



17 RISK FACTORS

SOUTH AFRICAN COMPARATIVE RISK ASSESSMENT

SUMMARY REPORT

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SOUTH AFRICAN COMPARATIVE RISK ASSESSMENT, 2000

Summary Report, January 2008

This Summary Report is based on a series of articles reporting the Comparative Risk Assessment (CRA) that estimates the contribution made by 17 selected risk factors.

The CRA study was undertaken by the MRC's Burden of Disease Research Unit in collaboration with numerous experts who formed the CRA Collaborating Group. The articles are published in the August 2007 edition of the South African Medical Journal.



A copy of the articles can be obtained from the website of the South African Medical Journal http://www.journals.co.za/sama/m_samj.html or from the website of the MRC www.mrc.ac.za/bod/bod.htm

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INTRODUCTION

A Comparative Risk Assessment:
systematic evaluation of the changes in population health which would result from modifying the population distribution of exposure to a particular risk factor or group of risk factors.

DALY: *a population measure of the health gap calculated by adding the years of life lost due to premature mortality with the number of years of life lived with disability or illness, weighted according to the severity.*

Burden of Disease Information:
extent of health problems and their causes.

The MRC Burden of Disease Research Unit has released a new publication, detailing a selected group of 17 major risk factors to health. A risk factor is defined as an exposure which increases a person's chances of developing a disease or disability. **The South African Comparative Risk Assessment** (SA CRA) study follows the first South African National Burden of Disease (SA NBD) study, assessed for 2000, which identified the underlying causes of premature mortality and morbidity experienced in South Africa. In both these studies, the burden of disease is measured using **disability adjusted life years (DALYs)** as a common metric.

The results of the SA NBD study suggested that the loss of health, and subsequent

untimely death, in South Africa is dominated by sexually transmitted infections (STIs) due to unsafe sex. It highlighted the urgency of finding ways to prevent the spread of HIV and treatment, care and support to people living with AIDS.

The recent SA CRA study followed the methodology of the World Health Organisation (WHO), which analyses available information and presents it in a format that is relevant for planning health and other services. It is an important milestone in generating **burden of disease information** in South Africa, and can be used to inform the development of relevant health promotion strategies.

METHODOLOGY

The SA CRA followed the standardised WHO methodology developed for the Global Comparative Risk Assessment. The risk factors were selected based on the following criteria:

- Were they likely to be among the leading causes of burden of disease and injury?
- Was there evidence of causality?
- Were they potentially modifiable?
- Was there an availability of data?

The focus of the study was on direct physiological and environmental risks as opposed to risk factors such as poverty and social inequality, which have a more complex relationship with health.

The burden of disease and injury caused by the various risk factors was estimated using a **counterfactual approach**, which meant considering what the burden would have been had there been no exposure to the risk factor. The advantage of this method is that the potential gain in population health by reducing risk to “ideal” levels becomes evident in a consistent way across all risk

factors. Another approach, which is known as **categorical attribution**, was also used in certain instances such as in the case of road traffic injuries where individually linked information about blood alcohol content was used to directly associate a health outcome to alcohol consumption.

The contribution of a risk factor was expressed as the **population attributable fraction (PAF)** of related diseases and injuries caused by exposure to this risk factor in the South African population. This was estimated by a discreet version of the generalised potential impact fraction for continuous exposures, or a multi-level extension of the usual attributable fraction formula when the exposure had several categories. Once the PAFs were calculated, they were applied to revised burden of disease estimates, deaths and (DALYs) from the SA NBD study for 2000 to obtain the attributable mortality and burden of disease for each selected risk factor. The methodology used for each selected risk factor is described in more detail in a series of articles published in the South African Medical Journal (SAMJ).

Counterfactual Analysis: *is the determination of the disease burden attributable to a particular risk factor by comparing the current health status with a hypothetical alternative scenario (in this case the theoretical minimum exposure conferring the lowest possible risk irrespective of whether or not it is attainable in practice).*

Categorical Attribution: *A death (or any other event) can be categorically attributed to a single cause such as a disease or risk factor according to a set of rules.*

Population Attributable Fraction (PAF): *A PAF is the proportion of the disease cases in a population that would be prevented if population exposure to a risk factor were absent, assuming the exposure was causal. The PAF is determined by the prevalence of exposure to the risk factor in the population, and the relative risk of disease occurrence given exposure. The relative risk is the risk of developing a disease or being injured or disabled in an exposed population relative to the risk in an unexposed population.*

FINDINGS

The results of the study, in the table below, reveal that the leading risk factor causes of the burden of disease in South Africa was STI burden resulting from unsafe sex, accounting for 31.5% of the 16.2 million DALYs in South Africa in 2000. This was followed by interpersonal violence accounting for 8.4% of DALYs. Alcohol harm also ranked high accounting for 7.0% while tobacco smoking accounted for 4.0% of total DALYs. Furthermore it was estimated that the diet related risk factors such as high body mass index (BMI), high blood pressure and cholesterol, as well as childhood and maternal under nutrition, together cause significant harm to health.

The risk factor profile overall depicts two distinct types of risk factors: those usually associated with more affluent lifestyles, such as tobacco smoking, diabetes, high BMI and high cholesterol as well as those related to poverty and under-development, such as unsafe water; sanitation and hygiene; and indoor air pollution from solid fuels. These risk factors contribute to the **protracted polarised health** transition underway in South Africa which is related to uneven development. The high ranking of interpersonal violence and alcohol abuse as risk factors are likely to be associated with the extreme inequalities in South African society and point to the need to build social cohesion in South African society.

Table . DALYs attributed to selected risk factors compared with the underlying causes of DALYS

Rank	Risk factor	% total DALYs	Rank	Disease, injury or condition	% total DALYs
1	Unsafe sex/STIs	31.5	1	HIV/AIDS	30.9
2	Interpersonal violence (risk factor)	8.4	2	Interpersonal violence injury	6.5
3	Alcohol harm	7.0	3	Tuberculosis	3.7
4	Tobacco smoking	4.0	4	Road traffic injury	3.0
5	High BMI (excess bodyweight)	2.9	5	Diarrhoeal diseases	2.9
6	Childhood and maternal underweight	2.7	6	Lower respiratory infections	2.8
7	Unsafe water sanitation and hygiene	2.6	7	Low birth weight	2.6
8	High blood pressure	2.4	8	Asthma	2.2
9	Diabetes (risk factor)	1.6	9	Stroke	2.2
10	High cholesterol	1.4	10	Unipolar depressive disorders	2.0
11	Low fruit and vegetable intake	1.1	11	Ischaemic heart disease	1.8
12	Physical inactivity	1.1	12	Protein-energy malnutrition	1.3
13	Iron deficiency anaemia	1.1	13	Birth asphyxia and birth trauma	1.2
14	Vitamin A deficiency	0.7	14	Diabetes mellitus	1.1
15	Indoor air pollution	0.4	15	Alcohol dependence	1.0
16	Lead exposure	0.4	16	Hearing loss, adult onset	1.0
17	Urban air pollution	0.3	17	Cataracts	0.9

High BMI (5th) and childhood and maternal under-weight (6th), are the highest ranking nutritional risk factors on the table. Similar ranking is a reflection of the complex nutritional transition. Largely among the poor, undernutrition in mothers and children can be accompanied by overweight in adults.

It is important to acknowledge that low ranking in this study does not negate the importance of some of these health risks, particularly the environmental risks, urban air pollution, indoor air pollution and lead exposure. Sizable mortality burdens are already associated with these low ranking risks and interventions are necessary to avoid a further increase in future burden.

These attributable burden estimates have been calculated in isolation of each other and reflect the independent contribution of each risk factor. Those risk factors that share a common causal pathway cannot be added together as there could be some double-counting. For example, for high blood pressure, cholesterol, BMI, physical inactivity, low fruit and vegetable intake, diabetes and smoking it would be necessary to estimate a joint effect of these multiple risks on cardiovascular disease outcomes. Similarly risk factors such as unsafe water, sanitation and hygiene and indoor air pollution from household use of solid fuels may also work synergistically with others such as undernutrition or HIV infection to increase incidence and effects of diseases such as respiratory infection and diarrhoeal diseases in children.

Protracted bipolar transition:
both infectious and chronic diseases exist simultaneously over an extended time period in the population.



RECOMMENDATIONS

The SA CRA points towards potential interventions for decreasing and preventing death and disability. The growing burden of disease in South Africa makes it imperative for government to take effective steps to improve and protect the health of the nation through effective, suitable and cost-effective health promotion strategies.

An intersectoral and multi-pronged approach that will operate at multiple levels is required to decrease and prevent premature death and disability in South Africa. This approach must target the individual as well as the family unit; institutional and organizational structures in the community; and macro-level public policy and legislation. Given the nature of the risk factors highlighted in this study, interventions will need to span three spheres, namely:

1. The social sphere
2. The health sphere
3. The development sphere.

The development of a strong evidence base to guide the selection of effective interventions is still at an early stage in South Africa. The CRA made use of a recent global review of disease control interventions for developing countries (DCPP) and the Cochrane Library Database, important reviews that can help in identifying interventions that are appropriate for South Africa. More than 80 promising interventions with the potential to reduce the burden of disease were identified for consideration. Recognizing that health is a “complex state” influenced by socio-economic status, education, gender, and physical infrastructure, the proposed interventions cross a range of sectors – from labour to agriculture. To reduce alcohol harm, for example, regulation of liquor outlets (by reducing hours of business), increases in taxes, and restrictions on alcohol marketing are recommended. Tax and agricultural policies that promote the availability of fruits and vegetables as key interventions to improve nutrition are recommended.

1. ADDRESSING SOCIAL DETERMINANTS

The three leading risk factors to health in South Africa (unsafe sex, interpersonal violence and alcohol use) are related to complex social factors and behaviours. Their substantial contribution to the burden of

disease highlights the urgent need to build social cohesion and leadership in realising the rights-based vision embedded in the South African Constitution. A sense of humanity (*ubuntu*) and a culture of respecting human rights and valuing life need to be fostered. Research to develop effective interventions, including structural interventions and behavioural change needs to be encouraged.

SEXUALLY TRANSMITTED DISEASE BURDEN/ UNSAFE SEX

South Africa faces one of the largest HIV/AIDS epidemics in the world. A multifaceted strategy to prevent HIV on the one hand and provide treatment, care and support to people with AIDS on the other hand is needed. The National Strategic Plan for 2007-11 has identified important interventions, placing particular emphasis on the current lack of human resources and infrastructure. Every effort is needed to ensure the implementation of the plan and there is an urgent need to strengthen the prevention of mother-to-child transmission programme.

On a lesser scale, cervical cancer needs to be addressed as it is a preventable disease, while policies are in place for regular screening; studies have shown that the programme does not function well. There is a need to strengthen the national screening programme and promote regular utilisation of screening services. The feasibility of introducing the HPV vaccine needs to be assessed.





INTERPERSONAL VIOLENCE

Interpersonal violence accounts for a high burden of the disease in South Africa and requires a multisectoral approach. In particular, here is a need to:

- Seek effective strategies to change cultural norms regarding violence, gender and sexual relations through interventions such as working with young men, reducing media violence and establishing adult recreational programmes. There is a need to increase positive adult involvement, possibly through family mentoring programmes to develop positive role models and build skills for non-violent conflict resolution. Home-school partnership programmes to promote parental involvement for primary school children and after-school programmes to extend adult supervision of children may also be of value.
- Improve the criminal justice and social welfare systems. Strengthen police and judicial systems to ensure more equitable access, protection and legal recourse. This must include better services for victims, witnesses and suspects as well as more streamlined and efficient investigation and judicial procedures. Set up temporary foster care programmes for chronic delinquents and therapeutic foster care for young children, and home visitation services aimed at reducing child maltreatment. Prioritise community policing to develop safe environments and enforce the Firearms Control Act to decrease the number of guns in society. Develop capacity for an appropriate health sector response - train health professionals to screen, examine, assist, support and refer victims of intimate partner violence or child sexual abuse and adults abused as children.
- Strengthen communities through education and childcare (eg school-based programmes to reduce aggressive behaviour, provide incentives to youth to complete secondary schooling, academic enrichment programmes for children aged 12 to 19 years etc). Initiate social development programmes including social development training aimed at nurturing community cohesion and strengthening social capital.
- In the longer term it is essential to reduce income inequalities through job-creation programmes and initiatives such as micro-financing projects (particularly targeting women).

ALCOHOL

Alcohol abuse results in a substantial burden of disease

Multilevel interventions are required to target high-risk drinkers and encourage sensible drinking patterns among those who choose to drink alcohol.

- Regulating coherent liquor outlet policy including reduced hours for sales and increasing alcohol excise tax are effective strategies but there is an urgent need to improve the enforcement of existing legislation / regulation regarding drinking and driving (eg random breath testing), and the minimum purchase age of alcohol.
- The public needs to be made aware of the problems associated with alcohol abuse. There is a need to restrict alcohol marketing, eg banning alcohol advertisements, and to increase active forms of alcohol counter-advertising using social and marketing techniques.
- There should be a universal abolition of the “dop” system or related practices.
- There is a need to strengthen the institutional support structures for recovering alcoholics including brief interventions at primary health care. Programmes to prevent drinking during pregnancy need to be implemented particularly in regions that have been identified to have high levels of fetal alcohol syndrome.

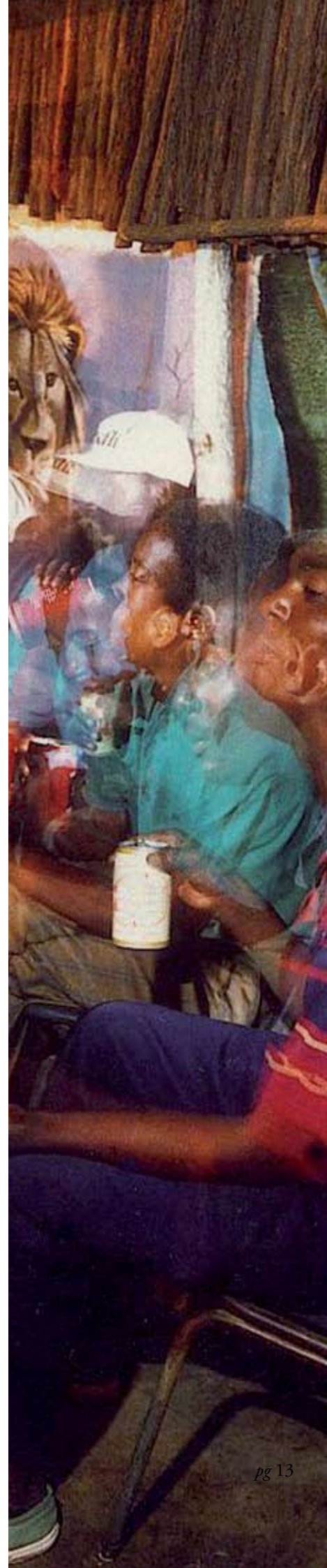
2. PROMOTING HEALTHY LIFESTYLES AND MANAGING RISK FACTORS

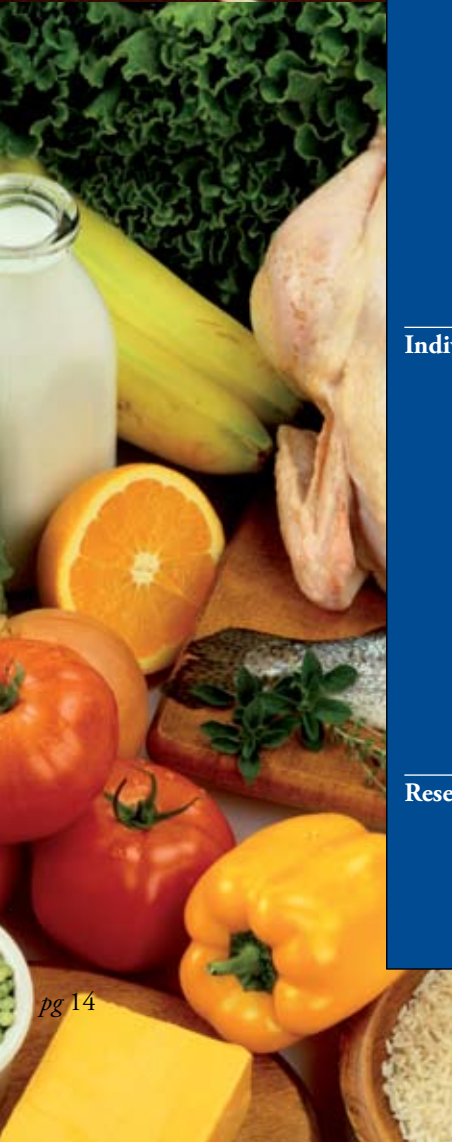
The health sector has a central role in reducing risk factors for chronic diseases through a population-based approach. This can be achieved by promoting healthy lifestyles on the one hand, and diagnosing chronic diseases at an early stage, and implementing cost-effective management of risk factors and disease.

In the context of chronic disease prevention, the WHO refers to a healthy lifestyle in terms of no tobacco use, good nutrition and increased physical activity. South Africa has

made good progress on tobacco control at the macro-policy level. Lessons from South Africa’s tobacco legislation and accompanying health-promotion campaigns should be considered when developing strategies to influence eating habits; increase levels of physical activity; and reduce alcohol use.

At an individual level, risk factors for chronic diseases tend to co-exist and have a synergistic impact on health. For this reason it is essential that a complete and comprehensive assessment of an individual’s risk profile be taken into account to identify the absolute risk for disease. Moderate reductions in several risk factors can therefore be more effective than major reductions in one and this approach has been shown to be cost-effective for South Africa.





PHYSICAL INACTIVITY, TOBACCO USE, AND DIET-RELATED RISK FACTORS FOR CHRONIC DISEASES OF LIFESTYLE

Macrolevel/ National

- Policy makers can influence consumption patterns through subsidies, taxes, regulations and policies, as well as concerted actions. These need to focus on the supply, processing and marketing of food to ensure wide availability and affordability of healthy foods including fruit and vegetables; limit the salt content of manufactured foods and staples such as bread, reduce the saturated fat content of food; limit the promotion of unhealthy food to children. Food labeling has an important role to play.
- South African tobacco legislation includes all recommendations of the WHO Framework Convention on Tobacco Control. However, there is a need to further tighten, enforce and monitor the impact of tobacco regulation.
- Design the environment to promote health: Modify town, road, building and environmental designs to promote physical activity through safe walking, cycling, and use of stairs, and improve access to public transportation.
- Allocate funds for interventions and research.

Population/ Community

- Develop locally-suitable health messages about smoking, physical activity and diet as part of population wide campaigns to promote healthy lifestyles. Ensure consistent messages on television, radio, and the print media.
- Promote workplace, health care provider, and community healthy lifestyle programmes.
- Develop school programmes that integrate nutrition, physical activity, tobacco and alcohol use into core curricula and/or lifestyles programmes, and healthy nutrition into school food/snack services.
- Improve primary care diagnosis and management of risk factors for chronic diseases including hypertension, raised blood sugar, raised cholesterol levels and excess bodyweight. Promote secondary prevention such as exercise after cardiovascular events or diagnosis of diabetes.
- Implement smoking cessation programmes in primary care clinics. Target pregnant women – particularly coloured women who have amongst the highest female smoking prevalence in the world.

Individual

- Balance dietary intake and energy expenditure to achieve and maintain a healthy weight.
 - Limit excessive caloric intake from any source.
 - Maintain daily physical activity
 - Limit consumption of sugar and sugar-based beverages.
- Eat a healthy diet
 - Eat 5 fruit and vegetable portions a day.
 - Reduce intake of salt.
 - Reduce intake of saturated and trans-fat content.
- Avoid tobacco use.
- Reduce alcohol intake.
- Check weight, blood pressure, blood sugar and cholesterol regularly.

Research

- Undertake research to identify cost-effective and sustainable interventions. Develop and evaluate healthy lifestyle programmes and social marketing strategies to promote improved diet, physical activity and non-smoking.
- Develop and implement sustainable surveillance systems to monitor these risk factors and related health outcomes.

3. SUSTAINABLE DEVELOPMENT AND POVERTY REDUCTION

Poverty results in the uneven distribution of disease, and there is consensus that sustainable development cannot be achieved where rates of debilitating illness are high. The reduction of poverty is not an automatic consequence of development, particularly in the context of current globalisation trends. Reducing poverty is critical in reducing risk factors for poor health such as undernutrition and unsafe water and lack of sanitation and hygiene.

It is essential to ensure that development is sustainable so as to avoid harmful effects

such as pollution, and so ensure that the environment can provide for future generations. Noticeable efforts to extend the provision of water have been made in South Africa in recent years, and legislation regarding the lead content of petrol has been introduced. However action is still needed to expand water and sanitation provision to marginal communities and rural areas, and to reduce exposure to indoor smoke from solid fuels. Efforts to reduce air pollution, particularly from industrial and motor vehicle emissions, are also needed. Poverty reduction strategies are complex and need careful monitoring and evaluation, inclusive of their impact on health.



CHILDHOOD AND MATERNAL UNDERNUTRITION

Undernutrition	A substantial burden of disease among children younger than 5 due to the underweight status of children, suggests that reduction of the occurrence of underweight would have a substantial impact on child mortality. The study highlights the need to monitor the nutritional status of children, an important indicator of child health.
Iron deficiency	This first study in South Africa to quantify the burden from IDA suggests that it is a less serious public health problem in South Africa than in many other developing countries. Nevertheless, this burden is preventable, and the study highlights the need to disseminate the food-based dietary guidelines formulated by the National Department of Health to people who need them and to monitor the impact of the food-fortification programme.
Vitamin A deficiency	The vitamin A supplementation programme for children and the new food fortification programme introduced in South Africa in 2003 should prevent future morbidity and mortality related to vitamin A deficiency. Monitoring the effectiveness of these interventions is strongly recommended.





ENVIRONMENTAL RISKS

Unsafe water, and lack of sanitation and hygiene

Unsafe water sanitation and hygiene (WSH) remains an important risk factor for disease in South Africa, especially in children younger than 5 years. High priority needs to be given to the provision of safe and sustainable sanitation and water facilities. In addition, it is important to promote safe hygiene behaviours, particularly among children.

Indoor air pollution

An estimated 20% of South African households were exposed to indoor smoke from solid fuels, with marked variation by population group resulting in a considerable burden of disease. Almost 99% of this burden occurred in the African population living in rural and peri-urban areas. Interventions should include:

- Technologies which aim at improved cooking/heating devices, improved fuels and reduced need for heating.
- Technologies aimed at improving the living environment.
- Behavioural change to reduce exposure and smoke generation.

Lead

Even with the phasing out of leaded petrol, exposure to lead from its ongoing addition to paint, para-occupational exposure and its use in backyard 'cottage industries' will continue to be an important public health hazard in South Africa for decades. Young children, especially those from disadvantaged communities, remain particularly vulnerable to lead exposure and poisoning.

Urban air pollution

This study found that in South Africa the public health impacts of urban air pollution has been under recognised. As the South African economy continues to develop and the urban populations grow, it is essential to implement strategies to control air pollution. One of the objectives of the air-quality management plan is to consider air quality in land use and transport planning.

WHAT NEEDS TO BE DONE?

This study has provided estimates of the relative contribution of selected risk factors that are considered modifiable. The findings of the study are the first steps in developing a roadmap for evidence based interventions and recommendations that will reduce the burden of disease in South Africa.

Steps to take the SA CRA forward include:

1. Promote discussion of the findings and recommendations of the CRA within national, provincial and local government departments, civil society and the private sector.
2. Identify **cost-effective** interventions to reduce exposures to risk factors that are responsible for substantial disease burden and initiate reviews or primary research where evidence for the effectiveness of interventions is lacking.
3. Prioritise interventions based on local applicability and acceptability. Key questions to address here include:
 - whether the interventions could work in the South African setting (feasibility)
 - what it would take to make the interventions work
 - the intervention's impact on equity
 - the cost of sustaining such interventions.
4. Formulate intersectoral policies for risk reduction at individual, community and macro-levels and across the social, health and development spheres.
5. Develop national, provincial and district level implementation plans for interventions within programmes and allocate resources to achieving these.
6. Develop strategic alliances to champion and advocate the processes at multiple levels.
7. Monitor and evaluate policy and programme implementation and their effects on key health determinants and indicators.

Cost-effectiveness Analysis: involves calculating the costs that would be incurred for alternative interventions compared with the health impact that would be achieved by the intervention.

In light of areas of uncertainty and omissions in the data, it remains important to improve the South African epidemiological data base for important conditions and their associated risk factors in follow-up studies. It would also be useful to conduct epidemiological research on the complex relationship between poverty and ill-health. The results from the CRA, despite these shortcomings, highlight the urgent need to improve the risk factor profile in South Africa so as to reduce the burden of disease.



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