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RESPONSIVENESS

Managing Infectious
Disease Outbreaks in
South Africa

5.1 Introduction

The need to urgently recognise an infectious disease outbreak and coordinate surveillance and action responses is vital for the health of a country's population. These responses are only possible if there is a thorough understanding of the transmission dynamics and resurgence of the disease. Developing, scaling-up and strengthening all aspects of the outbreak surveillance response system include contact-tracking, public information, community mobilisation, case management, infection prevention and control, and effective co-ordination (Thambo *et al.*, 2014).

An assessment of existing measures and capacity to detect, identify, control and prevent the natural, accidental or deliberate spread of infectious agents in South Africa was performed by interviewing key role players in the field. The database of facilities that was prepared as an earlier part of this study provided a base from which to identify key informants who could be interviewed to provide insights into the management of infectious disease outbreaks in South Africa. These in-depth interviews, although limited in number, provided valuable insights that helped shape the recommendations of this study.

5.2 Aim and objectives

The aim was to enhance the prior survey data by collecting and describing the detailed perceptions of key informants regarding the detection, identification, management, recording and prevention of infectious disease outbreaks in South Africa.

Specific objectives were:

- 1) To determine the current perceived ability of South African systems to detect, identify, manage, record and prevent infectious disease outbreaks in South Africa.
- 2) To identify challenges and opportunities specific to the South African system to detect, identify, manage, record and prevent infectious disease outbreaks in South Africa.
- 3) To provide recommendations to improve South African systems to detect, identify, manage, record and prevent infectious disease outbreaks in South Africa where necessary.

5.3 Methods

The study was qualitative in design and comprised semi-structured interviews with key informants widely representative of national key stakeholders either active in the field or with in-depth knowledge of the current South African systems to detect, identify, manage, record and prevent infectious disease outbreaks in South Africa. Individual interviews allow for more detailed exploration of the issues identified in the prior surveys, and provide rich, comprehensive data (Mays and Pope, 1995), which was not achievable by the use of the prior survey-driven approach.

5.3.1 Recruitment of interviewees

The first survey conducted by the panel mapped the life science community in South Africa (See Chapter 4). This survey yielded a comprehensive database of life science laboratories in the country including data on the type, location and funding of laboratories. This database also identified key government departments involved in related life science research, diagnostic facilities and management of disease outbreaks.

Key laboratories involved in biorisk management were categorised according to province, city and level of biorisk responsibility. We planned to include directors or senior managers of at least one key laboratory in each province. In addition, key officials in the relevant government departments responsible for outbreak control who were identified in the survey, were included as possible key informants. The panel checked the list and added additional potential participants based on their personal knowledge and expertise.

5.3.2 Sample size

Purposeful selection of the interview participants ensured that the sample included those individuals who were most knowledgeable and/or who were in positions with the greatest responsibility for addressing infectious disease outbreaks. The sample size was determined by balancing country, facility and department-wide representation against time and resource constraints.²⁹ Each informant was also asked to recommend other potential informants using a snow-balling technique. We planned to continue to interview informants until a saturation point was reached with no new information forthcoming. The panel anticipated that the researcher would interview between ten and 20 individuals between February and May 2014 to reach this point.

5.3.3 Instrument: semi-structured interviews

Participants were invited to take part in a semi-structured interview that would last approximately 15-20 minutes. A participant information sheet was provided to all invited participants (Appendix 8).

All interviews were conducted telephonically. Every effort was made to accommodate the preferences of the interviewee in terms of location and timing of the meeting. The interview was structured around specific questions (See Appendix 9), but interviewees were given the opportunity to comment on other related topics if they so wished. The researcher made use of probing techniques to obtain more detailed data when necessary. The researcher took notes during the interview and the telephonic interviews

²⁹ It was often difficult to identify the correct person to interview in a particular department, and in some cases when the correct person was identified they were unavailable for interview.

were digitally recorded but not transcribed. The recordings were used as an *aide memoire* to the notes.

5.3.4 Ethics and informed consent

The study received ethical approval as a Protocol Amendment from the UCT Faculty of Health Sciences' HREC on 7 February 2014 (HREC REF Number: 294/2013).

Interviewees provided written informed consent prior to study participation. The consent form is available in Appendix 10. Participants were given time to ask questions about the project and to discuss any concerns prior to the interview. The researcher highlighted that the interview was voluntary and could be terminated at any point by the participant.

All data were thoroughly anonymised. Data were stored on a password-protected computer until loaded onto the ASSAf server in an access-restricted file and only made available to the panel chairperson, contracted researcher and ASSAf management. The data will not be deleted after the production of the final consensus report and will be securely stored for seven years at ASSAf.

5.3.5 Analysis: thematic content analysis

The recordings and notes from the interviews were reviewed for emerging themes and coded inductively. A code list was generated to identify the emergent codes and sub-codes associated with them in order to organise the data for analysis in terms of the major themes. Analysis identified key themes present in the responses, as well as highlighting important differences where these arose.

A theme was noted to be 'strong' if the issue was raised repeatedly by different participants. In those cases where a participant was a single representative of an area of expertise, consideration was given to highlighting the responses if this was specific to that area of expertise only; for example, if there was only one participant with particular knowledge and experience in plant health. In this way, the qualitative nature of the responses informed the analysis, rather than the quantitative record alone.

All data were entered into an MS Excel spreadsheet.

5.4 Results

The results are presented in themes and *verbatim* quotations are provided where these are illustrative of or provide additional insights into the identified themes.

5.4.1 Sample

In total, 26 individuals who were eligible to be interviewed, were identified. This list included individuals who were initially identified from the mapping of laboratories, those suggested by the panel, those who were suggested as additional participants during interviews and those who were suggested by individuals who declined to be interviewed. Of the 26, 11 agreed to be interviewed, two expressed interest but were not able to commit to a time for the interview, and one agreed but failed to respond when called at the appointed time.

Ten declined the invitation. Reasons for declining included requiring permission from or referral to a more senior manager (2), referral to a participant who had already been interviewed (1), not currently active in the field (3), not engaged specifically with infectious disease control (2), and the interview study period coinciding with a busy period for government departments (2). We were not able to make contact with a further three.

5.4.2 Dates and duration of interviews

Interviews took place between 24 February and 25 May 2014. Duration of interviews ranged from 29 to 82 minutes, with a median of 33 minutes and a mean of 39 minutes.

5.4.3 Demographic and employment profile of key informants

The demographic and employment profile of the 11 participants is outlined in Table 5.1.

5.4.4 Participants' contribution to regulations, policies and procedures

Six participants contributed to the development of either national or international regulations, policies and procedures for the detection, identification, response and/or recording of infectious disease outbreaks. Contributions included drafting legislation (4), updating legislation (4), commenting on drafts of regulation (3) and advising on health systems data collection nationally and/or internationally (3).

Table 5.1: Demographic and employment profile of participants. (n = 11)

Profile	Number
Gender	
Male	7
Female	4
Institution	
Government Department	5
Parastatal Institution	4
University	1
Private	1
Qualification/Background (as reported by participant)	
Medical	2
Veterinary	3
Science	3
Public Health	1
Virology	2
Primary work focus	
Government Policy	3
Research	3
Laboratory	5
National or provincial	
National	9
Provincial	
Eastern Cape	1
Mpumalanga	1
Primary agent target	
Human	3
Animal	3
Human and Animal	3
Plant	1
Human, Animal and Plant	1

Participants were not asked to list all relevant regulations but some chose to note their specific contributions to or involvement with the regulations and procedural bodies listed as follows:

- Notifiable Medical Conditions Act – draft regulations.
- South African Occupational Health and Safety Act (Act 85 of 1993) Regulations for Hazardous Biological Agents.
- The Controlled and Notifiable Animal Diseases Act (Act 35 of 1984).
- Guidelines for inspecting and grading meat (with reference to the Meat Safety Act 40 of 2000).
- Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947) as amended.
- Plant Improvement Act (Act 53 of 1976).
- Genetic Modified Organisms Act (Act 15 of 1997).
- Health Data Advisory Committee for monitoring the performance of the Minister of Health.

5.4.5 Summary of responses to interview questions and related discussions

5.4.5.1 Assessment of the implementation strategies to detect, identify, record, manage and prevent disease outbreaks at a national level

1. Strengths

Participants were asked to speak from their experience about what is currently done well with respect to implementation of strategies to detect, identify, record, manage and prevent disease outbreaks at a national level. Four major strengths were identified:

- 1) *South Africa is very experienced in responding to disease outbreaks* (especially those caused by dangerous pathogens). Within human health, several participants mentioned the Outbreak Control Team situated within the Directorate for Communicable Diseases at DoH as a body that functions well. When there have been ‘false alarms’ of outbreaks, South Africa also responded well and such occasions offered an opportunity for the systems to be tested.
- 2) *There are regulations in place.* With respect to animal health, one participant reported that in addition to acts of Parliament, the Abattoir Association has its own self-governing body. In the case of abattoirs, licensing is linked to compliance outlined in the Meat Safety Act, with government inspections taking place regularly. It is thus in the commercial interests of industry to comply with the regulations. A system for approval and/or accreditation of diagnostic laboratories is in place.

- 3) *There is relatively good communication between sectors.* One participant reported that the system of nation-wide notification for animal diseases is in place and is being done well. The system of notification internationally is also in place and as a result, it is acclaimed that South Africa is one of the countries in Africa that notifies the world and updates information as and when necessary. In terms of national/provincial collaboration a system is in place to make implementation of strategies efficient.
- 4) *There is a good system for data collection and availability in some sectors.* Informants noted that the NICD monitors laboratory data and provides online tracking of human outbreak response. Two participants noted that data collection is increasingly recognised as important to informing the response to human disease outbreaks, with the data for targeting outbreaks of malaria noted as being of high quality. The NICD maintains a 24/7 emergency hotline (082 883 9920) for disease outbreaks and related enquiries.

2. Weaknesses

Participants were asked to outline if they had experience of, or had observed, problems with the implementation of strategies to detect, identify, record, manage and prevent disease outbreaks at a national level.

The following weaknesses emerged:

- 1) *A lack of adequately trained and available human resources.* The lack of human resources was noted across all health target areas, with not only a lack of sufficient staff noted, but also of the necessary skills. The absence of sufficient highly-trained clinical staff for managing very large outbreaks in humans was of particular concern to one participant. Another raised the problem of ongoing high staff turnover within the relevant structures to address outbreaks, leading to continual changes to contact persons for notification of diseases.
- 2) *The absence of good surveillance data,* especially for the human and plant sectors were recognised across all health target areas. Despite the acknowledgement by some participants that data collection was increasingly recognised as important by officials, most participants reported that the current state of surveillance is inadequate. One participant highlighted that there is a general perception that routine inspections within plant health are sufficient to adequately identify risks.
- 3) *The lack of funding for outbreak control and prevention,* with a lack of investment in supportive infrastructure noted.
- 4) *The indiscriminate transport of animals* with no proper control of animal movement across the country and between South Africa and other countries. In the past this was more effectively managed by the Department of Transport when there was better communication between sectors responsible for animal health. Contradictory to this was the experience that legitimate requests for permits to transport animal

- research specimens or conduct research itself were viewed with increasing suspicion by those responsible for issuing permits, with permits often being refused.
- 5) *The lack of regular monitoring and inspection of facilities* to ensure that laboratories adhere to the minimum requirements for biosafety. A participant noted that despite the regulatory environment governing laboratories, regular monitoring and inspection do not take place.
 - 6) *There is confusion surrounding the lists of infectious agents* included in the regulations governing laboratories due to changing taxonomies and the lists not being applicable to the local, South African epidemiological risk profile of the included organisms. One participant noted a complicated set of historical and political processes hindering progress in this area.
 - 7) *The role of the media* was highlighted as a significant obstacle to managing outbreaks by a participant. So-called ‘fear-mongering’ among the general public by the media had led to clinical staff also becoming fearful and unwilling to engage with the field of outbreak control.

5.4.5.2 Recommendations to improve the implementation of national strategies to manage disease outbreaks

Participants were asked what they thought could be done to improve the implementation of national strategies to manage disease outbreaks.

The following recommendations were made:

- 1) *Human resource capacity needs to be strengthened nationally, provincially and at a district level across all sectors and across all health targets.* Gaps were noted at a national level where key co-ordinating roles are currently not filled or where posts have been decentralised to a provincial level. At a provincial level, many state veterinary posts are vacant and in the Eastern Cape, more personnel are required, especially with respect to policing, in order to ensure that there is no illegal transportation of animals. Nurses require more training to manage outbreaks, as well as to increase awareness of how to find relevant information on contacts and infection control when necessary. One participant suggested that practical steps at a clinic level had been forgotten and that posters of the notification process and lists of relevant staff to contact together with their details should be prominently displayed in health-care facilities.
- 2) *Shortcomings in the current legislation need to be addressed.* Participants suggested that shortcomings in regulations could be addressed by ensuring that lists of infectious agents were current, classified with the correct taxonomy, relevant to local conditions, based on South African epidemiological risk profiles, and updated regularly. Regulations governing laboratory registration should include monitoring of the registered laboratories. A participant reported that current laboratory regulations focus on the safety of the laboratory worker rather than the

necessary bio-containment precautions. The legislation could be improved to also focus on bio-containment and would need to include clearer definitions for the biosafety levels of laboratories. With respect to legislation covering the transport of infectious agents in animal health research, a recommendation was made to audit facilities regularly to determine whether SOPs were in place and regular inspections were conducted.

- 3) *Linkages between laboratories and the current notification systems need to be strengthened.* Participants advocated that the linkages between the laboratories and the current disease notification systems be formalised and that active disease surveillance be implemented actively rather than only as a passive system. This was noted for both human and plant health. There was a perception among those working in human health and plant health that the system of disease surveillance, control and notification was simpler and more effective within animal health.
- 4) *Communication structures between government and research institutions should be formalised.* According to a participant, formalising current virtual networks, which are personality-driven, would lead to more sustainable communication.
- 5) *Awareness campaigns should be launched to increase public knowledge of disease outbreaks.*

Strengthening human resource capacity at all levels, addressing shortcomings in current legislation, increasing the linkages between the relevant laboratories and the current disease notification systems and formalising communication structures between government and research institutions will improve the implementation of national strategies to manage disease outbreaks.

5.4.5.3 Cross-sectoral co-operation with respect to implementation of policies and strategies

Participants were asked to comment, from their experience, on cross-sectoral co-operation with respect to the implementation of policies and strategies. Two strong contradictory themes emerged:

- 1) *Good co-operation.* Several participants reported good communication between sectors, especially with respect to laboratories.
- 2) *Poor co-operation.* Some participants reported that cross-sectoral co-operation was historically poor and required departments to engage with each other on a one-on-one basis. Cross-sectoral co-operation with respect to transport of animals was reported consistently to be problematic.

5.4.5.4 National and provincial co-ordination in detecting, identifying, responding, recording and preventing infectious disease outbreaks

Participants were asked to comment, from their experience, on national and provincial co-ordination in detecting, identifying, responding, recording and preventing infectious disease outbreaks. Experience of national co-ordination was varied, with strong favourable and critical themes emerging.

- 1) *Relationships between sectors are good and clear structures and guidelines exist for managing disease outbreaks.* This was particularly the case for managing acute outbreaks.
- 2) *National co-ordination in terms of planning and prevention is poor.* Participants suggested that although acute management of disease outbreaks indicated good national co-ordination across health target areas, this was not the case for planning and prevention. Participants reported uncertainty that the necessary mitigations were in place at a provincial level to manage outbreaks and that co-ordination was particularly poor for animal health, with devolution to control at a provincial level post-1994, raised as the reason for this.
- 3) *Notification of human diseases is poorly co-ordinated between national departments and provinces.* An example of the Soccer World Cup 2010 surveillance system which depended on multiple cross-sector co-operation and national co-ordination was provided. The system required local authorities to report directly to a national web-based platform. The system was reportedly not felt to be useful to local authorities, despite being considered groundbreaking nationally.

5.4.5.5 Information-sharing regarding the implementation of policies and strategies

Participants were asked whether there are opportunities for information-sharing between sectors and if not, what the obstacles to such information-sharing are. All informants believed that opportunities for information-sharing between sectors exist. Three strong themes emerged to allow for more information-sharing:

- 1) *More representation from each sector was required in decision-making structures.* With respect to increasing representation of all sectors in decision-making platforms, participants noted that there needs to be a common goal between sectors for this to be achieved. The establishment of a new forum would require clear goals and structures to ensure that there was no duplication, given the scarcity of resources. One participant warned that more layers of bureaucracy would not necessarily be optimal.
- 2) *Platforms were required to share 'real-time' data.* Participants noted that some sharing of data already occurs and cited the NICD monthly communiques (<http://www.nicd.ac.za/?page=communique&id=56>), the Medical Research Council

(MRC) GIS platform for mapping malaria, and the DAFF research and knowledge-sharing platform. Participants noted that online resources were not accessible everywhere. The issue of lack of dissemination of research conducted in university settings and the delay to publication of research findings was noted as a significant reason to establish a platform in human health for 'real-time' data-sharing. A further obstacle that was noted is the need for data, not only to be collected but also to be interpreted meaningfully before it can be shared. A lack of skilled human capacity hampered this from taking place.

- 3) *For some diseases, co-ordination should be done nationally.* Several participants reported that information-sharing would be optimised between sectors if it was co-ordinated at a national level. Specific diseases required a national response. Participants mentioned that this was true for malaria and some plant diseases, given the inability to contain these within specific demarcated geographic areas or provinces. One participant stated that cross-sectoral government fora are in place for human health, but that there was room for improvement, with competing work priorities sometimes leading to the cancellation of these meetings. There is also an overall lack of co-ordination between sectors, with no specific government department specifically tasked with co-ordination. Another strong theme was the recognition that detecting, identifying, managing and preventing infectious disease outbreaks required the participation of multiple groups spread widely across the country. The reach and scale of the task is large.

5.4.5.6 Recommendations to improve the management of disease outbreaks

Participants were asked what they would recommend for improving the management of disease outbreaks nationally. Three strong themes emerged across all health targets:

- 1) *Secure funding for the improvement and maintenance of infrastructure, human resources and technology.* Specific areas requiring secure funding were: 1) the maintenance of established laboratory capacity, with South Africa hosting the only BSL 4 laboratory in Africa; 2) improving the output and quality of research in this area; 3) filling vacant positions within the State Veterinary Services, with possible consideration given to compulsory community service for graduate veterinarians. A participant suggested that international security systems and mechanisms could be utilised to obtain funding for research and infrastructural development, but acknowledged that military funding was often not palatable in the health-care sphere. Additional suggestions included training more workers to be knowledgeable about outbreak control as is currently underway by the DoH within the provinces.
- 2) *Establish a better regional response to outbreak control and prevention.* The issue of outbreak control in the region generated strong responses. Several

participants noted throughout the interview that historically, South Africa had played a significant role in managing regional outbreaks. Within Africa, local capacity had increased in recent years possibly reducing the need for South Africa to steward the region. The example of the US CDC establishing a purpose-built laboratory in Uganda for human health was mentioned. Across health target areas, participants stressed that infectious disease outbreaks in neighbouring countries impacted the biosafety of South Africans and that organisms were not easily contained within geographic borders.

With respect to human health, a participant asked whether a list of criteria for allowing sick individuals to travel into South Africa specifically for receipt of intensive care existed. A further question included whether South Africa is ethically obliged to provide care to persons travelling from outside its borders and suspected of suffering from a dangerous infectious disease. The case of imported Ebola virus which was transmitted to South African nursing staff in 1996 was noted, with the reflection that South Africans have paid the price of poor disease control in neighbouring countries. In terms of providing support to neighbouring countries, one participant noted that it was unclear what this would mean specifically in terms of notification, surveillance and resources.

With respect to animal health, the example of a 2011 outbreak of foot-and-mouth disease was mentioned; South Africa was viewed as being able to help neighbouring countries which would in turn avoid the disease spreading to South Africa. Trans-frontier national parks which span across borders were flagged as a potential risk to biosafety. Although the official borders are controlled between South Africa and neighbouring countries, the transition areas within the park(s) could facilitate the illegal transportation of domestic and wild animals. This is of particular concern if neighbouring countries have limited capacity for disease prevention mechanisms.

To improve the management of disease outbreak in South Africa, the following is recommended:

- **funding for the improvement and maintenance of infrastructure, human resources and technology,**
- **the establishment of a better regional response to outbreak control and prevention, and**
- **the improvement of systems for collecting data and managing data integrity.**

- 3) *Improve systems for collecting data and managing data integrity.* Participants commented that in order to protect the health of humans, animals and plants, reporting, surveillance and notification systems needed major improvement. Better linkages were required between laboratories, health practitioners and government departments. The statistical systems for analysing and presenting the data needed to be operational. The lack of compliance with notification of human disease was seen as a huge obstacle to the efficient operation of the current notification system and suggestions for utilising accessible technology such as cell phones and simplification of the notification process were recommended to improve the system. The data collection form employed by the Malaria Control Programme was simple and observational research suggested it was preferentially completed by health-care staff instead of the Notification GW 17/5 form. A participant suggested harmonising the different surveillance systems with the notification system so it could be all part of one integrated system.

5.4.5.7 Other issues arising

Participants were asked to raise any other issues which they believed to be pertinent to the subject and the responses were diverse.

- 1) A concern was expressed that several terms are used broadly within this field (examples were 'biosafety' and 'biosecurity'), but that different individuals and departments understood the terms differently. Laboratory workers understand 'biosafety' to refer to protecting their health and preventing exposure in the laboratory setting, whereas the Cartagena Protocol on Biosafety (under the United Nations Environment Programme) defines biosafety as the protection of biological diversity from the potential risks posed by living modified organisms (LMOs) resulting from modern biotechnology (the focus is on GMOs). It is important to gain clarity within government and agreement on terms.
- 2) Two participants stated that there needs to be an increased focus on prevention and not only responsive management of outbreak control.
- 3) There was a request that the death notification system be evaluated. Currently at an operational level there was confusion about whether a pathologist or magistrate should complete the cause of death form. This has implications for reporting of Notifiable Medical Conditions and recording of such data within the national mortality statistics.
- 4) Several participants noted that all players in the field wanted the same outcome viz. to prevent infectious disease outbreaks. There was a request that future processes be developed and adopted in a respectful, conciliatory manner with broad consultation and recognition that health-care professionals, laboratory workers, farmers, industry, researchers, and government officials were all working towards the same goal. Mention was made that there is an undercurrent of suspicion in this area and that it needs to be addressed before meaningful progress can be made.

5.5 Discussion

5.5.1 Main findings

Each of the participants willingly and openly shared their knowledge, expertise and opinions based on their own experiences of working in the area of infectious disease outbreaks. Participants were highly qualified and worked in diverse settings, with each target health area (human, animal and plant) represented. Most participants worked in the human and animal area with only two having specific experience of the plant health field. Almost all participants had contributed to developing or revising relevant regulations and were active in the policy arena.

5.5.2 Strengths and weaknesses of implementation strategies

Despite the diversity of participant knowledge and experience, participants voiced similar concerns regarding the strengths and weaknesses of implementing national strategies to manage disease outbreaks.

Most participants recognised that South Africa continues to demonstrate an effective response to the control of disease outbreaks attributing this to institutional experience and expertise, the regulatory environment and good inter-sectoral communication during acute episodes. However, all participants noted that prevention, active and passive surveillance, effective data collection, statistical analysis and notification (specifically for human health) and regular planning within and between sectors are lacking. A shortage of skilled staff, vacant positions and limited funding for infrastructural support were key to the inability of South Africa to move from a reactive position to one of greater pro-activity.

5.5.3 Human resources

Frieden *et al.* (2014) note that a well-trained workforce greatly augments effective epidemic responses and recommend a multidisciplinary public health workforce, with one or more epidemiologists per 200 000 population. There are no current figures on the numbers of epidemiologists in South Africa, but given the overall shortage of health-care workers it is highly unlikely to be as high as the recommendation. In the 2006 *Lancet Series on Health in South Africa*, the authors challenged the DoH to work actively with regulatory authorities and training institutions to increase the numbers of health-care workers and to increase their professional abilities for implementation of an expanded range of services (Chopra *et al.*, 2009). This would also need to include trained staff available to deliver not only an outbreak response, but also to engage with planning and prevention.

5.5.4 Notifiable Medical Conditions

Within human health, poor compliance with the statutory obligation to notify Notifiable Medical Conditions was widely recognised. Reasons postulated included health professionals' lack of awareness regarding notification, the complexity of the GW 17/5 notification form and the rapid turnover of staff involved in managing outbreaks at a provincial level. These opinions are supported by Smith *et al.* (2007) who report that while outbreaks of food-borne disease (notifiable when a food poisoning incident affects ≥ 2 people) are common in South Africa, food-borne disease is markedly underreported (Smith *et al.*, 2007). In 2011, Dunbar reported using capture-recapture methodology to evaluate notification of TB in two communities in the Western Cape province, demonstrating the limited accuracy and completeness of routinely collected TB-recording and reporting data (Dunbar *et al.*, 2011). Nkgudi *et al.* (2006) published a detailed analysis of incidence and reporting of rheumatic fever (also a notifiable disease) and found that there appeared to be underreporting of cases by health-care professionals, and poor administration of the notification system. They recommended that health-care professionals need to be educated about the statutory requirements to notify and advocate for better co-ordination efforts to establish a seamless system for the accurate reporting of notifiable conditions.

5.5.5 Control of animal diseases

It was noteworthy that several participants, who did not work in animal health, viewed the ability of the DAFF to control animal diseases and to provide data on such controlled diseases as superior to the human and plant health field. This was not directly contradicted by those working within animal health, but they pointed to a lack of state veterinarians at provincial level hampering implementation of national policy. In addition, transport of animals was poorly managed because it relied on inter-sectoral co-operation among DAFF, the Department of Transport and the South African Police Services (SAPS), which was noted by participants to be very poor. Better co-ordination between sectors was raised by most participants as key to fulfilling regulatory obligations and policy imperatives. This would also meet international imperatives for global health security. In their list of key global health security areas, Frieden *et al.* (2014) include policies and practices to reduce the risk of zoonotic disease transmission as necessary to mitigate avoidable outbreaks.

5.5.6 Regulations

Participants observed significant shortcomings in current regulations with little cross-referencing between regulations and some contradictory elements between different regulations. Definitions were noted to be unclear especially with respect to levels of bio-containment in the *Regulations relating to the registration of microbiological laboratories and the acquisition, importation, handling, maintenance and supply of Human Pathogens (R178)* (March 2012). Participants pointed out that lists of infectious

agents included in specific regulations were imported from other international lists, most notably the lists of the Australian Group, and may not have local relevance. Those working in the laboratory field recommended that lists of agents be based on the South African epidemiological-risk profile of each agent. Concerns were expressed that most regulations were out-of-date, with agent names not adhering to current taxonomic classifications. Provision for regular revisions needs to be made within the current regulatory processes to avoid confusion and aid detection and identification.

5.5.7 Surveillance and data systems

In their list of key global health security areas for prevention and detection of infectious disease outbreaks, Frieden *et al.* (2014) include a requirement for regional and national interoperable electronic reporting systems with timely reporting to WHO, the World Organisation for Animal Health, and the Food and Agricultural Organisation (FAO) of the UN. Given the comments made by the informants, South Africa is currently not meeting this key requirement, with non-existent linkages between reporting systems and laboratories and questionable data quality. There was uncertainty about whether South Africa is currently providing regular, high-quality reports to the international agencies. Several participants suggested an integrated system of active surveillance (looking for disease in the community) and passive surveillance (reporting on disease presenting to health-care facilities). These systems should be linked to laboratory data, should be updated regularly and be accessible publicly.

5.5.8 Regional responsibility

There was consensus among the participants that South Africa must engage with neighbouring countries to prevent, detect, identify, control and record infectious disease outbreaks. The nature of this engagement was unclear. Participants recognised that ensuring that systems in neighbouring countries were optimal was self-serving in that it ultimately protects the public health of South Africans. There were few suggestions as to what specifically could be done to achieve this and whether or not South Africa should expend scarce resources on strengthening systems elsewhere. Nonetheless, there was a desire to see regional co-operation as a priority area for managing outbreaks.

5.5.9 Strengths and limitations of the study

The study is subject to limitations inherent in qualitative research (Britten, 1995). The participants were purposively sampled and so cannot be considered representative of all stakeholders. Nonetheless, given their cumulative knowledge and expertise (the reason for their inclusion) their voices and opinions provide comprehensive insights into the responses elicited by the prior survey and contribute to our understanding of the area under study. Perhaps most limiting were the voices missing from this study, notably those from several government departments who were not able to commit to

an interview due to time pressures. We were also not able to include representatives from at least one laboratory in each province. The limited time available in which to conduct the study significantly hampered our ability to include all those participants who could have provided additional meaning to the responses outlined here. Despite the short duration of the study, every effort was made to accommodate the preferences of participants and the researcher made herself available after hours when necessary. The cited time pressure of many government officials supports the commentaries that there is little time for strategic planning and preparation within government, again confirming a need for greater human resource deployment or evaluation of priority setting.

The study has highlighted the complexity of the systems required to manage infectious disease outbreaks in South Africa. Many sectors and levels of workers are required to navigate these complex systems to secure the health of the South African public, its animals and its plants. This study has identified significant strengths of the system which provide a strong foundation for future improvements. The voices of the participants provide clear advocacy for meaningful engagement between sectors with the shared aim of reducing the incidence of infectious disease outbreaks in the future.

5.6 Summary and conclusions

This chapter reported on a qualitative key-informant interview study to garner expert opinion related to managing disease outbreaks. Valuable insights were gained into current perceptions within the scientific community regarding biosafety and biosecurity practices.

It was revealed that many of these challenges are extremely complicated in nature and may require changes to existing legislation. However, improved inter-departmental communication and cooperation, together with adequate funding for legally-mandated responsibilities would improve biosafety and biosecurity in South Africa and enable the country to meet its agreed international obligations.

Improved inter-departmental communication and cooperation together with adequate funding for legally-mandated responsibilities would improve biosafety and biosecurity management in South Africa.