Environmental health in South Africa

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The World Health Organization has estimated that as much as one quarter of the global burden of disease is due to modifiable environmental factors. In children, and in developing countries, the proportion of illness that can be attributed to modifiable environmental factors is even higher. Addressing environmental hazards in the places in which people live, learn and play, is therefore a cost-effective means of preventing ill health and reducing the burden of treatment currently borne by the health services.

This chapter provides an overview of some of the challenges and progress in addressing environmental health issues in South Africa. After providing some basic definitions, the chapter focuses on the environmental contribution to the global burden of disease, environmental risk factors such as urbanisation, living environments, and exposure to toxins, and the role of poverty and inequity in perpetuating these risk factors. The chapter concludes by discussing a possible framework for responding to environmental health in South Africa and briefly considers the role of environmental health practitioners in a post-apartheid South Africa.

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Introduction

Environmental health is a branch of public health concerned with all aspects of the natural and built environment that may affect human health, and for which the World Health Organization (WHO) offers the following definition:

Environmental health addresses all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviours. It encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments. This definition excludes behaviour not related to environment, as well as behaviour related to the social and cultural environment, and genetics.1

Environmental health services are defined as:

Those services which implement environmental health policies through monitoring and control activities. They also carry out that role by promoting the improvement of environmental parameters and by encouraging the use of environmentally friendly and healthy technologies and behaviours. They also have a leading role in developing and suggesting new policy areas.2

The South African National Environmental Health Policy similarly defines environmental health as encompassing those aspects of human health, including quality of life, that are determined by physical, chemical, biological, social and psychosocial factors in the environment. The Policy also refers to the theory and practice of assessing, correcting, controlling and preventing those environmental factors with the potential to affect adversely the health of present and future generations.3

The environmental contribution to the global burden of disease

The WHO has estimated that as much as one quarter of the global burden of disease is due to modifiable environmental factors.4 In children, and in developing countries, the proportion is higher still: more than one third of the burden of ill health is attributable to environmental factors. Addressing environmental hazards in the places in which people live, learn and play, is therefore a cost-effective means of preventing ill health and reducing the burden of treatment currently borne by the health services.

Long-standing concerns, such as diarrhoeal diseases, lower respiratory infections and unintentional injuries, are among the main contributors to the environmental burden of disease.4 The provision of safe water, sanitation, waste removal, hygiene education and household electricity may significantly reduce the burden of disease in many developing countries. For example, around 94% of the burden of diarrhoeal disease, and 42% of lower respiratory infections, may be prevented through environmental health interventions.4 In the South African context of a particularly inequitable society, environmental health interventions also promote equity by addressing the needs of the most vulnerable and marginalised populations.5

Environmental risk factors in South Africa

From an environmental health perspective, South Africa has had a turbulent history. The nature and current distribution of some of the main environmental health problems in the country are rooted in the apartheid and colonial eras. Waves of rapid urbanisation, industrialisation, agriculture and mining, as well as a burgeoning informal or cottage industry sector, have all been driving forces of the current national environmental health profile.

The policies and programmes of non-health sectors are primary determinants of environmental quality and health status. For example, the promotion of private over public transport systems is associated with elevated exposure to vehicular pollution and road traffic injuries. The provision of communal or outdoor rather than domestic indoor water supplies is associated with water storage in containers, increased water contamination levels and elevated levels of diarrhoeal disease.6 The past use of asbestos roofing in low-cost housing may increase the risk of exposure to cancer-causing asbestos fibres.7

There has been increasing concern about the advent of climate change and variability, which presents an unprecedented environmental health challenge that threatens the entire planet. It is expected that the greatest health burden associated with the effects of climate change will be borne by impoverished communities, and will underscore existing weaknesses in public health systems.8

Urbanisation, human settlements and housing

In 2007, for the first time in history, the world’s urban population equalled the proportion living in rural areas. Urbanisation is expected to increase in the coming decades, with the fastest rates occurring in Africa.9 As the urbanisation process unfolds, the health of nations will be increasingly determined by that of their urban populations. Since the urbanisation process in many African countries is driven by poverty, and urban growth is occurring predominantly in areas of existing poverty, it is to be expected that poverty and environment-related ill-health conditions in South African cities may increase, and will concomitantly define the national health profile.

Living environments

Housing and the quality thereof is one of the most powerful determinants of public health. Proper location and design of settlements, and healthy housing, have considerable potential to prevent disease, to promote health and to create healthy and sustainable communities. Poor or inadequate housing, on the other hand, may directly lead to significant burdens of preventable ill health in a society or community. The WHO has stated:

Over and above their basic purpose of providing shelter against the elements and a focus for family life, human dwellings should afford protection against the hazards to health arising from the physical and social environments. At its best, appropriate housing promotes physical and mental health. It provides people with psychological security, physical ties with their community and culture, and a means of expressing their individuality.10
This definition of healthy housing was echoed in a State of the Nation Address by President Jacob Zuma on 3 June 2009, when he said:

Human settlement is not just about building houses. It is about transforming our cities and towns and building cohesive, sustainable and caring communities with closer access to work and social amenities, including sports and recreation facilities.¹¹

Housing and settlements in the apartheid era

Much of the housing delivered for the poor majority in South Africa during the apartheid era did not match the WHO definition of healthy housing. At the time, the majority of the black population was confined to rural homelands where they endured overcrowding and unsanitary living conditions, and where diseases such as tuberculosis were rife.¹² During the Johannesburg gold rush between 1880 and 1890, black miners lived mainly in overcrowded and squalid inner city settlements. An outbreak of bubonic plague in 1904 spurred the authorities to torch the area and relocate black residents to sprawling townships such as Soweto, which were located well away from places of work, and comprised mainly corrugated iron shacks or “matchbox” houses. Township housing was also often associated with hazards such as bucket toilets, asbestos roofing and lead-based paint.¹³ In dormitory-style mining “hostels”, amenities were usually of a communal nature, with privacy severely curtailed.

Housing and settlements in the democratic era

As can be seen in Figures 1 and 2, in the post-apartheid era, hundreds of thousands of households in South Africa have benefited from improved living conditions associated with housing construction programmes, improved water supplies, sanitation and waste removal services, electricity supplies and paved roads.¹⁴

Figures 1 and 2 illustrate the accelerated extension of housing and services to disadvantaged and marginalised people, thereby improving their environmental conditions, quality of life and health prospects. Nevertheless, large numbers of South African households remain without access to key environmental health services. Also, as Figure 3 shows, there is a degree of inequality with regard to the provision of environmental health services across provinces. The lowest levels of provision of indoor water supplies, for example, are in the Eastern Cape and Limpopo Provinces, compared with much higher household indoor water access in the Western Cape and Gauteng.

As a result of a significant historical housing backlog, urbanisation, influx from beyond the national borders and natural population increase, there continues to be a high demand for housing – a significant proportion of which remains unmet. There is a particular concern that urbanisation in developing countries is driven by poverty, and that much of the growth in urban areas in African settings in particular, is occurring in areas of existing poverty, resulting in sprawling areas of concentrated destitution.¹⁵ According to the 2011 South African Census, around 14% of households still reside in informal or squatter housing, and a further 8% live in traditional dwellings.¹⁵ Also, less than half of households have indoor water supplies and more than 7% use the bucket toilet system or have no access to sanitation at all.¹⁵

It is of concern that some new housing developments are not more closely aligned with the WHO definition of healthy housing, nor with the sentiments on sustainable communities expressed by President Zuma in June 2009. In such settings, for example, new housing has been developed in close proximity to mine dumps; moreover, a narrow definition of housing (or shelter) has been adopted, with scant regard for privacy needs (with the maximum possible number of dwellings being crammed into a confined space in some settlements), safe pedestrian and cycling infrastructure is absent, open space, sporting and recreation facilities are under-provided, and education, public transport, libraries and shopping facilities are limited. The end result is a loss of opportunity to build healthy and sustainable communities.

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**Figure 1a:** Percentage of households living in formal type dwellings by province

**Figure 1b:** Percentage of households living in informal types of dwellings by province

Source: Statistics SA, 2012.¹⁵
Figure 2a: Percentage of households using electricity for cooking by province

Figure 2b: Percentage of households using electricity for heating by province

Figure 2c: Percentage of households using electricity for lighting by province

Figure 3: Percentage of households with access to piped water into the dwelling by province

Exposure to persistent toxic substances

The mainstays of the South African economy have predominantly included mining, agriculture and other industries. While these activities have contributed to the national economy, they have also in many instances imposed a legacy of environmental contamination and degradation on some of the poorest sectors of the population. A study conducted at the lead mining town of Aggeneys in the Northern Cape Province showed elevated lead exposure in young schoolchildren, relative to their counterparts in the non-mining town of Pella, some 40 kilometres away. In 1990, concerns were raised over contamination and worker deaths at a mercury waste-processing plant in the province of KwaZulu-Natal. Recent studies point to continued environmental contamination around the site. Concerns have also been raised over elevated mercury levels in poor communities living around a dam downstream from the same plant. Researchers have drawn attention to poor pesticide management practices on farms and the risk of long-term health consequences, suicide and unintentional poisoning in agricultural settings in South Africa. Mining practices in Johannesburg have been associated with severe degradation of the local environment. A study undertaken in the broader Witwatersrand area showed that local mining activity contributed to reductions in the pH (acidification) of surface water, and that the seepage of acidified water from mine tailings dumps contributed around 20% of stream flow in the area, making local rivers and streams unsuitable for recreational use and unable to support diverse aquatic life. For example, high loads of heavy metals were found in water systems, and in certain areas, evaporation resulted in such high concentrations of heavy metals that the growth of vegetation is no longer supported.

Exposure to toxic metals

The removal of lead from petrol and paint constitutes two major milestones in lead poisoning prevention efforts in South Africa, and surveys indicate a decline in blood lead levels in certain groups of South African children. Nevertheless, lead remains a widespread environmental contaminant in South Africa, with elevated blood lead levels found in many parts of the country, including in children living in urban areas, around lead mines, and in subsistence fishing communities where lead is melted to make sinkers.

Elevated levels of mercury have been found in 62% of river and dam sediment samples, as well as in 50% of fish captured from the Inanda Dam in KwaZulu-Natal. Hair samples collected from community members alongside the dam showed that 17% had mercury concentrations above those specified in the WHO guidelines.

Pesticide exposure

Pesticide poisoning has been shown to be a growing problem in South Africa, notably associated with the informal sale of illicit pesticides. A study at the Red Cross War Memorial Children’s Hospital in Cape Town between 2003 and 2008 showed that 11% of all paediatric exposures and poisonings were associated with pesticide poisoning. The number of pesticide incidents increased annually over the study period, with cases peaking during the summer months. The vast majority of cases (91%) were in children aged five years or younger. There is also growing concern about increasing street sales of hazardous pesticides, such as aldicarb, methamidophos and chlorpyrifos, and their application in residential settings, with the potential for acute and chronic ill-health effects.

The informal sector and cottage industries

Impoverished communities, whose health may already be compromised by poor or under-nutrition, are in some instances simultaneously exposed to multiple environmental health hazards. Those living in an informal settlement located downstream of a polluting industry or mine, for example, may be exposed to harmful substances or chemicals, and at the same time face the hazards of poor housing and inadequate environmental health services. In a dwelling that serves as both a residence and the site of a cottage industry operation, there is the risk of exposure to hazardous substances, such as lead and volatile organic compounds, on an ongoing basis, including among young children. Unpublished findings from a long-term urban health surveillance study being undertaken by the South African Medical Research Council shows that around 22% of households in poor settings in Johannesburg operate small-scale industries from their homes. Among the most widespread operations of this type are hairdressing, car repairs, welding, spray painting, jewellery-making and electrical repairs, all of which may be associated with harmful exposures (such as volatile organic compounds and lead). In the face of limited formal employment opportunities, the informal economy and cottage industries have been burgeoning, and this potentially represents a growing environmental health concern among marginalised groups, especially in urban settings.

Environment and cancer

Globally, approximately 19% of all cancers are estimated to be attributable to the environment, including work settings. Decreasing exposure to carcinogens reduces health care costs, and contributes to the overall well-being of communities. Environmental and occupational interventions are critical to achieving a reduction in cancer incidence.

Poverty, inequality and health

Social determinants play an important part in influencing levels of poverty, inequality, quality of life and health. In South Africa, the poorest households generally live in housing that is least protective of health, with limited access to clean water, sanitation, waste removal and safe fuels. They are often more likely than the wealthy to be exposed to indoor and outdoor pollution (from traffic, and formal and informal industry). They are also more likely to be subject to food insecurity and malnourishment, which increases their vulnerability to the ill-health effects from environmental exposures. In cities, poor households may suffer from a double burden of disease resulting from under-development in their residential settings, and simultaneously from exposure to pollution associated with industry and traffic, for example. Therefore, social determinants of health and health status should be of concern to policy-makers in every sector, and not solely to those working in health policy.

Climate and health

There is scientific consensus that the global climate is changing most probably as a result of human activities, giving rise to increasing surface temperatures, melting ice, rising sea levels, and increasing climate variability. The predicted effects on health include injuries and fatalities related to severe weather events and heat waves, infectious diseases related to altered vector distribution, contamination of food...
and water, allergic reactions from increased allergen production, respiratory and cardiovascular disease related to deteriorating air quality, and malnutrition from food insecurity, mental ill health and stress from disasters and emerging environmental concerns, and civil dislocation. While the National Department of Health has developed the National Climate Change and Health Adaptation Plan 2012–2016 (awaiting signature by the Minister of Health),

there is little evidence of action or capacity at local level to implement this strategy.

**Burden of disease from environmental exposure in South Africa**

South Africa has to grapple with multiple, simultaneous burdens of disease: communicable, non-communicable, perinatal and maternal, and injury-related disorders. Environmental factors have a role to play in the causation and prevention of each of these. For example, five environmental risk factors (unsafe water, sanitation and hygiene; indoor air pollution from household use of solid fuels; urban outdoor air pollution and lead exposure) were associated with 5% of all deaths in South Africa in 2000. The joint attributable burden was especially high in children under five years of age, accounting for nearly 11% of total deaths in this age group. For those who are HIV-positive, access to basic environmental health services is of critical importance to ensure personal hygiene and to adhere to medical regimes; safe water is needed for sound domestic hygiene to reduce the risk of opportunistic infections, and for taking medication, while proper sanitation in close proximity is needed for those with diarrhoeal disease, for example. From an environmental health perspective, access to healthy housing, safe water, sanitation and non-polluting fuels are critical factors necessary to work towards significant reductions in maternal and peri-natal mortality.

Several studies have shown that national figures may mask the very high burdens of ill health borne by certain communities. For example, an environmental health surveillance study in five impoverished settings in Johannesburg illustrates (see Table 1) the simultaneous prevalence of particularly high burdens of ill health especially violence and chronic lifestyle diseases; environmental interventions may play a positive role in all of these settings to improve quality of life and enhance psychological wellness.

### Table 1: Selected environmental risk factors and ill health levels in five impoverished neighbourhoods in Johannesburg

<table>
<thead>
<tr>
<th>Percentage of Households</th>
<th>Hospital Hill (informal settlements)</th>
<th>Riverlea (apartheid era low-cost housing)</th>
<th>Braamfischerville (democratic era low-cost housing)</th>
<th>Bertrams (inner city suburb)</th>
<th>Hillbrow (high-rise inner city suburb)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households using mainly electricity for cooking</td>
<td>2</td>
<td>97</td>
<td>98</td>
<td>90</td>
<td>98</td>
<td>78</td>
</tr>
<tr>
<td>Households with cottage industries</td>
<td>16</td>
<td>16</td>
<td>12</td>
<td>22</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Households affected by violence (rape, gunshot, stabbing or beating)</td>
<td>28</td>
<td>19</td>
<td>17</td>
<td>18</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>Households with a member with asthma</td>
<td>3</td>
<td>19</td>
<td>7</td>
<td>20</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Households with a member with diabetes</td>
<td>8</td>
<td>16</td>
<td>4</td>
<td>15</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Households with a member with hypertension</td>
<td>11</td>
<td>31</td>
<td>16</td>
<td>23</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>Households with a death in the past year</td>
<td>12</td>
<td>13</td>
<td>13</td>
<td>11</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Households with a member who committed suicide in the past year</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Adapted from Mathee et al., 2009

Towards a framework for responding to environmental health concerns in South Africa

This chapter has thus far outlined the seriousness and diversity of environmental health challenges prevailing in South Africa, noting the vulnerability of the poorest, the youngest and those with pre-existing ill health conditions. There is particular concern that several of these challenges may be exacerbated in an era of climate change, especially in the light of widespread poverty and inequality in South Africa. Over the past two centuries, approaches to and institutional arrangements for environmental health have periodically required adaptation to respond effectively to prevailing environment and health issues. The changing spectrum of public and environmental health challenges, and the increasing emphasis over time on socio-environmental concerns, are reflected in a number of public health milestones, such as the Alma-Ata Declaration on Primary Health Care, the Sundsvall Declaration on the Creation of Supportive Environments for Health, and the Commission on the Social Determinants of Health. Overall, these and other milestones provide an evolving framework, as well as the tenets and tools for the public and environmental health response to prevailing health challenges.

Given the seriousness and persistence of environmental health hazards in South Africa, and especially with the advent of global environmental change, it may now be time for the environmental health sector in South Africa to reflect on whether current approaches and interventions for environmental health and environmental health...
services in the country are effective or optimal. In the interests of
cost-effectiveness and delivering on the constitutional right of all
citizens to a safe and healthy environment, it is imperative that
preventing diseases of environmental origin becomes a fundamental
environmental and public health goal. In this regard, several
strategies and tools are of particular relevance, including inter-
sectoral action (ISA) and health impact assessment (HIA).

Inter-sectoral action

One of the most important and promising strategies for the resolution
of environmental health challenges is inter-sectoral action. In a
context of limited resources and complex, cross-cutting problems,
and where the determinants of health problems lie predominantly
outside of the sphere of control of the health sector, it is essential
and obvious that the expertise, knowledge and experience of all
relevant sectors of society, including the private sector, should be
drawn on in order to develop solutions. Civil society groups, such as
non-governmental organisations and pressure or lobby groups also
have powerful roles to play in highlighting and securing attention
to environmental health concerns.

Government health departments on occasion involve non-health
sectors in environmental health problems as a matter of courtesy, or
at a relatively superficial level. In general however, the fundamental
opportunities presented by ISA to prevent ill health and address the
systemic problems which cause or contribute to disease, remain
under-exploited. Consequently, the health sector usually lacks the
institutional arrangements, expertise and capacity to fully capitalise
on ISA. In South Africa, ISA would be invaluable in starting to
address the poverty and inequality that underline many health
problems, to ensure that human settlements and housing are planned,
designed and constructed to optimise health and prevent acute and
chronic diseases, to ensure that industries are located, designed and
controlled to minimise public exposure to pollutants, to ensure that
the drainage of toxic water from mining sites is curtailed, and to
ensure that water supply and sanitation standards and targets will
reduce diarrhoeal diseases.

Health Impact Assessment

Economic sectors such as transport, agriculture and housing have
profound impacts on health. For instance, transport is a major factor
contributing to traffic injuries, air pollution and noise. But “healthy
transport policies” can help to reduce these risks, as well as to
promote walking and cycling, and thereby have a role to play in the
prevention of obesity and chronic diseases. In agriculture, fertilisers
and pesticides may boost crop yields, but prudence is required to
protect farm workers and consumers from excessive chemical
exposure.

Health Impact Assessment is a means of assessing the health impacts
of policies, plans and projects in diverse economic sectors using
quantitative, qualitative and participatory techniques. HIA helps
decision-makers make choices about alternatives and improvements
to prevent disease and/or injury, and to actively promote health.
Such assessment is a practical approach used to judge the potential
health effects of a policy, programme or project on a population,
particularly vulnerable or disadvantaged groups. Recommendations
are produced for decision-makers and stakeholders with the aim of
maximising the proposal’s positive health effects and minimising its
negative health effects. In South Africa, the National Department
of Health has produced guidelines on Environmental Health Impact
Assessments.36 However, these are not in widespread use at the
local level.

At a broad or strategic level, together with HIA and ISA, activities
such as the development and maintenance of relevant environment
and health information systems, ongoing legislative and policy
reviews, continuing education/training and opportunities for local
and international exchange of experiences and ideas, are also of
high importance.

Local Agenda 21 / Healthy Cities

At the local level or the community interface with Environmental
Health Practitioners (EHPs), there are several examples of operational
frameworks that may guide the work of EHPs. These include the
Local Agenda 2137 and Healthy Cities38 initiatives, which provide
health-based or community-focused approaches to the planning and
development of cities and settlements. They recognise that health
is determined predominantly by economic, environmental and
social factors, rather than by health services. Healthy Cities aims
to improve recognition of the holistic and inter-sectoral nature of ill
health, and is built on the principles and approaches of the Alma-
Ata Declaration on Primary Health Care and the Ottawa Charter
for Health Promotion. They also promote a generic, systematic and
cyclical approach (see Figure 5) to address environmental health
challenges within settings (settlements, schools and market-places,
for example) or when tackling key environmental health issues (such
as exposure to indoor air pollution or environmental tobacco smoke).

The Healthy Cities approach may be of particular use at the local
level, providing a framework and process for EHPs together with
others in the broad field of environmental health, to directly respond
to local problems typical of human settlements in developing
countries. The first step in any Healthy Cities initiative is to undertake
the research or assessments needed to gain an understanding of the
spectrum of environmental health challenges faced by the local
community. Data may be collected from, for example, the census,
surveys, records of complaints and inspections, and through
public consultation processes. This information may be used to
plan and implement programmes of action to eliminate or reduce
environmental health hazards (see Figure 4), and may also feed
into Integrated Development Planning (IDP). Such a constructive,
developmental approach may be more appropriate, especially in
settings of poverty, than the current trend towards regulatory and
punitive environmental health systems. In some highly impoverished
settings, it appears that the main body of work for EHPs constitutes
meeting targets for the issuing of notices or penalties. While punitive
measures may be warranted under certain circumstances, there is
the danger that in communities where poverty, unemployment and
food insecurity are rife, such punitive regulatory systems may serve
to deepen inequality in a society that is already among the most
unequal in the world.
Research, monitoring and surveillance

If EHPs are to fulfill their primary function of properly identifying, assessing and managing health risks in the environment, research, monitoring and surveillance are fundamental. In a context of confirmed climate change and variability, but with high levels of uncertainty regarding related health outcomes, these functions become increasingly important. Environmental health monitoring programmes will need to be implemented at the level of cities, districts and neighbourhoods to determine spatial as well as temporal variations, to identify groups and locations at risk, and for the allocation of resources. Research should focus on estimating the contribution that various social and environmental factors are making to urban health problems, identifying health opportunities in key development sectors, and supporting decision-making.

The role of Environmental Health Practitioners

Environmental Health Practitioners (EHPs) constitute the backbone of environmental health services, and are trained and well-placed to play a key role in resolving environmental health challenges and preventing disease of environmental origin. The field of environmental health can be traced back to the 1840s in England when Edwin Chadwick conducted a study of poverty which concluded that people often became poor because of ill health due to living in a poor-quality environment. A campaign by Chadwick resulted in the Public Health Act of 1848 in England, which provided for Inspectors of Nuisances (later called Health Inspectors and Environmental Health Officers). Over time, the roles of these inspectors grew, with training programmes and standards being implemented, culminating in the establishment of an advanced training curriculum and environmental health as a graduate profession.

Presently, EHPs are trained in a range of fields to enable their undertaking an array of activities aimed at protecting public health from environmental risk exposure. These include health risk assessment and auditing, epidemiology and research methods, environmental planning and management, environmental pollution, community development, microbiology, and food science and technology. These practitioners also need strong investigative and negotiation skills and a thorough understanding of the application of legislation related to public health and the environment. EHPs are required to register with the Health Professions Council of South Africa (HPCSA) and must participate in a programme of continuing professional development. Their role requires working in partnership with key government departments (such as Water, Energy, Housing, Agriculture, Mining and Environment), local municipalities, the business sector, community groups, non-government organisations and individual members of the community. They have a direct relationship with the public, and adapt problem-solving skills in combination with legislative authority to address the causes of ill health. EHPs therefore have a wealth of skills and knowledge of public health, together with a broad understanding of how the policies, decisions and programmes of local authorities and other sectors affect health. Their skills enable them to play a powerful and unique role in the promotion of health and prevention of disease in multiple settings, including homes, schools, workplaces and neighbourhoods. Their training, as well as the legal powers and functions bestowed on the profession in the “Scope of the Profession of Environmental Health” – Scope of Practice of EHPs place them in a unique position to play a key role in the prevention of exposure to environmental hazards and the elimination of the avoidable health burden of ill health as previously described in this chapter. Currently in South Africa however, a range of factors contribute to EHPs not entirely fulfilling their potential to make a meaningful contribution to reducing the burden of ill health of environmental origin: a selection of these factors is outlined in this section. This has implications for PHC re-engineering as they form part of the team.

Over the past decade, and notably as a result of the reality of climate change, the environmental health landscape is changing. In a context of uncertainty, EHPs around the world are reflecting on their role and scope of practice in the light of emerging environmental health hazards and threats. The Chartered Institute of Environmental Health together with the Government of the United Kingdom has, for example, prepared several resources for EHPs on health effects of climate change and the role of EHPs.

Serious consideration will need to be given to the role of EHPs in terms of climate change and to an integrated response strategy to climate-related threats and impacts on environmental health. Human resource requirements are likely to include increased capacity and staffing, as well as additional training and perhaps even the re-framing of the EHP’s scope of practice to include climate variability implications. In South Africa, as this chapter has illustrated, there is a need to consider the role of EHPs in a situation of multiple, simultaneous environmental threats to health, taking into consideration the legislative framework and service provision, among others.

Legislative framework

South Africa’s legal framework for the provision of environmental health services is rooted in the Constitution of the Republic of South Africa (108 of 1996), which guarantees the right of citizens to a safe and healthy environment. The Department of Health is primarily responsible for Environmental Health Services (EHS). In terms of the National Health Act (61 of 2003), EHPs are granted broad powers to investigate and address public health problems, as defined in the gazetted “Scope of Practice of EHPs.” While certain functions (port health, malaria control and control of hazardous substances) are designated as provincial level services, Section 5 of the National Health Act and the Municipal Structures Act (117 of
lists specific services that are to be provided at municipal level (referred to as “municipal health services” – MHS – originally referred to in the Constitution) in the context of the District Health System (DHS). These are:

- Adequate and safe water supply
- Basic sanitation
- Disposal of solid, toxic and hazardous waste
- Control of air and water pollution
- Chemical safety
- Food hygiene and safety
- Radiation
- Noise control
- Vector and vermin control
- Environmental public health disease control
- Human habitat
- Port health
- Occupational health
- Accident and disaster prevention and control

Municipal health services (MHS) authorisation came into effect on 1 July 2004; however, finalisation of these services to communities is far from complete. While relative success has been achieved in some provinces, in others the transfer of MHS to metropolitan and district municipalities is incomplete and a response from national and provincial structures is being called for. A more formal charge to municipalities to implement fully functioning MHS in their areas of jurisdiction is needed from the National Department of Health. While a policy for this exists, it has not been given force and implemented effectively. Some of the challenges facing municipalities with regard to implementation of EHS include lack of financial allocation, lack of by-laws in some municipalities to rely on since no national legislation and regulations exist, under-staffing, financial allocation, lack of by-laws in some municipalities to rely on, inadequate and safe water supply, and implemented effectively. Some of the challenges facing municipalities with regard to implementation of EHS include lack of financial allocation, lack of by-laws in some municipalities to rely on since no national legislation and regulations exist, under-staffing, lack of capacity and lack of training of EHPs.

In December 2013, the National Environmental Health Policy was gazetted by the South African Government to serve as a broad guideline and framework for the effective implementation of environmental health services in South Africa. While this is a positive step, it remains to be seen how this policy will be implemented and its strategies and policy objectives monitored and evaluated.

### Fragmentation of environmental health legislation

Confusion and inefficiency is caused by fragmentation of legislation guiding the work of EHPs. For example, the promulgation of certain sections of the new National Health Act was delayed, leading to aspects of the work of EHPs needing to be undertaken under the umbrella of the old Health Act (63 of 1977). In addition, EHPs have to be familiar with a plethora of acts, regulations and by-laws, promulgated across a range of sectors, for the implementation of their work. These include, for example:

- Hazardous Substances Act (15 of 1973)
- National Health Act (61 of 2003)
- Foodstuffs, Cosmetics and Disinfectants Act (54 of 1972)
- National Environmental Management: Air Quality Act (39 of 2004)
- Occupational Health and Safety Act (85 of 1993)

#### Inequity in environmental health service provision

During the apartheid era, environmental health services were inequitably provided, with urban areas characterised by white populations being the main beneficiaries. Environmental health services were especially scarce in the former “homelands”. There continues to be a serious shortage of EHPs in the country in relation to the WHO guidelines’ level of 1 EHP per 10 000 population, and even in respect of the lower South African target of 1 EHP for every 15 000 people. Recent figures by province were reported in the South African Local Government Association (SALGA) report on Municipal Health Services Status Quo. Table 2 provides a staffing analysis by province of the current EHP population and the figures for both ratios, 1:15 000 and 1:10 000, respectively. This analysis demonstrates that EHPs are woefully under-provided, even in areas of considerable need. Existing figures for the EHP:population ratio may also mask the appointment of individuals to EHP positions, followed by subsequent allocation of tasks unrelated to environmental health.

### Table 2: Staffing analysis by province of the current EHP population and the figures for both ratios, 1:15 000 and 1:10 000, respectively

<table>
<thead>
<tr>
<th>Province</th>
<th>Current EHP population</th>
<th>EHP per Pop based on 1:15 000 (SA target)</th>
<th>EHP per Pop based on 1:10 000 (WHO target)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC</td>
<td>252</td>
<td>444</td>
<td>666</td>
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<tr>
<td>FS</td>
<td>88</td>
<td>185</td>
<td>278</td>
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<tr>
<td>GP</td>
<td>453</td>
<td>746</td>
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</tr>
<tr>
<td>WC</td>
<td>324</td>
<td>389</td>
<td>568</td>
</tr>
</tbody>
</table>

Source: SALGA, 2013

Inequality in environmental health service delivery remains a concern, particularly in district municipalities, where these services were historically not provided and where funding and staff capacity were constrained or absent; such provision continues to be weak. Unequal service delivery is likely to prevail until challenges such as varying funding models across municipalities and districts are resolved.

#### Training

With advancing urbanisation, rapid industrialisation and climate change, it is imperative that the training of EHPs be reviewed and appropriately adapted on an ongoing basis. The health sector should lead the definition of the changing role of EHPs and associated staff. In this light, it is gratifying that the Professional Board for Environmental Health Practitioners recently approved the curriculum for a Bachelor of Science degree in Environmental Health,
scheduled for implementation in 2014. Action is also being taken to offer, on a more widespread basis, Masters of Public Health courses with an Environmental Health specialisation at multiple institutions across South Africa.

Discussion and conclusion

In the past two decades, a number of steps have been taken to improve environmental health in South Africa. For example, new legislation, such as the National Environmental Management and Air Quality Acts, have been promulgated and the country is a signatory to a wide range of international environmental agreements and protocols, including the United Nations Framework Convention on Climate Change, the Montreal Protocol (on ozone depletion), the Minamata Convention on Mercury, and the Basel Convention dealing with control of trans-boundary movements of hazardous waste. The government has also acted to control the use of asbestos in dwellings (although many older houses still have asbestos roofing installed), phased out leaded petrol, and regulated the use of lead in paint. Through promulgation of the Tobacco Products Control Act of 1993 and participation in the Framework Convention on Tobacco Control, South Africa became a global leader in prevention of exposure to environmental tobacco smoke. Hundreds of thousands of households have benefited from improved housing, water, sanitation, waste disposal and electricity.

Notwithstanding this progress, South Africa continues to face numerous formidable and complex environmental health challenges. These include problems emanating from improper mining, agricultural and industrial practices, and under- or inappropriately developed human settlements. With the advent of climate change and increased climate variability, there is increasing concern that existing environmental health challenges are likely to be intensified.

Tackling the large-scale and complex environmental health problems in South Africa will require the pooled expertise and experience of multiple disciplines and sectors, including non-government organisations, the media and public pressure groups.

EHPs have a key role to play with respect to addressing prevailing problems, as well as to ensuring that all future development and planning opportunities are fully exploited in the interests of promoting health and preventing disease. Paradoxically, at this time of unmatched need for scaled-up and prudent environmental health action, South African environmental health services appear to be stagnant or in decline. In part, this decline is attributable to unresolved issues arising from a protracted and incomplete transformation process, such as unfunded or inadequately funded environmental health mandates (particularly at district level), an inadequate EHP:population ratio, and a high degree of inequality in environmental health service provision across the country. Serious attention should be given to these and other issues to ensure that the field and profession of environmental health can live up to its potential to reduce and prevent ill health of environmental origin.

South Africa is among the most unequal societies in the world: the lack of employment opportunities, unhealthy quality of living environments, high levels of exposure to environmental hazards and compromised health status among the poor are vastly different from the conditions enjoyed by the wealthiest in the country. The role of social factors in health have recently been emphasised by the WHO Commission on the Social Determinants of Health. It therefore stands to reason that the approach to environmental health in settings of poverty and under-development ought to take account of local challenges and needs. The facilitation of healthy and sustainable development and innovative solutions to local challenges and health threats, and support for community efforts, should underpin environmental health strategies in such settings. In wealthier areas, on the other hand, a stronger focus on the enforcement of regulations may be more appropriate. While this approach should not condone environmental pollution by any socio-economic group within society, in an unequal society, environmental health strategies should be tailored to local environmental health profiles and community needs; a “one-size-fits-all” approach to environmental health may serve to exacerbate inequality.

History provides strong evidence for the powerful role that environmental health action and professionals can play in preventing disease and promoting health. Remarkable reductions in cholera, typhoid and other infectious diseases were achieved during the Nineteenth Century in England as a consequence of improved housing and environmental health services, associated with the forging of closer relationships among planners, engineers and the health sector. Health is at the heart of national economic prospects. Efforts to ensure cleaner and safer environments will yield reductions in the burden of disease. Through their vital role in this regard, EHPs contribute, inter alia, to the reduction of school and work absenteeism, and the improvement of societal intellectual capacity and learning ability (for example, through lead exposure reduction efforts), ultimately paving the way for people to participate more effectively and productively in the national or regional economy. Therefore, the field and profession of environmental health has much to offer in South Africa in terms of the prevention of disease and the promotion of good health, but its potential will be reached only if the prevailing obstacles are addressed.
References


