremely high. Prevalence among Ghanaian migrants living in Amsterdam is about 60% compared to 16% in the Dutch population. What are your experiences in terms of ethnic disparities?

Response, Prof Damasceno: A very interesting paper was published some years ago that compared genetic markers of hypertension among the black population of the USA through tracing slavery, and in Nigeria. They found no differences at all and concluded that hypertension is more prevalent in the black population because of social situations, but this could not be tested in a trial. There is more recent work on genetic markers of hypertension. Clinically, what we do see is that if the sodium content in food is decreased, there is a greater improvement in SBP in the black population than in the white population. Second, the use of some of the cheaper drugs can better control BP in the black population. Our guidelines should change in this regard. In Africa we should use low-cost, good generic drugs.

Response, Prof Schutte: Most of our work has been on the topic of ethnic differences, comparing African and Caucasian populations from South Africa. The studies in ten to 15-year-old children showed differences in higher BP in African children. The most recent study was in high socio-economic groups of African and Caucasian school teachers where BP was measured every 24 hours. When comparing the prevalence of hypertension based on the ambulatory scores, 70% of the African and 50% of the Caucasian school teachers were hypertensive. A comparison of each of the half-hour BP measurements during 24 hours showed that BP was higher in each instance in the African group.

SESSION EIGHT: RESPONSE OF HEALTH SYSTEMS TO NCD: CHALLENGES AND THE RSA NUTRITION SURVEY RESULTS

(Facilitator: Dr Oladoyin Odubanjo, Nigerian Academy of Science, Nigeria)

INTEGRATING PREVENTION AND TREATMENT FOR NCDs INTO PRIMARY HEALTH CARE

(Dr Lara Fairall, University of Cape Town, South Africa)

Rationale for integration

The following issues have a direct bearing on how NCDs are integrated into PHC:

- Lots of disease needs lots of health workers: NCDs are now so common that the only health care platform with health workers numerous enough to manage them is PHC. In practical terms, this means that integration requires that NCDs will need to be managed by non-physician clinicians and not doctors.
- NCDs are only one group of chronic illnesses posing similar demands on health services: While all NCDs qualify as chronic conditions, they represent only a proportion of chronic illness. This is important to recognise because while at a policy level there may be important distinctions, at a service delivery interface these conditions impose very similar demands on the health system requiring repeated visits over a prolonged period.

The Chronic Disease Initiative in Africa's framework of chronic disease for adults includes mental health and the 'forgotten conditions', such as epilepsy and musculoskeletal disorders, which are predicted to account for an increasing share of the morbidity burden. Women's health is also included in the framework.

While programme organisation remains verticalised, putting NCDs into direct competition with other priorities for resources both within countries and from donors, this distinction is increasingly artificial for the people who use health services and the people who provide their health care. This is partly because of climbing co-morbidity where single conditions are now the exception, and the majority of people attending PHC have more than one condition.

- Co-morbidity is the new norm: The Chronic Disease Initiative in Africa has recently completed a trial in the Eden district in the Western Cape. Patients were recruited from PHC clinics for NCDs. The baseline data showed exceptionally high rates of co-morbidity between hypertension and diabetes, chronic respiratory disease and depression risk. Furthermore, as many as one in ten of these patients reported previous TB and one in four reported already having CVD. Furthermore, HIV and its treatments are associated

with increased risk of NCDs and mental illness. Although many people now survive HIV, the large investment made in scaling up ARV treatment programmes is, and will be, increasingly eroded by NCDs.

- Reduce fragmentation of care and make it person-centred: The impact that this co-morbidity plays out on patients accessing effective care is the most important issue. The first level of care has become increasingly fragmented and time-consuming, making care anything but person-centred. This applies to settings where NCD care is not yet widely available, as well as to those settings where NCD care is available from primary care facilities, as most programmes retain a vertical presence within primary care itself.

There is no 'magic bullet', nor is there any evidence available of what does and does not work with regard to integrating the prevention and management of NCDs into PHC. Particularly distressing is that only a slither of evidence for NCD interventions come from lower and middle-income countries despite them carrying the biggest share of the NCD burden. However, some factors have been found to be important to consider when integrating NCDs into PHC and lessons can be learnt from the work done in South Africa by the Chronic Disease Initiative in Africa.

Factors for consideration when integrating NCDs into primary care

- Simplified treatment and monitoring protocols: The academics and specialists who author guidelines tend to forget that people present to PHC with symptoms and not diagnoses, yet few guidelines contain content that can be readily applied within a symptom or visit-based approach. In addition, adapting guidelines for South African settings requires working out how best practice approaches developed and tested in HICs can be pruned to meet South Africa's resource constraints, including less skilled health workers and markedly reduced access to investigations and medication. This requires some hard but necessary choices, if prevention and treatment is to be scaled-up to all those who need it.

There are important lessons to be learnt from the scale-up of ARV treatment services. When the South African ART programme started in 2004, it was as a 'Rolls Royce version' with specialist physicians initiating treatment, full-on blood monitoring and very advanced adherence interventions for patients. However, the programme could not meet the demand for treatment. What followed was task-shifting prescribing from doctors to nurses, scrapping all but the occasional blood test and relaxing the adherence requirements for patients before they started treatment, as well as the gratifying reduction in mortality. These lessons should be applied to NCDs without delay.

A further consideration when developing guidelines for PHC settings is how to balance the prevention/curative agendas within NCDs. While it is far more popular to focus on prevention, it is not acceptable to neglect the millions of people with NCDs who remain undiagnosed, untreated and uncontrolled given that we have evidence for highly cost-effective interventions to prevent complications and save lives. A range of prevention and treatment interventions is possible at PHC and the role of academics should be to help prioritise these, instead of paralyse the health system with a wish list that cannot be implemented.

- Free NCD drugs (preferably combination) at point-of-care: ARVs have shown that this is possible. Efforts to do the same for NCDs are underway and were eloquently summarised in the third instalment of *The Lancet* series on NCDs published earlier this year. It is necessary to focus on combination drugs (such as the polypill), reducing the load on pharmaceutical supply chains and patients. As a point of caution, it should be noted that despite having the world's largest ART programme, South Africa only introduced combination ARVs in April 2013, some nine years after the programme started. Such delays pose a real threat to fully realising the potential of better primary care prevention and treatment of NCDs by making treatment more complex and adherence more challenging for patients.

Although essential NCD drugs are available in primary care at no cost to patients, they are not necessarily being made freely available. Restrictions regarding who may or may not prescribe the drugs have hampered access to treatment and in many provinces, nurses who see nine out of ten patients in primary care have not been authorised to prescribe NCD drugs that are sufficient to control these conditions.

- Task-shifting: There is a well-established evidence base from HICs that nurses can maintain and even improve the quality of care and outcomes for patients compared with doctor-led care. There is a growing evidence base supporting task-shifting of prescribing to non-physician clinicians in Africa in the context of ART programmes, as well as with NCDs.

However, task-shifting prescribing does have knock-on effects that have to be taken into consideration. Upstream, doctors tend to offer initial resistance to non-physicians taking on roles traditionally viewed as theirs and tend not to follow guidelines, making it difficult to share care with nurses who do follow guidelines.

The provision of education and adherence support tends to fall by the wayside when nurses assume greater clinical responsibilities, with the result that patients can be left stranded with large packets of pills but no understanding of why

they are needed or how to take them. Treatment literacy for NCDs has lagged far behind that for diseases like HIV and TB. Task-shifting this responsibility from nurses to community health workers is one way of ensuring that it gets back on the agenda.

A brief pocket guide for community care workers (CCWs) supporting people living with chronic disease is being piloted among 380 CCWs in the Eden district. Each chronic disease is assigned a two-page spread and the content has been kept very basic, focusing on understanding the role of treatment in preventing complications, drug literacy and standardised lifestyle advice, but stopping short of the intensity of intervention required to guarantee lifestyle changes.

- Integrate NCDs with chronic diseases, maternal and child health, sexually transmitted infection (STI) clinics: This is an area with a growing number of models and evidence. The strategy taken by the South African government has been to integrate the management of all chronic diseases, whether communicable or non-communicable. Known as the Integrated Chronic Disease Model, this aims to provide a one-stop service for all patients with chronic diseases, reducing fragmentation of care and the need for repeat visits. Other opportunities for integration include maternal and child health programmes and STI clinics, and any visit by an adult to a PHC facility.

Other factors such as integrated patient-monitoring systems and point-of-care tests can also play a role in integrating NCDs into PHC environment.

Experiences in applying integrated care models in South Africa

Primary Care (PC) 101 is a 101-page guideline covering the management of all common symptoms and chronic conditions in adults attending primary care. It is accompanied by a training programme that equips usual nurse managers to become outreach trainers who, in turn, deliver short 1.5 hour case-based training sessions to clinic staff on site and in their primary care teams at facilities. This is linked to expanded prescribing provisions for nurses who complete the training. Its precursor, PALSA PLUS, which focused on communicable diseases, has been tested in several large pragmatic trials and scaled-up to over 19 000 health workers in 2 000 clinics throughout South Africa. Adaptations have also been implemented in Malawi, the Gambia, Brazil and Mexico.

The Eden study tested the effectiveness of PC 101 on the quality of NCD care in a fourth trial completed in 38 clinics in the Eden district over the last 2.5 years. Treatment intensification was looked at based on the hypothesis that a large proportion of NCDs remain inadequately treated in PC. Baseline data confirmed that there was room for improvement with only 40% of hypertensives and 23% of diabetics meeting treatment targets. It was found that there were

small increases in treatment intensification among patients across all three NCD cohorts attending intervention clinics. While these effects are modest, they are consistent with those from other changing professional practice trials globally. These effects were highly significant until one adjusted for clustering, suggesting that it was not possible to demonstrate a modest difference given the limited number of clinics available for randomisation. Adjustment for patient-level factors improved the strength of evidence for the effect among diabetic patients and a pre-specified sub-group analysis showed higher rates of treatment intensification among patients with baseline HbA1c in the seven to 10% range. This is consistent with findings from previous work among HIV patients not yet started on ART, which showed benefits of this task-shifting approach in patients with moderate but not severe disease.

However, no evidence was found of benefit for case detection of depression. This was not entirely unexpected as provision of additional resources for its treatment in PC had not been planned in that almost absent counselling services were not strengthened and the initiation of antidepressants remained restricted to doctors in short supply, and overloaded by HIV and NCD caseloads. The lack of evidence of benefit for case detection of depression also serves as a clear reminder that there is a limit to how much one can change at any given time, and that integrating mental health with the NCD training proved one step too far for the nurses. The trial provides further evidence for the effectiveness of this approach combining simplified guidelines with outreach training and task-shifting of prescribing.

Messages for policymakers and academics

- The integration of NCDs into PHC is not optional, but rather an imperative in order to impact the burden they imposed. Without 'universal coverage', any improvements in NCD care will never translate into improvements in the BOD data.
- Evidence for how to integrate these services into PC in resource-constrained settings is slim. Academics should flag this as a priority area for research.
- Prioritise and keep the package simple, although this is not always possible.

INTEGRATING MENTAL HEALTH WITH OTHER NCDs

(Prof Inge Petersen, University of KwaZulu-Natal, South Africa)

Why integrate mental health with other NCDs?

There is a rising burden of mental disorders globally with depression predicted to be the second leading BOD globally in 2020. There is also a high prevalence of depression co-morbid with NCDs. The WHO World Health Survey of over 60 countries shows that between 9.3% and 23% of people with NCDs have co-morbid depression.

This is a problem because common mental disorders (CMDs) compromise the fight against the rising burden of NCDs in that they can exacerbate the modifiable risk factors in terms of prevention of NCDs and can compromise treatment adherence. The WHO World Health Survey showed that depression co-morbid with NCDs has worse health outcomes compared to depression alone, any other NCD alone and any combination of NCD without depression.

In South Africa, neuropsychiatric disorders rank third after HIV/AIDS and other infectious diseases; one in six adults experienced a CMD within the last 12-month period but only one in four receive treatment of any kind.

There is not much current literature about CMDs in chronic conditions in South Africa, apart from one study looking at depression in PHC patients with hypertension and diabetes, which found a prevalence of 20%. The Programme for Improving Mental Health Care (PRIME), a collaboration between Ethiopia, India, Nepal, Uganda and South Africa, as well as the WHO and other partners, recently completed a study in the North-West province of South Africa and found that 31% of a mixed chronic disease group met diagnostic criteria for major depressive disorder.

The proposed solution to this problem is to adopt an integrated chronic care model, integrating care for mental disorders into the chronic disease service delivery platform at primary health level. An integrated chronic care model is being considered in terms of South African policy and piloted in the North-West province. Depression and alcohol-use disorders in particular are ripe for integration because of their high prevalence in this population and because of evidence of the effectiveness of task-shared care. A task-shared approach would help address the dearth of mental health specialists in South Africa and the African continent.

Models of integrating mental health into the NCD agenda in high-income countries were looked at, as there are no such models in lower and middle-income countries. One of the best models is the TEAMcare trial in the USA where depression co-morbid with poorly controlled diabetes and/or heart disease was treated and was found to be more cost-effective than usual care. A collaborative chronic care model was adopted that used a nurse-led team-based approach combining pharmacotherapy with psychosocial interventions to solve problems and set goals to improve adherence and self-care. The model identifies the strengthening of self-management support and the importance of delivery system design, decision support and clinical information systems within the health system. This is located within the broader context of facilitating linkages to community support structures and resources and the policy environment.

The model requires an intensive case management approach, raising the question of how such a collaborative chronic care approach can be implemented in scarce resource settings, such as South Africa.

Example of integration using the collaborative chronic care model in high-income country

PRIME's purpose is to generate collective evidence on how best to implement and scale-up integrated care. PRIME is involved in studies in the North-West province and has engaged in a process to integrate mental health into the DoH model for integrated chronic disease management. In terms of the activities, the DoH is considering strengthening the facility reorganisation, including a 'one-stop shop' for all chronic illnesses, clinical management support and adoption of the PC 101 manual, which provides integrated chronic care guidelines for nurses. At community level, the model provides assisted self-management through community outreach teams and public health interventions will be provided at the population level.

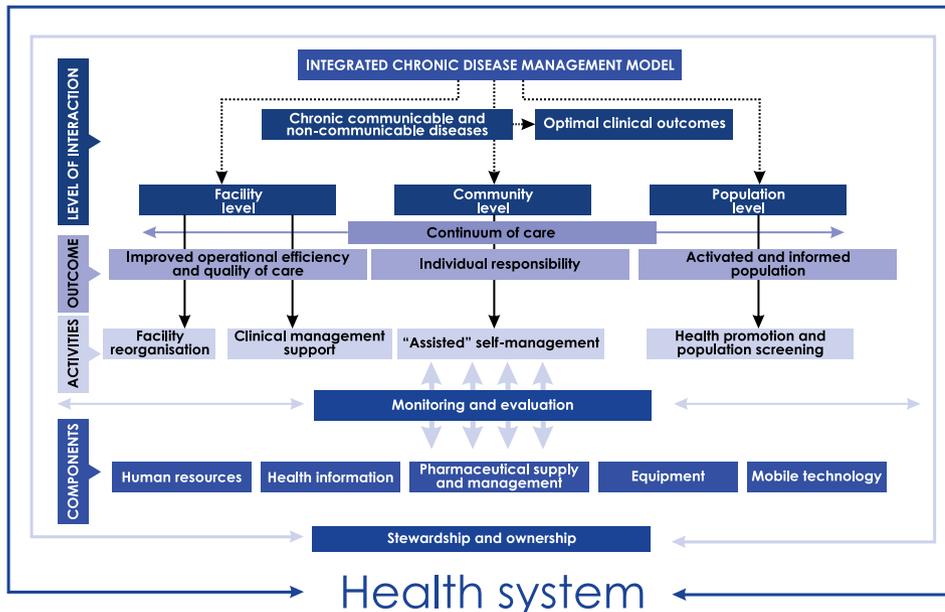


Figure 4: DoH Integrated Chronic Disease Management Model

PRIME is working mostly at the facility level and to a smaller extent, at the community level, and has engaged in a process to develop a district mental health care plan, which involved a series of theory of change workshops with district stakeholders, as well as formative/qualitative interviews with service users and service providers. The information collected was used to develop collaborative care models for depression, alcohol misuse and psychosis. The models draw on

PC 101+, which includes strengthened guidelines for mental health, particularly depression and alcohol misuse, using the WHO's Mental Health Gap Action Programme (mhGAP) guidelines for adult mental disorders. Depression guidelines were strengthened in terms of initiating referral pathways for facility-based counselling, as well as primary health care doctors. Alcohol misuse guidelines were strengthened by including screening and brief intervention for harmful and hazardous drinking.

At district level, the existing HIV counsellors will be trained in evidence-based psychological therapies that have been adapted and incorporated into a step-by-step lay counsellor guideline and adapted from an intervention that showed good outcomes in a non-randomised control. The counselling sessions are based on triggers that have been found to trigger depression in people with NCDs within the North-West province, and draw on appropriate evidence-based ways of helping for each of the conditions.

At a community level, PRIME is building on the assisted self-management proposed by the DoH, which is provided by CHW-led community outreach teams. The DoH CHW training programme provides for screening and identification, follow-up of patients who are non-adherent to medication/counselling, provides follow-up medication for stable patients, and health promotion. The health promotion aspect has been strengthened through the development of self-help pamphlets that provide psycho-education to promote self-care for depression and alcohol misuse, as well as information on helpful resources within the community.

The training and supervision structure follows the standard structure in terms of PC 101+ that is being used by the DoH at the pilot sites. A three-tiered structure has been implemented for counselling: peer-to-peer mentoring, district PHC psychologist/district hospital psychology outreach team and specialist district teams for mental health.

The interventions will be evaluated in pragmatic cluster-randomised controlled trials to measure the real-world effectiveness of the PRIME facility-based collaborative care intervention for depression in ART patients, as well as NCD patients.

Messages for policymakers and academics

- Integrating mental health is smart because it can optimise and protect investment in NCD prevention and treatment, improve health outcomes, reduce stigma and strengthen health systems for chronic care. Counselling is particularly important to promote patient self-management and provides advantages of treatment and health promotion.
- Adopt task-sharing to integrate mental health by strengthening decision support for mental health for PHC nurses and doctors through PC101+, and

diversify the roles of existing HIV counsellors to provide counselling for CMDs. Manualised counselling guidelines are in place, but a clear job description, standardised training programme and standardised supervision and support structure still need to be provided by the DoH.

SOUTH AFRICAN NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (Prof Demetre Labadarios, Human Sciences Research Council, South Africa)

Purpose

SANHANES was established as a repeated population health survey in order to address the changing health needs in the country and provide a broader and more comprehensive platform to study the health and nutritional status of the nation on a regular basis.

Objectives

SANHANES' objective is to investigate the:

- knowledge, attitudes and behaviour of South Africans with respect to non-communicable and communicable diseases;
- nutritional status of South Africans as it relates to food security, dietary intake/behaviour, including the consumption of alcohol, and body weight management;
- behavioural (smoking, diet, physical inactivity) and social determinants of health and nutrition (demographic, socioeconomic status and geolocation) and relate these to the health and nutritional status of the SA population;
- general perceptions of health and health care services.

Study design

- SANHANES-1 is a cross-sectional survey providing baseline data for repeated surveys and also for future longitudinal (prospective) analysis.
- A prospective cohort that will be able to address the relationships is being developed and would start within the next year.

Population and sampling

- Individuals of all age groups living in South African households, excluding those living in institutions.
- Multi-stage disproportionate, stratified cluster sampling.
- 500 enumeration areas (EA).
- 20 households per EA.
- All persons in the household were eligible to participate.

Data Collection

SANHANES-1 obtained data through:

- Interviews based on questionnaires administered by fieldworkers.

- Clinical examination by doctors, nurses and clinic assistants (free of charge) in a variety of settings measuring:
 - physical examinations: blood pressure, step fitness test, anthropometry;
 - laboratory tests: blood samples for biomarker testing (full blood count, HbA1c, cholesterol, triglycerides, C-reactive protein, cotinine, vitamin A, ferritin).

Data management and analyses

- One questionnaire for children and one for adults.
- Custom-designed forms for clinical examination data.
- Laboratory data.
- Analytical quality control documentation indicated that the coefficient of variation for the analyses ranged from 0.5 to 3.75%.
- All data were analysed using SPSS and STATA statistical software packages.
- Data were weighed and benchmarked against the 2012 mid-year population estimate.

Results

The survey comprised 8 168 valid households and 77.2% agreed to be interviewed. Close to 28 000 people were studied, of which 92.8% completed interviews, 43.6% completed a physical examination and 29.3% gave blood specimens. Representativity of the sample compared to 2012 mid-year estimates confirms that SANHANES was nationally representative.

A brief overview of the results of the survey that related to NCDs in adults

- Rates (%) of self-reported personal history of NCDs by sex and age show that:
 - In men: hypertension is rated highest, followed by diabetes, high blood cholesterol, stroke and heart disease.
 - In women: Slightly higher rate of hypertension with a preponderance of about 50% at the age of 65 and over.
- Prevalence of measured prehypertension and hypertension by age:
 - Prehypertension peaks at around 45 to 54 years of age.
 - Hypertension rises with age and is found in about one in five individuals at the age of 65.
- Prevalence of measured hyperlipidaemia by age and sex.
- Prevalence of hypercholesterolaemia (total cholesterol) by race group:
 - In total, 28% of females and 19% of males have high total cholesterol.
- Prevalence of impaired glucose homeostasis and diabetes by age (HbA1C above 6.5% is diagnosed diabetic):
 - By the age of 65, one out of five people is diabetic.
 - The pre-diabetic state also increases with age and by the age of 65 a further 20% of people have impaired glucose homeostasis.

- Prevalence of aerobic fitness: percentage aged 18-40 years old unfit by sex and locality:
 - Half the females are unfit.
 - A quarter of males did not meet the aerobic fitness criteria.
- Prevalence of tobacco smoking (current smokers):
 - 16% of those who ever smoked, smoke daily.
 - 2% of them smoke occasionally.
 - The trend for smoking is decreasing in the country. The rate has dropped every time legislation has been introduced against tobacco use.
- Perceived seriousness of problems of alcohol misuse amongst members of the household:
 - 40% of those that consume alcohol have serious problems of alcohol misuse.
- Extent of snacking while drinking alcohol in households by race:
 - 67% of those that consume alcohol snack while drinking, reflecting a behavioural problem.
- Prevalence of underweight, overweight and obesity by sex and age:
 - Obesity is far less prevalent in males than in females, who are particularly obese.
- Waist circumference by sex and age:
 - 60.3% of females have a waist circumference of more than 88cm at the age of 65.
- Trends in food security status:
 - Food security was a scarcity in 1999 and 2005 and improved in 2008 and remained the same in 2012.
 - The reverse was true in that those households that were hungry at two out of four decreased over the same period.
 - This means that an impact has been made on food security, but since 2008 the impact has lessened.
- Prevalence of dietary risk factors for NCDs (high fat and sugar intake):
 - A lot of people eat a lot of fat and sugar.
- Factors influencing grocery shopping by sex:
 - Ladies do the shopping and care most about the price of food and least about healthy foods.
- Prevalence of psychological distress in adults 15 years and older by sex and age:
 - Psychological distress increases with age and those under stress are symptomatic.
- Quality of health care services:
 - Most aspects of public versus private health care services are similar and the main difference is in terms of longer waiting times in public health care services.

Summary

The successfully completed SANHANES-1:

- Is representative of the population.
- Provides baseline values and informs policy in a number of health and nutrition domains.
- Provides evidence on the impact of current interventions.
- Creates the basis on which the population's health and nutritional status can be monitored longitudinally.

Overall summary

- South Africa has a huge burden of disease that is fuelled by a multiplicity of risk factors requiring multi-sectoral action and healthy public policies.
- The underlying socio-economic, cultural, behavioural and environmental determinants of health are significant.
- Self-reported levels of morbidity are high.

DISCUSSION: Q&A

Dr Mary Amuyunzu-Nyamongo: Two things that struck me in the SANHANES presentation were:

- 1) The message we get is that Africans are getting heavier. Scientists in this region need to look at what is happening in our countries in relation to waist circumference and whether there are biological or genetic explanations.
- 2) The satisfaction levels with public health facilities in South Africa are very high. These levels will not be as high in Kenya. There must be something that South Africa is doing right and perhaps other African countries can learn from South Africa.

Response, Prof Labadarios:

- 1) South Africa, Egypt and Tunisia have the highest increases in waist circumference in Africa. This is also worldwide phenomenon and should be looked at.
- 2) The satisfaction levels reflected the opinion of the masses, although inexcusable things are happening in the public health services at times. The results of the SANHANES are not surprising and are similar to previous historical results. However, there are problems in the overall good rate of satisfaction, particularly from the point of view of waiting times.

Prof Hoosen Coovadia: Perhaps we are doing a disservice by not looking at the project as a whole. What did you define as food security? My understanding of food security is that it covers the whole food value chain. The complete picture is very important for us. The comparison between public and private health services showed no significant differences. This is very good, particularly as the private sector spends the same amount of money as the public sector and the public sector looks after about 75% to 80% of the population.

Response, Prof Labadarios: The problem with food security is that we do not know how to measure it. In the late 1990s we decided to use a method that is not simple but asks questions in real life about the lives of people with limited resources. Do you often skip meals? Do you give fewer, smaller portions to your children? Do your children go to bed hungry? These types of questions are from the community hunger intervention programme questions, an internationally validated and used instrument. This same instrument has been administered over a period of time. This has a significance of its own. What we need to do is to add substance to answer your question more comprehensively. The hunger questionnaire is used to measure food security and although it is not the best, it is consistent over a long period.

Dr Steven van de Vijver: Two essential terms have been mentioned for the first time in the earlier presentations: 'universal coverage' and 'mental health'. In terms of mental health, I know that it is an old-fashioned idea that you get hypertension from stress, but I would like to know what Prof Petersen's idea is about the relationship between a continuous stressful life and hypertension and what are the newest insights in this regard?

Response, Prof Petersen: The stress physiological interface is very well established. In the proposed interventions and trials, we want to assess whether interventions to help people deal with stress will have an impact on health outcomes in relation to NCDs.

Dr Oladoyin Odubanjo: 1) Dr Fairall prescribed free drugs in the integration of NCDs into PHC. I wonder how sustainable this would be given the current experience with HIV drugs being funded. 2) Dr Fairall also prescribed task-shifting. In an environment such as the ones we practise in, I wonder if we take environmental factors into account in task-shifting.

Response, Dr Fairall: 1) In relation to the sustainability of making drugs free at point-of-care and how this compares with ARVs, the first point to make is that we have to work out a sustainable plan for free drugs. There is no alternative. This was done for ARVs. NCD drugs still cost a fraction of the cost of ARVs. The other consideration is that benefits can be yielded from sub-optimal adherence of taking NCD drugs compared to taking ART which requires very high rates of adherence and compliance with treatment to provide benefit. In terms of cost efficiencies and the impact on morbidity and mortality, NCD drugs give more 'bank for your buck' and should be given serious consideration. 2) In terms of task-shifting, Africa is very diverse. Our experience in South Africa is that we live in a highly regulated environment, which prevents people from taking on tasks that they have been equipped and empowered to do. We have not seen that much use of task-shifting interventions. We have seen the opposite. There is an

assumption that doctors provide gold-standard care but they do not. In many cases, non-physicians provide superior care. Our experience is that nurses are far more likely to follow evidence-based guidelines than doctors. Task-shifting does have to be done within a regulatory framework that provides ongoing training, mentorship and supervision for those who take on increased clinical responsibilities.

SESSION NINE: SCIENCE-POLICY ROUNDTABLE

(Facilitator: Prof Salim Abdool-Karim, MRC, South Africa)

Participants:

1. Prof Melvyn Freeman, DoH, South Africa
2. Dr Sarah Barber, WHO, South Africa
3. Dr Sue Goldstein, Soul City, South Africa
4. Prof Karen Hofman, University of the Witwatersrand, South Africa
5. Prof Detlev Ganten, World Health Summit, Germany
6. Dr Anthony Oyekunle, Obafemi Awolowo University, Nigeria
7. Dr Edith Madela-Mntla, ICSU, South Africa

Prof Salim Abdool-Karim:

We would like to know about a success in translating a scientific finding or a set of scientific findings into policy and into practice. Give us an example of where you have seen this happen. What are some of the ingredients that contributed to that success?

Prof Melvyn Freeman:

The DG of DoH commented that policy was neither trivial nor linear. One example of this was the DoH's Strategic Plan for the Prevention and Control of NCDs 2013-2017, which came about because of the science that preceded it. There was a lot of thinking, surveillance and work done by a lot of people about what needs to be done in terms of NCDs. Primarily, scientists had been thinking about three aspects: Surveillance and research, prevention issues whether at a community level, population level, an individual level, or control and treatment issues. When we drew up the plan, we did not only take the science, but took stakeholders from a wide range of stakeholder groups who came together at a summit hosted by the Minister of Health to hear what the users, the scientists, the academics, the pharmaceutical industry and international peoples' thoughts were. In two days, ten targets were set of what we wanted to reach by 2020. We looked at some of the pre-thinking that the WHO had been engaging in, in coming up with the targets, but essentially the targets are the policy that we want to implement to reach particular indicators and targets. The Strategic Plan deals with how we are going about to reach these targets, and deals with salt, alcohol, HPV, an integrated chronic disease programme and so on. This can be called the beginning of policy.

Dr Sarah Barber:

Tobacco control is an excellent example of how we have used science and translated science into public policy. In the 1950s and 1960s in the US, there were smoking prevalence rates of 50% or more among adults. The 1964 US Surgeon General's Report, a compilation of thousands of scientific articles that conclusively linked smoking to lung cancer, resulted in an immediate drop in smoking prevalence in the US. After that, there has been 40 years of research on the health impact and on cost-effectiveness of policies that resulted in the WHO framework convention on tobacco control, the first public health treaty ever issued by the WHO, and identifies the most cost-effective interventions for all countries, now signed and ratified.

Some of the critical factors included widespread population awareness and public discourse, good-quality research and funding for research from public and private sources, research on health, as well as research on interventions.

Civil society played a critical role to maintain the public discourse and to inform populations, advocate and put pressure on policymakers to make change.

Dr Sue Goldstein:

There are many examples of evidence being driven into policy around science – immunisation is just one of these. One of reasons why evidence is not being converted into policy is because scientists are very unscientific in the way we deliver messages and the way we expect the linear approach to work. A better approach would be to look at how social change happens, what the issues are that policymakers have to deal with and what are their imperatives. In most cases, the imperatives of policymakers are related to politics, and political imperatives are related to elections, and elections are related to how the public views policymakers. It is at this level that engagement between scientists and policymakers should take place, particularly in terms of economic issues. Each group feels that their issue is more important and more serious than the next. When an ordinary person gets ill from one or the other disease, they want the best treatment and how to prevent it. The scientific community needs to get to grips with this reality as it is losing out on many opportunities.

Prof Karen Hofman:

Our programme is working on issues related to setting priorities for health using both burden of disease and cost-effectiveness. In terms of our experience so far, the one that has been successful concerns salt. We built on expansive research by local academics that prepared and developed research on salt and how it could be decreased and its relationship to BP. The information was conveyed very effectively to the DoH. Our research team took it one step further, to the Minister of Health, and showed how many lives would be saved

and the cost and consequences from decreasing salt in bread by less than one gram per day. Soon after the research was completed, the government passed the first mandatory regulations on the continent and the second in the world, that will change the salt content of several food products in South Africa in a two-stage process starting in 2016 until 2019.

Some of the ingredients that contributed to this successful research to policy translation were:

- Providing local evidence that was tailored to policy needs.
- There was strong engagement with government.
- There was strong and unwavering political leadership in health, and an understanding that prevention itself provides very good value for money.

Prof Detlev Ganten:

Politicians have for good reasons completely different criteria in terms of actions and priorities. Academia has a very important responsibility: it does not speak with one voice and is frequently controversial, this is confusing for politicians and for the public. The best network to ensure a uniform and united voice of academia is the academies. Academies are not divided in disciplines and can play a key role in being the voice of science versus politics, with the IAMP as a key role player in this regard for medicine and for health, which is not the same. Academies and science alone cannot successfully ensure that research is translated into policy, and must work together with other institutions, including NGOs and health economy. Academia alone is not enough; it only represents the voice of science. It is necessary for this reason to have a joint forum for all stakeholders in medicine and health, in addition to the WHO, where other parts of society can play a role, such as the World Health Summit. The World Health Summit is five years old and has been surprisingly successful to date. Regional meetings are held all over the world and are attended by up to 1 000 people who are key opinion leaders from academia, health economy, NGOs, civil society and politics. The summit itself is responsible for setting the agenda and communicating priorities to politicians, and has been successful in this respect. Examples are:

- The World Climate Summit in Copenhagen, which was a complete disaster. Health is an important part of the climate discussion. The World Health Summit, together with the IAMP, has produced a climate change and health paper, which has very effectively introduced health into the discussion on climate change.
- The Health Summit will take place in October 2013 in Berlin. A paper prepared by the IAMP on research capacity strengthening in low and middle-income countries will be discussed. If a country does not have research capacity it will be difficult to build up a scientific work force, prevent brain drain and make the voice of science heard by politicians.

Prof Salim Abdool-Karim:

We cannot simply be lone voices and must be part of an overall push from multiple perspectives.

Dr Anthony Oyekunle:

In terms of getting science into policy, there are some very good success stories. In Nigeria we have a programme for fortifying certain foodstuffs with various micronutrients. This policy came out of the work of science. Exactly how this was achieved should be studied more carefully, and packaged appropriately in order to replicate it in a predictable manner in future endeavours. The young science academies would like to see a situation where some of these processes are outsourced to the younger scientists to think through and produce decisions. This would assist the agenda-setting process so that we can begin to see a better voice for our science and policies, bearing in mind that the policies are going to be made for now and for future generations.

Prof Salim Abdool-Karim:

Dr Oyekunle reminded us of the young mind, voice, talent and the young belief that anything can be done.

Dr Edith Madela-Mntla:

One example of translation of research into policy and practice is the United Nations Conference on Sustainable Development, commonly known as Rio+20. ICSU was the convenor for the scientific and technological community, and it participated throughout the proceedings of the conference. The process culminated in a multi-stakeholder document involving governments, all the UN agencies and nine major groups that were defined for the process. The document was an expression of policy intent by governments and stakeholders, and all the governments made commitments to this effect. The section on sustainable development in action of the UN website has become a newsletter, conveying all the actions taken by major groups, governments and UN agencies in terms of implementation of sustainable development, resulting from the document. The current process, which involves the development of the sustainable development goals, will be implemented after the evaluation of the Millennium Development Goals. Groups such as ICSU are involved in the open working committee that is considering the incorporation of health issues and issues of urban populations into the sustainable development goals.

The ingredients that contribute to translation of research into policy are:

- Inclusivity and commitment to the process.
- Collective views.
- Involvement of policymakers, as recipients of input from scientists and by informing scientists about policymaking processes.

- Providing opportunities for comment and input on information that is disseminated.

Prof Salim Abdool-Karim:

You are reminding us of the importance of peer pressure and getting governments to make commitments and bringing all the parties to the table.

QUESTIONS AND COMMENTS

Causy Deoraj: I have worked all over the world and have seen how policy is made and implemented in various countries. Policymaking is a complex process and scientific evidence is only the beginning of the process. Do national governments really make national policies and to what extent are we driven by international standards? In health, we attend meetings, sign resolutions and agree to meet global targets. Academia is failing in that our evidence does not help policymakers to choose priorities. Policymakers have to prioritise issues. We pay lip service to an international standard of policy, but very few countries set their own policy. So what are we talking about when we refer to policy?

Prof Volker ter Meulen: I am the past-President of Leopoldina and past-President of the European Academy Science Advisory Council. This Council represents the National Academy of Europe and advises the EU Commission and the EU Parliament. How do you measure success? This is most difficult. There is no blueprint. It depends on the culture, the country and other factors. In Brussels there are over 4 000 organisations registered to give advice to the EU Commission. From a political point of view, it is difficult to know whose advice to trust.

The academies of science have formed a network similar to NASAC that takes a different approach. We try to get access to the political agenda because we feel the timing of advice and the manner in which you give advice are most important. If you pick a topic that is in the yellow press, it is too late. If you do horizon scanning, you can point to something of importance for the future that is not necessarily recognised. It is best to pick the time when there is discussion happening in parliament and when parliamentarians need advice. The European Academy Network does not go beyond giving advice and we do not try to put pressure on policymakers. One has to have trust and luck, and activate the scientific community, but one has to keep a distance from policymakers. Success is when a parliamentarian casts his vote according to the advice given.

Prof Salim Abdool-Karim: The credibility of the voice, the timing and being responsive to information needs.

Prof Charles Olweny: Success is achieving one's vision, goals and objectives within a prescribed timeframe. What happened to the utopian phrase of the WHO, 'Health for all in 2000'?

Prof Salim Abdool-Karim: We have seen that science is a necessary starting point towards policy formulation but that policymaking involves a complex process. We heard about the importance of the credibility of the voice and the role of the academies, and about the extent to which the initiative is locally or internationally driven. How do we define where the nexus of the initiative is? What happens when grand visions fade?

PANEL RESPONSES

Dr Sue Goldstein: The voice of ordinary people who are affected by evidence not being translated into policy is not being heard. We have been doing work with the community in South Africa concerning alcohol, supporting the Minister of Health's drive in relation to alcohol, through evidence, as well as through speaking to people and asking them to map out how alcohol influences their lives, and about the advertising they are exposed to. Very often social science is regarded as less valuable, but social science plays an invaluable role in policy development. In terms of international and local, we need to think big and act local.

We need to broaden our minds and apply an inter-sectoral approach. We should recognise that health is not everything. Our experience is that alcohol affects people's lives in a huge way: social issues, violence, living in poor areas.

Dr Sarah Barber: The Surgeon-General's report on smoking involved thousands of studies and it was reviewed systematically by a respected, objective body and then issued to the public. The issue for policymakers is not only that there is a problem, but what should be done about it. We need to focus a lot more on intervention research, particularly in health policies and systems, and systematic evaluations of how to scale up interventions.

With regard to the WHO phrase on primary health care, it has evolved, but not died. The WHO issued a report on primary health care, essentially the revitalisation of primary health care, and it is now called universal health coverage. This is in recognition that it is more complex. We have taken a political commitment but need to look at financing systems, protection of individuals from falling into poverty because of catastrophic health events. It has evolved in recognition of the complexity of making sure that we have universal access for whole populations.

The WHO is a member state organisation and so countries like South Africa are at the table. The South African government is vocal and strong and had their voices heard at the NCD monitoring framework and indicators. International agreements are valuable because they can be used by countries to facilitate national policy responses.

Prof Melvyn Freeman: I agree that timing is very important, although it is also incumbent on scientists to be a few steps ahead so that when issues get to the table, they have the evidence available. It is not coincidental that South Africa is beginning to get on top of the HIV issue and now starting to look more seriously at NCDs. It is not possible to do everything at the same time. It is necessary to choose priorities and decide and time them right.

Prof Karen Hofman: International issues are important in terms of the policy on salt. These things do not happen based on one piece of information. There was an influence of the local data over a couple of decades, as well as growing international evidence that legislation and regulation on salt could make a difference.

In terms of other ingredients that contribute to success, certainly engagement with the media by scientists and researchers is critical. Media shape public opinion from grassroots up to business. In South Africa, policymakers are particularly open to hearing about the evidence.

Prof Salim Abdool-Karim: The confluence of the events is important, where public opinion, civil society, a receptive political environment, timing, academic voice and evidence have been built up.

Prof Detlev Ganten: Let me clarify the term national/international: politicians are elected nationally but countries cannot work in isolation and politicians are aware of this. International evidence, mechanisms and programmes have a strong influence on national politics. Health is a good example of making use of international evidence, experience, mechanisms and programmes for national and local decisions. Health has a very high priority with the electorate and health could be a good example of using international evidence to influence national policy. IAMP and the World Health Summit as an international Forum would be in a good position to emphasise this point to the benefit of many.

Dr Anthony Oyekunle: We have not looked at the influence of the *status quo*. There are times when the impact of the *status quo* can be significant, such as the tobacco industry that has power and can lobby. If there is scientific evidence sometimes people who benefit from the *status quo* also fund other scientists to do counter studies. It may then take many years and many studies be-

fore everyone will be able to agree. For a long time the evidence for tobacco has been on the table and it took a long time before we all agreed about the evidence and what steps to take.

The other issue relates to international relevance. It can be very useful if international bodies meet and make policies. Some of the policy decisions taken in developing countries emanate from international policy decisions.

Dr Edith Madela-Mntla: On the issue of global versus local, policies at a global level have to take into account what is happening at local levels. For example, in terms of the agenda for sustainable development, actions commence at country level, feed to regional level and from there input is made to the global process. The global process is totally reliant on local input. Local organisations need to take global issues and lessons learnt into account. In terms of the credibility of the voice, politicians hear lots of voices and will only listen to some. It is important to build credibility in order for policymakers to take the voice of objectively based evidence seriously. In terms of the Rio+20 process, the UN defined the organisations it wanted to listen to. Timing is crucial.

QUESTIONS AND COMMENTS

Prof Hoosen Coovadia: I do not believe that science is the only thing that makes it work. That case has been made in this discussion. The points not made during these discussions concern:

- The other factors that propel governments to do things or not do things, at least in South Africa.
- A reasonable and rational approach to solve public problems.
- Justice, because this is inherent in our community.

There are big problems that have not been solved, such as poverty, unemployment and equity. These problems also require more than just science.

Dr Charles Agyemang: It appears that academics and policymakers are living on different planets. There is pressure to produce publications and in this process we do research that is not actually useful to society. We have to find common ground. Instead of operating apart we should set the agenda together.

Prof Salim Abdool-Karim: Societies' norms are important: our quest for justice and equity, and how this drives the process. We need to find each other.

Prof Ali Dhansay: Once policies have been implemented, what activities should take place in the short and long term?

Unknown person: Going from policy to application must take into account the actors. Policymakers are not the same as decision-makers. Young people must have a voice. Strong advocacy is necessary.

Wagida Anwar: In order to solve problems we need to know what they are. Prioritisation is a major task and research requires funding. The cycle, from identifying the problem, acquiring funding for research, doing the research, developing policy, funding and planning implementation, is often not completed. Funding is a key issue through this cycle.

Dr Mary Amuyunzu-Nyamongo: I am not discounting the issue of international targets, but the reality is that most of the African countries will be chasing evidence to respond to the current UN indicators for NCDs. My main concern is whether we have the baselines and what we are going to be reporting on. Our leaders sign every declaration, commitment and treaty, but there is a big gap in terms of translating these into national policy. Our evidence will chase these commitments and this requires funding. This is a critical issue.

The role of donors in policies requires comment. A lot of donor institutions really push policies that may not be within the national policy framework.

Prof Salim Abdool-Karim: Policies sometimes come from some international forum or donors and are not within our ambit.

Dr Carmencita Padilla: I have a very different paradigm. As a scientist, I did research, wrote the bill and am helping to implement the programme. There is always distance between policymakers and scientists. It is about time to bring them together in the same room although this is challenging because most scientists do not have the background in writing policy. Scientists do the science and we leave the policy writing to another group.

- I acknowledge the international statements because I use them as references.
- Success is not in the international platform but in the national arena. Even if international statements are good, they will not achieve success if individual countries do not implement them.
- Advocacy is critical.

Perhaps we should start by giving scientists the skills to understand policymaking. If there are 100 ideas from 100 scientists and these scientists have training to put their research into policy, then we will have 100 excellent policies.

Health Secretaries change every few years. It is therefore important to deal with the Under secretary and the people below them as they will not change and

they are needed as advocates of policy. Scientists and policymakers should work together from the beginning.

PANEL RESPONSE

Prof Melvyn Freeman: It is the politicians who are ultimately responsible for decisions concerning policy, although it is good to interact with and try to influence officials in the department.

In terms of the issue of what happens after policy is made, many governments have massive bottlenecks around the policymaking and implementation processes, and policymaking is the responsibility of very few officials. There is a gap at national level between the research and the provinces, due to the lack of capacity. I would like to see specialists who really understand public health issues, to take the research, integrate it and translate it and help people to implement it. This would accelerate the process.

Dr Sarah Barber: The funding sources are critical to determine what research is done and whether or not it is operational or basic science research. There is a movement in the US under the NIH to promote multi-disciplinary research for NCDs. The WHO and governments should advocate for funding that deals with operational problems or public policy.

Dr Sue Goldstein: It is important to get the timing right. However, we can also set the agenda as scientists, by creating an environment in which the timing is appropriate. Our project is a mass media drama and in 2000 we realised there is a domestic violence act in South Africa that was not being implemented. We did a popular TV series and social mobilisation around this act, and a few months later it was implemented. Research on the impact of the TV series showed that pressure from the public had persuaded government to implement the act. On the other hand, policy can be the best in the world, but many institutions can refuse to implement it.

Prof Karen Hofman: The NCD agenda is clearly linked to issues around poverty. The Minister has said that health cannot be dealt with by health systems alone. It is very difficult for the Health Minister to persuade other sectors to engage with unpopular policies. These policies are however key to human development and affect poverty. NCDs affect the macro-economy, with a poverty spiral that takes place as a result of NCDs. They impact the livelihoods of breadwinners and caregivers. Until these links are made, it will remain very difficult for the Health Ministry to act alone. Other sector involvement is critical.

Prof Detlev Ganten: I concur with the importance of values of society and other factors at a distance from health, such as equity, justice, poverty and freedom.

The common denominator is education, something that has not been discussed at length at this meeting. "Education is the best vaccination", not only against infectious diseases and NCDs, but also against other threats of society such as dictatorship, suppression, poverty and others. Education is the basis of so many seemingly unrelated things and is one of the most important issues for the sustainable development of society.

In terms of the current turmoil in Egypt, I suggest that the group represented at this conference produces a press release that states that people should not suffer, independent of the political issues. Academia needs to get involved not only in specific problem, but also in political problems of this nature.

Dr Anthony Oyekunle: In terms of health and social justice, the major difference between many developing countries and developed countries is in the area of health insurance. I believe that health insurance must be strengthened – not only availability of health insurance but functionality of the insurance should be made universal. Every citizen should be entitled to and have access to a basic minimum insurance.

The other issue is the question of universality of principles, concepts and strategies. There are some concepts that have been properly tested and have become best practices, and can be decided upon internationally and translated nationally into individual processes. Local implementation will differ from country to country. Some strategies are clearly universal and are highly desirable.

Dr Edith Mandela-Mntla: In terms of the role of donors influencing policy. Until the time that government cost the policies and make sure they invest in the implementation of policies, we will continue to have donors dictating policies to countries. This calls for a mind shift, especially in Africa, where there is a lack of mobilisation of internal resources to implement policies.

In terms of what happens once policies are developed, I believe that those who implement policies should be involved from the beginning so that they are part of the process. They should know what strategies need to be employed in implementing policies. Resource mobilisation is central to this.

QUESTIONS AND COMMENTS

Otmar Schober: Are diversity and gender differences key problems or are they a solution towards better acceptance in policy?

Prof Jimmy Volmink: The industry's role in subverting evidence-based policy should be addressed. This is important, particularly in NCDs, where industry is

involved in creating uncertainty around the evidence, disseminating misinformation and using scare tactics in many instances to block policy and to sow confusion. Although we need to have a discussion with the public about the evidence that supports particular policy, we also need to make them more aware of the people who are working against policies. This is complicated by the fact that some scientists collude with industry and the media is often the instrument of industry. Industry's voice is heard much louder than the scientists' voice that is trying to put forward the evidence.

Prof Esther Mwaikambo: Researchers become very discouraged because they do a lot of research and give advice to government but government does not use the evidence to develop policies or when they do, policies are not implemented. There is a greater focus on quick results than on policy development based on evidence.

Prof Fola Esan: Most countries in Africa have very unstable politics, as well as policies. When there is a change of government there is a tendency to forget or ignore existing policies no matter how good they are.

CLOSING MESSAGES FROM THE PANEL

Prof Melvyn Freeman: Speaking on behalf of most of us in the DoH, we are there because we are working for the well-being and health of people and we want to work with scientists to achieve this. Together we can.

Dr Sarah Barber: I would emphasise the issue of health in all policies. Although we have focused on the health sector and health sector policies, we know that health is increasingly vulnerable to policies made in other sectors. It is necessary

to consider, in terms of research, how to inform the policy developments so that health targets become part of economic goals.

Dr Sue Goldstein: Scientists should remember the complexity of health and should look at policy as a complex process and learn advocacy strategies in order to get research into policy in a way that makes sense to the DoH and other departments of government.

Prof Karen Hofman: We should all be doing more research that deals with costs and how many lives are saved because our scarce resources have to be used wisely. This would enable scientists to provide compelling evidence to policy-makers. Evidence does need to be tailored to address policy needs.

Prof Detlev Ganten: The future of mankind and societies is shaped by education and science. There is no more noble cause for science than to serve a humanitarian goal to improve the living conditions of the people on this globe. Health research should have the highest priority, because health has the highest priority for the individual and for society.

Dr Anthony Oyekunle: The need for stronger collaboration between scientists and policymakers has become obvious. Academies should possibly have science policy committees that will focus on disseminating evidence and ensuring that policies come to fruition.

Dr Edith Madela-Mntla: We need to remember that health issues are complex and no one sector can hope to find solutions to the issues. Therefore, it is necessary to involve all sectors as well as the public. Sectors have different perspectives and need to educate each other by creating room for dialogue in order to reach consensus.

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APPENDIX A: ATTENDANCE LIST

NAME	SURNAME	COUNTRY	DELEGATE
Eusebe	Alihonou	Benin	ASSAf Guest
Hoosen	Coovadia	South Africa	ASSAf Guest
Robin	Crewe	South Africa	ASSAf Guest
Causy	Deoraj	Mauritius	ASSAf Guest
Ali	Dhansay	South Africa	ASSAf Guest
Roseanne	Diab	South Africa	ASSAf Guest
Rajae	El Aouad	Morocco	ASSAf Guest
Ahmed	El Safi Ahmed Habib Alla	Sudan	ASSAf Guest
Shahira	Elsaied	Egypt	ASSAf Guest
Glenda	Gray	South Africa	ASSAf Guest
Annegret	Kuhnigik	Germany	ASSAf Guest
Precious	Matsoso	South Africa	ASSAf Guest
John	Musuku	Zambia	ASSAf Guest
Nqaba	Ngcobo	South Africa	ASSAf Guest
Charles	Nhachi	Zimbabwe	ASSAf Guest
Doyin	Odubanjo	Nigeria	ASSAf Guest
Jackie	Olang	Kenya	ASSAf Guest
Anthony	Oyekunle	Nigeria	ASSAf Guest
Iqbal	Parker	South Africa	ASSAf Guest
John	Pettifor	South Africa	ASSAf Guest
Daya	Reddy	South Africa	ASSAf Guest
Dexter	Tagwireyi	Zimbabwe	ASSAf Guest
Anta	Tal Dia	Senegal	ASSAf Guest
Thandi	Badugela	South Africa	Secretariat
Linda	Fick	South Africa	Secretariat
Muthoni	Kareithi	Italy	Secretariat
Lebo	Makgae	South Africa	Secretariat
Constance	Manyeli	South Africa	Secretariat
Xola	Mafi	South Africa	Secretariat
Zuki	Mbiyakhe	South Africa	Secretariat
Phakamile	Mngadi	South Africa	Secretariat

NAME	SURNAME	COUNTRY	DELEGATE
Phathu	Nemushungwa	South Africa	Secretariat
Dorothy	Ngila	South Africa	Secretariat
Takalani	Rambau	South Africa	Secretariat
Patsy	Scholtz	South Africa	Secretariat
Ian	Shendelana	South Africa	Secretariat
Renate	Venier	South Africa	Secretariat
Henriette	Wagener	South Africa	Secretariat
Nadine	Wubbeling	South Africa	Secretariat
Arjuna	Aluwihare	Sri Lanka	IAMP
Herman	Amstad	Switzerland	IAMP
Leif	Andersson	Finland	IAMP
Wagida	Anwar	Egypt	IAMP
Francois	Bertin	France	IAMP
Jo Ivey	Boufford	USA	IAMP
Susan	Elliott	Canada	IAMP
Fola	Esan	Nigeria	IAMP
Benson	Estambale	Kenya	IAMP
Bernhard	Fleischer	Germany	IAMP
Detlev	Ganten	Germany	IAMP
Eva	Kantelhardt	Germany	IAMP
Byung Soo	Kim	Korea, Rep.	IAMP
Christian	Kind	Switzerland	IAMP
Eduardo	Krieger	Brazil	IAMP
De-Pei	Liu	China	IAMP
Stephanie	Lu	Canada	IAMP
Jean-Claude	Mbanya	Cameroon	IAMP
Alvaro	Moncayo	Colombia	IAMP
Paul	Mugambi	Uganda	IAMP
Esther	Mwaikambo	Tanzania	IAMP
Jorge	Neira	Argentina	IAMP
Resat	Ozaras	Turkey	IAMP
Carmencita	Padilla	Philippines	IAMP
Otmar	Schober	Germany	IAMP

NAME	SURNAME	COUNTRY	DELEGATE
Robert	Souhami	UK	IAMP
Lucilla	Spini	Italy	IAMP
Mario	Stefanini	Italy	IAMP
Davor	Stimac	Croatia	IAMP
Volker	ter Meulen	Germany	IAMP
Jimmy	Volmink	South Africa	IAMP
Jin	Xu	China	IAMP
Thomas	Zeltner	Switzerland	IAMP
Zhuqin	Zhang	China	IAMP
Yang	Zhao	China	IAMP
Brad	Bense	South Africa	Media
Chris	Booth	South Africa	Media
Jae	Braun	South Africa	Media
Jacob	Claassens	South Africa	Media
Harry	Dugmore	South Africa	Media
Khangji	Dziba	South Africa	Media
Megan	Harker	South Africa	Media
Prinesha	Naidoo	South Africa	Media
Jill	Penaluna	South Africa	Media
Ina	Skosane	South Africa	Media
Jade	Smith	South Africa	Media
Theresa	Taylor	South Africa	Media
Debbie	Campbell	South Africa	Participant
Namukolo	Covic	South Africa	Participant
Julia	Goedecke	South Africa	Participant
Arshad	Hoosen	South Africa	Participant
Gail	Hughes	South Africa	Participant
Savera	Kaliden	South Africa	Participant
Valencia	Khumalo	South Africa	Participant
Salome	Kruger	South Africa	Participant
Pradeep	Kumar	South Africa	Participant
Elena	Libhaber	South Africa	Participant
Eric	Mabasa	South Africa	Participant

NAME	SURNAME	COUNTRY	DELEGATE
Mandy	Maeda	South Africa	Participant
Tjale	Mahopo	South Africa	Participant
Babatyi	Malope-Kgokong	South Africa	Participant
Tshifhiwa	Mandiwana	South Africa	Participant
Mercy	Manyema	South Africa	Participant
Anthony	Mbewu	South Africa	Participant
Vanessa	Mbhatsani	South Africa	Participant
Selekane	Motadi	South Africa	Participant
Douglas	Mubayiwa	South Africa	Participant
Chris	Naidoo	South Africa	Participant
Sylvia	Njoroge	South Africa	Participant
Hans	Onya	South Africa	Participant
Nasheeta	Peer	South Africa	Participant
Priyamvada	Pradeep	South Africa	Participant
Tomas	Roubal	South Africa	Participant
Naveen	Sankar	South Africa	Participant
Phamela	Shibambu	South Africa	Participant
Sandhya	Singh	South Africa	Participant
Kirsten	Thomson	South Africa	Participant
Marketa	Toman	South Africa	Participant
Bruce	Tshilamulele	South Africa	Participant
Aviva	Tugendhaft	South Africa	Participant
Natural	Twala	South Africa	Participant
Ushotaneffe	Useh	South Africa	Participant
Barbara	van Dyk	South Africa	Participant
Tania	van Rooijen	South Africa	Participant
E	Wentzel-Viljoen	South Africa	Participant
Hattie	Wright	South Africa	Participant
Salim	Abdool Karim	South Africa	Speaker
Charles	Agyemang	Netherlands	Speaker
Mary	Amuyunzu-Nyamongo	Kenya	Speaker
Sarah	Barber	South Africa	Speaker
Debbie	Bradshaw	South Africa	Speaker

NAME	SURNAME	COUNTRY	DELEGATE
Yayha	Choonara	South Africa	Speaker
Albertino	Damasceno	Mozambique	Speaker
Lara	Fairall	South Africa	Speaker
Melvyn	Freeman	South Africa	Speaker
Sue	Goldstein	South Africa	Speaker
Karen	Hofman	South Africa	Speaker
Demetre	Labadarios	South Africa	Speaker
Vicky	Lambert	South Africa	Speaker
Naomi	Levitt	South Africa	Speaker
Bronwyn	Myers	South Africa	Speaker
Shane	Norris	South Africa	Speaker
Charles	Olweny	Uganda	Speaker
Inge	Petersen	South Africa	Speaker
Kaushik	Ramaiya	Tanzania	Speaker
Michele	Ramsay	South Africa	Speaker
Gary	Sacks	Australia	Speaker
Alta	Schutte	South Africa	Speaker
Stephen	Tollman	South Africa	Speaker
Steven	Van de Vijver	Kenya	Speaker
Denis	Xavier	India	Speaker
Derek	Yach	USA	Speaker
Preola	Adam	South Africa	Sponsor
Christiane	Diehl	Germany	Sponsor
Edith	Madela-Mntla	South Africa	Sponsor
Bongani	Mahlalela	South Africa	Sponsor
Kotana	Makanye	South Africa	Sponsor
Duduzile	Mthuli	South Africa	Sponsor
Keletso	Ratselo	South Africa	Sponsor
Nazeeia	Sayed	South Africa	Sponsor
Heather	Erasmus	South Africa	Scribe

