VECTOR CONTROL MANAGEMENT MANUAL

FOR

ENVIRONMENTAL HEALTH PRACTITIONERS IN SOUTH AFRICA

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NATIONAL DEPARTMENT OF HEALTH SOUTH AFRICA

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This Manual for Environmental Health Practitioners in South Africa was developed by National Department of Health.

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Responsible National Department of Health Unit

The cluster responsible for co-ordination of the Manual for Environmental Health Practitioners in South Africa is Environmental Health and Port Health Services.

Dissemination Plan

The manual will be circulated to provinces and municipalities after the approval by the Chief Director through e-mails and hard copies. Communication and Knowledge Hub will assist with loading the manual into the departmental website where the clients/members of the public and officials can be able to access the document. Provinces and municipalities will be capacitated on the document for implementation.

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GLOSSARY

Arboviral diseases: viruses that are transmitted via the bite of an infected insect - usually mosquitoes and ticks.

Disease control: the reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts and continued intervention measures are required to maintain the reduction.

Integrated Pest Management (IPM): an effective and environmentally sensitive approach to pest management that relies on a combination of practices where pesticides are used as the last resort to control pests.

Malaria: is an acute febrile illness caused by Plasmodium parasites, which are spread to people through the bites of infected female Anopheles mosquitoes.

Neglected Tropical Disease: a group of diseases that occur under tropical and sub-tropical climate conditions and are intimately linked to poverty.

Pest: an organism which has characteristics that are or can be injurious or unwanted.

Pest control: refers to the regulation or management of a species defined as a pest, usually because it is perceived to be detrimental to a person's health, the ecology or the economy.

Pest Control Programme: means a written programme that outlines activities to be conducted for the control of pest control in the premises.

Pesticides: chemical compounds that are used to kill pests, including insects, rodents, fungi and unwanted plants (weeds).

Vector: organism that does not cause disease itself, but which transmits infection by conveying pathogens from host to another.

Vector-borne disease: infections transmitted by the bite of infected arthropod species which include mosquitoes, ticks and fleas.

Vector control: a limitation of the transmission of pathogens by reducing or eliminating human contact with the vector.

Zoonosis: is an infectious disease that has jumped from a non-human animal to humans.

ABBREVIATIONS

CHIKV	Chikungunya Virus
EH	Environmental Health
EHP	Environmental Health Practitioners
GVCR	Global Vector Control Response
GHS	Global Harmonised System
IPM	Integrated Pest Management
IRS	Indoor Residual Spraying
NICD	National Institute for Communicable Diseases
NTD	Neglected Tropical Diseases
PPE	Personal Protective Equipment
SANS	South African National Standards
SAWS	South African Weather Services
WHO	World Health Organization

1. INTRODUCTION

One of the functions of Environmental Health Practitioners (EHPs) in accordance with the Scope of Professions for Environmental Health is vector control.

This is as a result of the uniqueness of each of the spheres, the vector that need to be controlled, the available resources to implement, prioritisation of functions, etc. This manual will assist with ensuring that throughout the country, all vector control related challenges are addressed accordingly, and best practices to manage the programme are followed or applied.

Environmental Health Practitioners (EHPs) are very important as the first line of defence to ensure sufficient monitoring in vector control management and pest control to address public health pests and vectors that spread pathogens as well as those that cause a nuisance, in response to assist the public at large.

In disease control, the containment of a vector-borne disease can be achieved by various means, in the following order of priority:

1. diagnosis and treatment
2. vector control
3. environmental hygiene
4. personal protection (topical repellents, insecticide-treated clothing and indoor spatial/airborne repellents)

In the case of nuisance control, targeted applications of pesticides are required. The measures to be taken should aim at medium and longer-term environmental improvement, in the following order of priority:

1. identification of the causative agent
2. environmental hygiene
3. personal protection

The inspection of premises on a routine basis is of importance as it assists in the identification of all challenges that are related to vectors, for example, pest infestation, structural defects, unhygienic conditions, to mention a few. Vector related risks need to be communicated to the communities once there are red flags raised.

1.1 Purpose

This manual seeks to give more guidance on implementation of legislative prescripts that address vector control. The manual is developed to assist with capacity building of Environmental Health Practitioners.

This manual will address vector control including malaria control. Vector control is also an essential component of malaria prevention, control, and elimination strategies since it can be highly effective in providing personal protection and/or reducing disease transmission. The manual takes cognisance of the fact that vector control is not implemented in a uniform way throughout the spheres of government. This manual will assist in ensuring that EHPs address emerging and re-emerging vector borne diseases in South Africa, which is also a global concern. Besides the World Health Organization (WHO) guidelines mentioned above, South Africa has some guiding documents that one can refer to regarding vector control.

2. LITERATURE AND GUIDING DOCUMENTS ON VECTOR CONTROL

The following international and national literature can be accessed to guide EHPs in vector control monitoring including schistosomiasis and malaria control:

WHO Guidelines for malaria vector control

1. WHO recommended classification of Pesticides by hazard and guidelines to classification, 2019
2. WHO Keeping the Vector Out 2017
3. WHO guideline on control and elimination of human schistosomiasis 2022
4. WHO Global Vector Control Response 2017-2030
5. WHO Global technical strategy for Malaria 2016-2030
6. Malaria Elimination Strategic Plan for South Africa 2019-2023
7. *SANS 10133:1997 will further guide on the application of pesticides in food environments
8. WHO Guidance on policymaking for integrated vector management

The department developed a draft National Vector Control Strategy which will be shared once it is approved.

3. LEGISLATIVE FRAMEWORK

The legislative and framework covers the mandates, responsibilities, and intentions concerning Environmental Health Practitioner in all spheres of government responsible for rendering environmental health services, at national, provincial and local government, including those in hospital settings and ports of entry.

3.1 The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)

Chapter 2 – Bill of Rights

24. Environment. –Everyone has the right-

(a) to an environment that is not harmful to their health or well-being; and

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-

(i) prevent pollution and ecological degradation

(ii) promote conservation; and

(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

3.2 The National Health Act, 2003 (Act 61 of 2003)

Chapter 3 – National Health

General Functions of the National Department

21. (2) The Director-General must, in accordance with national health policy-

(b) issue, and promote adherence to, norms and standards on health matters, including-

(ii) environmental conditions that constitute a health hazard

(k) facilitate and promote the provision of health services for the management, prevention and control of communicable and non-communicable diseases.

Chapter 10 – Health Officers and Compliance Procedures

Establishment of Inspectorate for Health Establishments

Environmental health investigations

83. (1) If a health officer has reasonable grounds to believe that any condition exists which-

(a) constitutes a violation of the right contained in section 24(a) of the Constitution;
(b) constitutes pollution detrimental to health;
(c) is likely to cause a health nuisance; or
(d) constitutes a health nuisance, the health officer must investigate such condition.

(2) If the investigation reveals that a condition contemplated in subsection (1) exists, the health officer must endeavour to determine the identity of the person responsible for such condition.

(3) The health officer must issue a compliance notice to the person determined to be responsible for any condition contemplated in subsection (1) to take appropriate corrective action in order to minimise, remove or rectify such condition.

(4) Any person aggrieved by a determination or instruction in terms of subsection (2) or (3) may, within a period of 14 days from the date on which he or she became aware of the determination or instruction, lodge an appeal with the head of the relevant provincial department.

3.3 Health Professions Act, 1974 (Act 56 of 1974), Regulations 698 defining the scope of the profession of environmental health, as amended, scope of practice of environmental health practitioners

(6) Vector control monitoring

(a) Identification of vectors, their habits and breeding places.
(b) Vector control of public health interest including the control of arthropods, molluscs, rodents and other alternative hosts of diseases.
(c) Removal or remedying of conditions resulting or favouring the prevalence or increase of rodents, insects, diseases carriers or pests.
(d) Residual spraying of premises and surrounds.
(e) Investigate zoonotic diseases and other vector borne diseases in the working and living environment.
(f) Surveillance of imported cargo and livestock for the prevalence of disease vectors.
(g) Serological tests of rodents, dogs and other pests.

(7) Environmental pollution control

(a) Ensuring hygienic working, living and recreational environments.
(b) Identifying the polluting agents and sources of water, air and soil pollution.

(12) Port health

(e) Continuous Rodent and Vector Control Programme at the airports/harbours.
(f) Monitoring the import of used pneumatic tyres entering the country for mosquitoes. The *Aedes albopictus* which is the vector for yellow, Dengue fever including Encephalitis.
(g) Providing a continuous vaccination programme for sea fares at all ports.

(13) Malaria control

(a) Ensure, develop and implement a Malaria Control Programme for the country. Thus lowering parasite levels in the population and prevent deaths through rapid diagnosis and prompt treatment.
(b) Ensures a continued active surveillance programme.
(c) Carryout house to house surveys.
(d) Ensure that blood smears from local and foreign mosquito populations.
(e) Random blood samples from the population during seasonal changes.
(f) Epidemiological surveys to look at the extent of transmission, gather data and population of infected people.
(g) Vector Control on an annual basis by application of residual insecticides on interior of walls, roofs, eaves of dwellings in malaria affected areas.
(h) Continuous health education/awareness programme i.e., distribution of pamphlets/campaign etc.

3.4 National environmental health norms and standards for premises and acceptable monitoring standards for environmental health practitioners

3.4.1 Scope of application

These Norms and Standards apply to District and Metropolitan Municipalities, Provinces, District Health, National and all other government entities rendering Environmental Health Services, to the extent indicated in these Regulations.

3.4.2 Monitoring Standards for Vector Control

1. Inspection of rodent proofing on premises is guided by requirements as outlined in the SANS Code 080: 1972 – Code of practice for the rodent proofing of premises.

2. Inspection checklists are designed and utilised for every vector control related inspection and/or EH investigation, highlighting analysis of risk areas and focus such as waste management.

3. Inspection records are kept and maintained.

4. Inspections include checking of pest control programmes and documents kept on the premises to determine:

    1. Records of chemical applications and quantities
    2. Records of name of chemicals utilised active ingredient and its poison category
    3. Qualifications and skills of pest controllers- people applying chemicals
    4. Records of any other vector/rodent control methods utilised other than chemicals

3.4.3 Monitoring Standards for Hazardous Substances Control

1. A monitoring system is in place to manage and ensure that all pesticide and chemical poisonings are investigated by an EHP and reported on the pesticide/chemical incident report form.
2. Records of all poisoning cases investigated are kept for reference purposes.

3.4.4 Monitoring Standards for Malaria Control

1. The province is implementing a malaria control programme for lowering parasite levels in the population and preventing deaths through rapid diagnosis and prompt treatment.
2. A malaria surveillance programme is in place.
3. House-to-house surveys are conducted to actively detect malaria cases.
4. A programme is in place to conduct blood smears from foreigners and people who have visited malaria-endemic countries for malaria parasitaemia screening.
5. Randomised screening of the population by conducting blood sampling for testing during seasonal changes in high-risk malaria areas.
6. Epidemiological surveys are conducted to research the extent of transmission and gather data on the infected population.
7. A vector control programme is in place for application of residual insecticides on inner wall surfaces, roofs and eaves of dwellings in malaria areas.
8. Malaria health education and awareness programmes are conducted.
9. There are collaborative mechanisms in place with South African Weather Services (SAWS) on Early Warning Systems for planning purposes and possible movement of malaria vectors.

4. THE ROLE OF AN ENVIRONMENTAL HEALTH PRACTITIONER IN VECTOR CONTROL

National Environmental Health Norms and Standards for Premises and Acceptable Monitoring Standards for Environmental Health Practitioners together with the Health Professions Act, 1974 (Act 56 of 1974) Regulations Defining the Scope of the Profession of Environmental Health and the Scope of Environmental Health Practitioners outlines the role of an Environmental Health Practitioner in vector control. Below are key areas of focus on vector control:

4.1 Planning and management

Taking into consideration all challenges Environmental Health services could be facing, effective and sustainable vector control is achievable with prioritisation of human resources in the vector control programme, an enabling infrastructure, and a functional health system.

A vector control needs assessment will help to appraise current capacity, define the requisite capacity to conduct proposed activities identified from the assessment, identify opportunities for improved vector control delivery efficiency, and guide resource mobilisation to implement the legislative framework that is in place.

4.2 Stakeholder engagement

It is important for Environmental Health to be part of the stakeholders in the different forums that address vector control within their respective areas of jurisdiction. The collaboration will assist in attending to the vector-borne disease or other vector related challenges effectively. Identification of such stakeholders and their role in addressing the challenge is key. Below are some of the stakeholders in the vector control and their responsibilities:

1. Department of Agriculture, Land Reform and Rural Development responsible for registration of all pesticides in the country.
2. Department of Forestry, Fisheries and the Environment and provinces and municipalities (Environmental Management)– give guidance on management of vectors – removal of unwanted vector such as snakes and take to their natural habitat.
3. Department of Transport Vehicle responsible for registration of vehicles transporting dangerous goods through road.
4. Communicable Disease Control together with National Institute of Communicable Diseases (NICD) – Responsible in Notifiable Medical Conditions.
5. Health Promoters, Community Development workers, Ward Based Outreach Teams (WBOT) - public awareness on vector control and chemical safety.
6. Entomologists – Detection of vectors.
7. Pest Controller – responsible for applying pesticides.

4.3 Environmental Health Practitioners as Stakeholders

Stakeholders differ in terms of the vector at hand and area. The other stakeholder which is key is communities and the role of Environmental Health Practitioners is to educate and capacitate the communities about their role / responsibility, such as, lodging of complaints related to vectors e.g., infestation, favourable breeding sites and control.

4.4 Environmental Health vector control inspections and investigations

Risk assessment is one of the components that is key in vector control. This is conducted in order to assess the area together with activities that can potentially support vector breeding. It is important to note that rapid unplanned urbanisation, changing land use patterns and increased international travel and trade bring humans into more frequent contact with vectors, while climate and other environmental changes, fuel their spread worldwide. Before one can strive to investigate, it is advisable to conduct research on the type of vector one is dealing with, including its characteristics, etc.

It is imperative for an EHP during inspection to monitor the vector control programme within the premises. This is in line with the Environmental Health norms and standards. Hygiene is very key in prevention and control of vectors and vector-borne diseases.

Investigations play a major role in any disease prevention and management programme. There are different tools that can be utilised during an investigation of a vector-borne disease and its vector. For some vector-borne diseases, there are Case Investigation Forms which are attached as Annexures A developed to assist with investigation. These are mostly vector-borne diseases which fall under categories of Notifiable Medical Conditions (NMC) (Annexure B) which guides on timelines for reporting by a private or public laboratory. For the purpose of notification, a Notifiable Medical Condition form / APP (Annexure C) is utilised.

4.5 Outbreak response teams

EHP's are a very important role player in the Outbreak Response Team (ORT). The same with vector-borne disease control, there is a need to activate ORT. This depends on the type of vector, number of confirmed cases and classification as per Notifiable Medical Condition. There are various forums such as District Outbreak Response, Provincial Outbreak Response Team etc. available comprised of different stakeholders in addressing issues of vector-borne diseases. An example is meetings that discuss Malaria, Plaque, etc. The Outbreak Response Teams meet on as per need however in other spheres there are monthly meetings held to discuss different types of diseases / outbreaks and response measures undertaken. Within the Outbreak Response Teams, there are terms of reference which give guidance in terms of role clarification of each member that sits in the meetings.

4.6 Education and awareness

With each EH function, there is a need for education and awareness. This assists in changing social and cultural norms and prevents further spread of diseases. When developing materials (pamphlets, posters, zip folder and other mediums) of education and awareness for vector-borne diseases, epidemiology of the disease should be noted and be addressed as a way of preventing further spread.

Materials developed should also acknowledge the common language spoken in that community and the target group in terms of the demographic profile such as age, gender, etc. Attached are other developed materials (Annexure D) on vector control such as: Prevention of Yellow Fever importation in South Africa; How to prevent and treat Malaria and Zika Virus, etc.

5. PREVENTION METHODS OF VECTOR-BORNE DISEASES

Target Species	Disease (S) Carried	Other Methods/Personal Protection Methods	Vector Hygiene Methods
Anopheles	Malaria	Chemoprophylaxis, Mosquito nets (impregnated)	Residual indoor spraying, burning mosquito coils at night, space spraying before retiring (bedroom needs to be screened for effectiveness)
	Lymphatic filariasis	Mosquito nets (impregnated)	
Aedes mosquitoes	Viral encephalitis	Repellents	Elimination of breeding sites in and around the house
	Dengue/DHF		
	Yellow fever		
	Lymphatic filariasis		
Cockroaches	Diarrhoeal infections		Kitchen hygiene, all food leftovers removed at night
Houseflies	Diarrhoeal infections		Kitchen hygiene, proper (re)heating or cooked food, daily rubbish removal
Tsetse flies	Sleeping sickness	Repellents, impregnated clothing	Avoiding riverside laundering and defecation, installation of tsetse traps in human settlements
Bedbugs	None	Mosquito nets (impregnated)	Regular airing and washing bedding materials and beds
Lice	Epidemic typhus, Relapsing fever, Trench fever	Chemoprophylaxis	Body hygiene, including use of shampoos, laundering clothes
Rodents	Plague		Rat-proofing of houses and storage facilities, rubbish removal, kitchen hygiene
	Leptospirosis		

Fig 1: Vectors and methods for prevention and control

6. COMMON VECTORS AND PESTS TO BE CONTROLLED IN SOUTH AFRICA

Vectors and pests that are most challenging in communities are those that can cause diseases that are detrimental to the health of the population or can be a nuisance to the population. The types of vectors and pests that need to be controlled without causing damage or altering the ecosystem in communities include:

1. Mosquitoes
2. Fleas
3. Lice
4. Cockroaches
5. Rats and mice (rodents)
6. Flies
7. Bees and wasps
8. Termites and ants
9. Ticks
10. Snakes
11. Itchy grub

7. MOST COMMON VECTOR-BORNE DISEASES

Most vector-borne diseases survive in nature by utilising animals as their vertebrate hosts (zoonotic diseases). For a small number of zoonotic diseases, such as malaria and yellow fever, humans are the major host, with no significant animal reservoirs. Intermediary animal hosts often serve as a reservoir for the pathogens until susceptible human populations are exposed. The most common vector-borne diseases found in South Africa must be made known to communities, through awareness programmes.

It is also important to note the priority vector-borne diseases targeted for elimination in South Africa include malaria, schistosomiasis and plague. Most vector-borne diseases survive in nature by utilising animals as their vertebrate hosts (zoonoses).

7.1 Yellow fever

Yellow fever is an infectious vector-borne disease that is caused by a virus transmitted by a bite of an infected mosquito vector such as *Aedes aegypti*. It is a viral disease characterised in man by a sudden onset of fever, headache, backache, prostration, nausea and vomiting, and haemorrhagic symptoms and jaundice. South Africa has a risk of introduction of the disease as the mosquito vector exists in the country.

Port Health Services in points of entry work together with other stakeholders to ensure that travellers arriving from yellow fever endemic countries within the incubation period are vaccinated against yellow fever and that the vaccination was administered at least 10 days prior to travel. Aircrafts arriving from yellow fever endemic countries must be disinfected with an approved airline disinfection spray prior to landing in South Africa. Travellers are advised to be vaccinated against yellow fever prior to travel to an endemic country.

7.2 Malaria

Malaria is an acute febrile illness caused by *Plasmodium* parasites, which is spread to people through the bites of infected female *Anopheles* mosquitoes. It is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes. It is preventable and curable. The first symptoms – fever, headache and chills – usually appear 10–15 days after the infective mosquito bite and may be mild and difficult to recognise as malaria. In South Africa, endemic provinces with malaria vector are Mpumalanga, KwaZulu-Natal and Limpopo.

Other provinces, however, still receive many imported malaria cases which also leads to mortality. Gauteng and Northwest have seen Odyssean malaria cases (also known as “suitcase-cases”). Investigations in such cases are important in order to provide correct classification of cases and develop appropriate interventions.

7.3 Plague

Plague is an infectious disease caused by the bacterium *Yersinia pestis*. Fleas, especially those that parasitise rodents, are the main vectors of plague. The last outbreak of plague in South Africa occurred in Johannesburg in 1904, during which 113 cases were reported. Plague can be controlled by rapidly applying insecticidal dust in rodent burrows and runways. Dusting against fleas should be followed by measures to control rodents.

Overall rodent control is necessary to reduce the risk of plague outbreaks. Effective control of plague vectors and their rodent hosts requires a multi-sectoral approach involving Health (vector control, health promotion, environmental health and port health), Environmental Affairs, Agriculture, and municipalities as implementers, as well as research institutes to provide technical expertise on flea identification. Regular monitoring of rodent and flea population dynamics is necessary.

7.4 Neglected Tropical Diseases (NTDs)

7.4.1 Bilharzia / Schistosomiasis

It is important to understand other Neglected Tropical Disease (NTD) like Schistosomiasis, also known as bilharzia, a disease caused by parasitic worms. It ranks second to malaria as the most common parasitic disease in Africa. It is transmitted to humans by contact with freshwater (lakes, ponds, rivers, dams) contaminated with '*cercariae*'. Persons at risk are those living in or traveling to areas where schistosomiasis is endemic and who come into direct (skin) contact with fresh water sources and children. Schistosomiasis is a major neglected public health problem in South Africa.

It is important for EHPs to be part of stakeholders developing the Schistosomiasis Control Programme for the country to ensure implementation. The following are key in schistosomiasis control:

1. Conduct community awareness on Schistosomiasis
2. Environmental management of Schistosomiasis – environmental surveillance for vector snails
3. Testing for Schistosomiasis infections in snails and non-human mammalian hosts
4. Chemical-based snail control in at-risk communities

The above will ensure the control morbidity due to schistosomiasis by interrupting transmission and ultimately eliminating schistosomiasis as a public health problem.

7.4.2 Rabies

Rabies is a vaccine-preventable, zoonotic, viral disease. Rabies is one of the Neglected Tropical Diseases (NTD) that predominantly affects poor and vulnerable populations who live in remote rural locations (WHO, 2021). It is a contagious disease to which man is also susceptible, mainly transmitted by the bite of an infected animal and characterised by salivation, deviation, aggressiveness, progressive paralysis, high mortality and continuous bellowing in cattle. Environmental Health needs to play a role of case management (investigation and reporting), as well as participating in community awareness programmes.

7.5 Tick-borne diseases

Crimean-Congo haemorrhagic fever (CCHF): A zoonotic disease caused by the CCHF virus, a Nairovirus which is a member of *Nairoviridae* family of viruses. The CCHF virus is transmitted to humans mainly through bites of *Hyalomma* ticks or contact with infected animal tissues and blood. People at risk of CCHF include farmers, veterinarians, abattoir workers and hunters. The virus infects the tick vector permanently across developmental stages and transovarially to the eggs to infect the next generation of ticks.

There are three recognised species of *Hyalomma* in South Africa, and although they are widely distributed, they tend to be most numerous in the drier north-western parts of the country – the Karoo, western Free State, Northern Cape and Northwest Province. Crimean-Congo haemorrhagic fever disease has been known in South Africa since 1981 when it was first recognised in the country. Up to 20 cases of CCHF are diagnosed each year. Although cases have been reported from all the nine provinces in the past 35 years, more than half of them originate from the semi-arid areas of Northern Cape Province (31.5% of cases) and Free State (23% of cases).

Tick bite fever: This is a bacterial infection transmitted by ticks. It is caused by bacterial organisms called Rickettsia. Two types of tick bite fever that occur throughout sub-Saharan Africa and South Africa. *Rickettsia conorii*-like infection is transmitted by dog ticks, often in urban or peri-urban areas, and is sometimes responsible for severe illness. African tick bite fever or ATBF, caused by *Rickettsia africae*, is transmitted by cattle and game ticks (especially *Amblyomma* or 'Bont' ticks) in rural farming and game reserve areas and is usually a milder infection [8]. Persons who walk, camp or work in the bush are at high risk of infection. Personal protection using repellents (DEET) and suitable clothing are the main preventive measures against tick bites.

Ticks also have an indirect impact on human health by transmitting numerous diseases to companion and domestic animals as well as livestock. This impacts socioeconomic welfare by burdening humans with costs of disease control and loss of animals and increases the risk of zoonosis. As such, major tick species that have an economic impact includes *Rhipicephalus appendiculatus*, the vector of *Theileria parva*, the causative agent of Corridor disease in cattle; *Amblyomma hebraeum*, the vector for *Ehrlichia ruminantium* that causes heartwater in cattle, sheep and goats; *Rhipicephalus microplus* and *Rhipicephalus decoloratus*, the vectors for the causative agents of red water and anaplasmosis. Climate change is leading to changes in the geographic distribution of these species with concomitant changes in disease outbreaks and distribution. Surveillance of tick distribution every few (3 years) years is therefore necessary to track changes in their distribution. A National tick control strategy does not exist. However, regular dipping by the Veterinary authorities occurs in regions endemic for Corridor disease. It may be advised that future National tick control strategies may be beneficial for human welfare.

7.6 Arboviral

Arboviral disease may be underdiagnosed and underreported in South Africa. Many arboviruses are not endemic to South Africa, but in the South African context are associated with travellers returning to South Africa from endemic areas. This includes, but is not limited to Dengue, Zika and Yellow fever viruses. Although Chikungunya virus (CHIKV) is endemic to South Africa, human cases in South Africa are usually travellers from other areas (NICD, 2022).

7.7 Tsetse flies

Human sleeping sickness is currently not a major concern in South Africa since its primary vector, *Glossina morsitans*, was eradicated from the country during the Rinderpest epidemic in the early 1900s. However, concerns of re-introduction into the country remain since it does occur in neighbouring countries such as Botswana, Mozambique and Zimbabwe. A dedicated surveillance program that monitors for re-introduction should be a priority for early detection and negation. *Glossina austeni* and *G. brevipalpis* remain in pockets in northern Kwa-Zulu Natal as vectors of trypanosomes that cause animal trypanosomosis or Nagana. This places a large economic burden on the local population since it impacts livestock productivity and therefore human socioeconomics. No National strategy exists for possible eradication of these flies, especially since environmental concerns remain regarding the impact of eradication on the local environment. However, it would certainly benefit the local population and reduce the risk of missing re-introduction of *G. morsitans* due to misidentification of the tsetse species. Given this latter risk, increased surveillance of tsetse species in this region is necessary to determine whether any risk exists of re-introduction.

7.8 Sand flies

Sand flies are vectors of human and animal Leishmaniasis. This disease is considered non-endemic in South Africa. However, scattered reports of dogs infected with *Leishmania* do occur. The risk for introduction of Leishmaniasis into South Africa is considered low. However, a risk assessment based on surveillance data of existing sand fly species in South Africa has not been performed for 50 years or more. No surveillance of dog populations in high-risk rural regions for Leishmaniasis has been conducted either. A strong need for surveillance of vectors and diseases is therefore needed.

8. PESTICIDES USED IN VECTOR CONTROL

When addressing vector control, pesticides used need to be considered and the most used are mentioned and explained below:

1. Fungicides - either chemicals or biological agents that inhibit the growth of fungi or fungal spores.
2. Insecticides - chemicals used to control insects by killing them or preventing them from engaging in undesirable or destructive behaviours.
3. Rodenticides - any substances (both organic and inorganic), that are used to kill rats, mice, and other rodent pests.

The Guidelines on the Data and Documents required for the Registration of Agricultural Remedies used in non-Crop situations in South Africa, can give guidance on other classifications of pesticides, active ingredients, pesticide application and registration. A more detailed list of pesticides used to control vectors is found in the mentioned guidelines. The Department of Agriculture, Land Reform and Rural Development (DALRRD) can advise on banned pesticides not to be utilised by service providers in South Africa and the registration of pesticides. Those who apply pesticides (Pest Controllers) need to be registered with DALRRD.

8.1 Pesticide application and labelling in vector control

8.1.1 Pesticide application

Professional application of pesticides both indoors and outdoors is commonly used for the control of rodents, cockroaches, mosquito larvae, ants, termites and other pests in communities.

Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) stipulates section 3 as:

Registration of fertilisers, farm feeds, agricultural remedies, stock remedies, sterilising plants and pest control operators:

1. (a) Application for registration of a fertiliser, farm feed, agricultural remedy, stock remedy, sterilising plant or pest control operator shall be made to the registrar in the prescribed manner and shall be accompanied by the prescribed application fee.
   (b) Any person applying for registration in terms of paragraph (a) shall supply or make available to the registrar, in the manner and at the time and place that he determines, the samples and particulars that he requires.
2. If, after consideration of any such application and after such investigation and enquiry as he may deem necessary, the registrar is satisfied that:

(a) the fertiliser, farm feed, agricultural remedy or stock remedy in respect of which registration is applied for is suitable and sufficiently effective for the purposes for which it is intended, and complies with such requirements as may be prescribed, and that it is not contrary to the public interest that it be registered, and that the establishment where it is manufactured is suitable for such manufacture, he shall register such fertiliser, farm feed, agricultural remedy or stock remedy.
(b) the sterilising plant in respect of which registration is applied for is suitable and sufficiently effective for the purpose for which it is intended, and complies with such requirements as may be prescribed, and that it is not contrary to the public interest that such sterilising plant be registered, he shall register such sterilising plant.
(c) the pest control operator in respect of whom registration is applied for has the prescribed qualifications or is otherwise, to such extent as may be determined by the registrar, skilled in the use of agricultural remedies, and that it is not contrary to the public interest that such pest control operator be registered, he shall register such pest control operator: Provided that the registrar may refuse an application for registration of a fertiliser, farm feed, agricultural remedy, stock remedy, sterilising plant or pest control operator if any previous registration of such a fertiliser, farm feed, agricultural remedy, stock remedy, sterilising plant or pest control operator has been cancelled under section 4.

3. Any registration under this section shall be subject to the prescribed and any additional conditions as may be determined by the registrar and shall be valid for such period as may be prescribed, and the registrar shall issue in respect of such registration a certificate of registration to the person applying therefor.
4. (a) Any registration under this section may be renewed when the period for which it is valid has lapsed.
(b) The provisions of subsections (1), (2) and (3) shall mutatis mutandis apply to the renewal of any registration.

8.1.2 Pesticide labelling

Environmental Health Practitioner monitors that labelling of pesticides is done accordingly as indicated by specifications of SANS 10234: Globally Harmonised System of classification and labelling of chemicals (GHS), these are the following steps towards ensuring correct labelling is applied:

8.1.2.1Pesticide labelling requirements

1. The colour and presentation of the label, or of the package itself, shall be such that the hazard symbol(s) and its background stand out clearly. Furthermore, the information given on the label shall stand out clearly from its background and the size and spacing of the lettering shall be such that the lettering is easily legible.

b) For very small packages, it is permissible to reduce the size of the label, provided that the lettering is easily legible. The package shall be accompanied by the relevant precautionary statements in the form of an insert or a SDS if it is physical impossible to include the advice on the label of the package.

c) Colour bands shall be used on the labels of pesticides as background for pictograms depicting hazard statements and precautionary statements. The colour bands shall visually match colour reference numbers Pantone 192 or NCS S 0580-Y90R (red), Pantone 361 or NCS S 1565-G (green), Pantone 300 or NCS S 2065-B (blue) and Pantone 109 or NCS S 0570-G90Y (yellow).

8.1.2.2Pesticide Labelling Colour bands

1. Red - when the signal word danger is assigned.
2. Yellow - when the signal word Warning, hazard pictogram(s), hazard statements and precautionary statements are assigned.
3. Blue - when the signal word Warning, hazard statements and precautionary statements are assigned but a hazard pictogram is not required.
4. Green - when no signal word, hazard pictogram(s), hazard statements and precautionary statements are applicable.

8.2 Pesticide poisoning incident reporting by Environmental Health Practitioners

8.2.1 Intervention roles

1. Once the poisoning cases is reported, the role of National Department of Health is surveillance and monitoring. However, provinces, districts and sub-districts are also expected to conduct surveillance and monitoring, to strengthen prevention and intervention measures.
2. The role of the nominated outbreak response coordinator in the sub-district is to conduct history taking, blood sampling for laboratory sampling analysis, diagnoses a conduct investigation upon receipt of notification form.
3. The role of an EHP is to conduct and environmental investigation using the investigation report form on Annexure A. In case of lead poisoning investigation, the investigation form in Annexure B is to be used. All areas of the pesticide/chemical/lead poisoning investigation form are to be completed and written neatly. Completed investigation forms are to be faxed or e-mailed to Environmental Health Directorate in the National Department of Health.

8.2.2 Steps in the Environmental Health investigation of pesticide poisoning cases

The investigation form for chemical poisoning case (Annexure A) consists of the following sections that are to be completed in conducting the investigation as based on the steps outlined:

1) Patient details
2) Pesticide/chemical involved
3) Poisoning event
4) Workplace poisonings
5) Interventions
6) Details of the official completing the investigation report

8.2.2.1 STEP 1: Notification Receipt

The notification form is received by the EHP from the health facility sub-district focal person.

8.2.2.2 STEP 2: Notification Information Verification

The EHP verify details of the person who reported/notified the case by contacting the patient or the notifying person/ institution. The following information on the notification form relating to the patient or affected person or poisoning incident to be verified to enable efficient follow up investigation of the case.

1. Patient/victim names
2. Patient/victim contact number
3. Patient/victim residential address
4. Address where the poisoning incident occurred
1. Names and contact number of the notifying person/institution
2. If the patient died, the names and contact number of the family, forensic pathology laboratory and investigating SAPS

8.2.2.3 STEP 3: Chemical Identification

In case of chemical poisoning cases, the type, nature, trade name and active ingredient of chemical involved should be investigated and identified, through:

1. Conducting patient interview to ask what chemical product was consumed, if the patient survived or the family if the patient died.
2. Linking the symptoms experienced with the commonly known symptoms of chemical exposure as per Annexure C.
3. Physical observation of the chemical product and inspection of the label of the chemical product involved, if the chemical is labelled.
4. In a situation, where the product is unlabelled, medical diagnosis from blood/urine tests laboratory results can be used to identify the product.
5. Sampling of a chemical product and laboratory results.
6. Identifying the hazard class of the chemical substance involved by checking the SDS sheet and the classification and declaration as Group I or II hazardous substance.

8.2.2.4 STEP 4: Chemical Exposure/Poisoning Event Assessment

1. Identify date, time and location of exposure.
7. Identify the source of the chemical. NB. Chemicals can be found in household and different chemical use industries. It should also be determined where have chemical involved been purchased, e.g., from street trader, retail shop, etc. Household chemicals can be found in the kitchen, bathroom, garage or storerooms. Household chemicals include cosmetics, personal care products, medicine, detergents, disinfectants, paints and lacquers, paint strippers, pesticides, building materials, home furnishings and craft materials such as glues, adhesives, and permanent markers.
8. Identify the possible route of exposure on SDS, if the information is unavailable do google search, but avoid Wikipedia as a source of information. Chemicals can enter the body through inhalation, ingestion, skin or eyes absorption Consider each possibility separately when conducting a risk assessment.
9. Inhalation may be an important route of entry. Exposure occurs by breathing in airborne concentrations of a chemical in the form of an aerosol, vapour, mist or suspended dust.
10. Skin contact is a common route of entry. Many chemicals are readily absorbed through the skin or eyes. Formulations which contain solvents and surfactants may increase skin absorption. Higher temperatures or humidity may increase absorption.
11. Ingestion is normally considered a minor route of exposure, except in the cases of accidents such as splashing

while mixing or spraying. Inhalation, ingestion, absorption can occur through contamination of food, air, soil and water.

12. Determine the route of exposure based on the how the product was used or the main activity at the time of exposure and how the incident occurred.
13. Identify symptoms experienced by checking information on symptoms experienced and period, based on information on the notification and interviewing the patient, if the patient survived.
14. To determine chemical exposure, link the symptoms experienced with the commonly known symptoms of chemical exposure as per Annexure C.
15. In case of workplace exposure, inspect the workplace setting to determine the type of occupational setting, chemical use/application method, status of workers OHS training, use and type of personal protective equipment and climatic conditions in case of chemical product that was used outside at the time of exposure. NB. Consider comprehensive chemical risk assessment, as per (Annexure D) in case of workplace settings, chemical incident spillages and suspected environmental contamination.

8.2.2.5 STEP 5: Environmental Health intervention in order for an EHP to determine appropriate chemical exposure control strategies for implementation to protect public health, the following must be ensured:

1. All follow-up investigation actions under steps 3 and 4 are conducted to identify the chemical involved and how the exposure or the poisoning event occurred.
2. It should also be investigated if the chemical product involved require a Hazardous Substance license or NRCS registration or DALRRD registration or DFFE permit or require permit under relevant municipal By-Laws, or the incident happened in a workplace setting, in order to determine the relevant authority to further refer the case to if necessary.

8.2.2.5.1 The key interventions by an EHP following investigation include:

Health education to raise awareness of poisoning possible exposures and preventive measures, refer to (Annexure E) on “Tips to Prevent Human Chemical Poisoning”, to guide on preventative measures that must be taken in households.

1. Law enforcement, where appropriate, to improve compliance.
2. Liaison with other sectors/stakeholders, to ensure implementation of wider intervention.
3. Surveillance of poisoning cases to monitor trends of cases.
4. Monitoring the effectiveness of intervention strategies to ensure sustainability of interventions.

8.2.2.6 STEP 6: Investigation Conclusion

All areas of the investigation form are to be completed as this will give guidance on completion of the investigation. For the country to identify problematic chemicals that should be reported to the Secretariat of the Rotterdam Convention, the following key aspects must be thoroughly investigated:

1. chemical trade name
2. name of manufacture
3. active ingredient
4. type of formulation
5. source of poison
6. cause of poisoning/main activity at time of exposure
7. patient’s reaction to the chemical

The investigation form serves as a report; however, a written report can be complied to provide additional relevant information. The investigation EHP, must provide his/her full names, contact details, date of investigation and signature on the form. The completed investigation report from is to be verified by the manager form for completeness before submission to national Department of Health.

Environmental Health forms part of preventative medicine, an essential part of the health care system. It is the first line of defence against diseases, including poisoning from chemicals. It is acknowledged that most poisoning cases in the country are intentional suicide/homicide cases, of which EHPs have a role to play in preventing such cases. It is the duty of EHPs to investigate chemical poisoning cases and to monitor, control, eliminate and prevent conditions that lead to poisoning from chemicals, whether poisoning is accidental or intentional.

8.2.3 Other methods of Pest Control

Pesticides should be used only when the benefits outweigh the risks, and non-chemical pest control procedures have failed. Otherwise, integrated pest management procedures which include hygiene, sealing of cracks and crevices, screening of doors and windows, and other measures should be the first line of defence for pest management.

8.2.4 WHO Classification of Pesticides by hazard

The table showing the Recommended Criteria for Classification from the original World Health Assembly Proposal is not shown because it is no longer used. WHO now uses the Acute Toxicity. Hazard Categories from the GHS8 as the starting point for classification. This change is consistent with the 1975 World Health Assembly Resolution which envisaged that the WHO Classification would be further developed with time in consultation with countries, international agencies and regional bodies.

The GHS meets this requirement as a classification system with global acceptance following extensive international consultation.

Class	Exposure [LD50 for the rat (mg/kg body weight)]	
	Oral	Dermal
Ia Extremely hazardous	< 5	< 50
Ib Highly hazardous	5–50	50–200
II Moderately hazardous	50–2000	200–2000
III Slightly hazardous	Over 2000	Over 2000
U Unlikely to present acute hazard	5000 or higher	5000 or higher

Fig 2: Revised criteria for classification (in use since 2009 update)

8.2.5 WHO Tips to management of pesticides

1. Evaluating the risks of pesticides - A conservative, protective approach should be followed in assessing the health and environmental risks associated with the use of household pesticides. Both active ingredients and formulated products should be assessed. Risks to vulnerable populations should always be considered.
2. Registration of pesticides - pesticides should be registered like other pesticides before they are placed on the market. If not registered for non-professional use, a pesticide should be considered “banned” for use by non-professionals.
3. Review of registered products - If reports of adverse health or environmental incidents resulting from use of a product are received, the problem should be investigated, and the product registration reviewed immediately. If the incident is indeed related to the use of the product, compliance and enforcement action should be taken. This may include stopping sales of the product. Cases of accidental ingestion, homicide and intentional self-harm should also be monitored and addressed.
4. Quality control - If a poor-quality product fails to control the pest, non-professional pesticide users may make the mistake of increasing the dose, and the resulting risks, thinking more will work better.
5. Transportation, storage, and sale - Government authorities should impose and enforce requirements for the safe transport, storage, handling, and display of household pesticides by distributers and retailers.
6. Storage of household pesticides in homes - Household pesticides should be kept under lock and key, away from food and out of the reach of children, people who are depressed and other fragile populations. Information on safe storage of pesticides should be posted and distributed to users at the point of sale.
7. Disposal of pesticide leftover products and containers - Empty household pesticide containers and leftover pesticide should be considered toxic and disposed of correctly to prevent hazardous exposures or environmental contamination. Users should be alerted to the importance of proper disposal.
8. Advertising - The advertising of household pesticides should be discouraged or forbidden. If advertisements are allowed, they should not exaggerate the benefits or safety of chemical pesticides or imply that the products are essential. They should include explicit warnings about potential risks and about problems that can result from overuse.
9. Public education and awareness - Public education is an essential part of household pets and pesticide management. Pest prevention should be emphasised, because safe and sustainable use of household pesticides starts with taking away the pest source.

8.2.6 Vector control in accordance with the malaria elimination strategic plan 2019-2023 for the Republic of South Africa

Indoor Residual Spraying (IRS) is the major vector control intervention used to interrupt malaria transmission, and the country has many years of experience in implementing IRS programmes. Vector control is entirely funded by government resources, and is supported by technical guidance from national guidelines, partners, government departments and academia.

Recommendations for vector control include:

1. Complete procurement processes by May each year to ensure timely delivery of insecticides to field teams, enabling timely implementation of IRS.
2. Undertake insecticide resistance studies to inform the selection of appropriate and efficacious insecticides for IRS.
3. Recruit and retain sufficient team leaders, foremen, and spray operators to effectively guide and implement vector surveillance and control activities.
4. Re-quantify areas of risk requiring IRS.
5. Provide sufficient financial resources to ensure that all populations at risk of malaria transmission are covered by IRS.

Dichlorodiphenyltrichloroethane (DDT) is used in IRS by spraying indoor surfaces with a coating of DDT. This residual coating prevents malaria transmission as a spatial repellent or contact irritant or by killing mosquitoes, effectively preventing or interrupting transmission. There is one sole manufacturer of DDT globally, based in India, which supplies South Africa for the malaria control programme.

8.3 Global harmonised system for chemicals

Environmental Health should establish the chemicals that are utilised for vector control management. The active ingredient should be identified to ensure guidance on registering of the chemical with relevant legislation e.g., Hazardous Substance Control Act Fertiliser, Farm feeds, Agricultural Remedies and Stock Remedies Act, SANS 10234: Globally Harmonised System of classification and labelling of chemicals (GHS) and measures to be followed in terms of storage, application, Material Safety Data Sheet (MSDS) etc. Global Harmonised System is a system that is utilised in ensuring that all stakeholders rendering hazardous substances identify and agree on roles as per stakeholder and conduct inspections as a team.

9. TRAINING

Employee development is needed even in vector control as it is the continuous effort that strengthen work performance. It is important for one to be capacitated on vector control continuously as information keeps on being updated and one needs to be in par with new developments to implement vector control effectively. The picture below depicts that.

Fig 3: Training and development

Employee development is needed in vector control as it is continuous learning which strengthens work performance. It is important for EHPs to be continuously updated on vector control as information is constantly revised. EHPs need to remain current new developments to implement vector control effectively. Development can either be formal or informal as depicted below.

10. CONCLUSION

The future of the vector control programme is vital and ensures that duties of EHPs in this regard are preserved. The EHPs' increased high visibility and participation in the vector control surveillance activities will enable community needs assessments that are continuously conducted to assist in informing vector control plans which must be evaluated or analysed for adjustments.

The increased knowledge and skills in integrated pest management and accessible learning opportunities in vector control and pest management for environmental health professionals enables appropriate supervision during and after application of pesticides while protecting the routes of entry and the use of proper personal protective equipment (PPE) by pest control operators or service providers.

To ensure prevention of pesticide exposure and poisoning in both operators and communities especially in the food industries and businesses selling food products, Environmental Health should partner with other sector departments for consultations of safe pesticides in the vector control, integrated pest management and in vector-related emergencies for all businesses.

The consultations will enable practitioners to advise all businesses and industries as well as to educate the communities on mentioned topics. To control, reduce and minimise vectors that transmit disease and pests that cause nuisance in communities, all Environmental Health Services should ensure that vector control services are provided throughout the country.

11. REFERENCES

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ANNEXURES: EDUCATION AND AWARENESS AND CASE INVESTIGATION FORMS

NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES

NOTIFIABLE MEDICAL CONDITIONS (NMC) CASE DEFINITIONS FLIPCHART

Category 1: Immediate reporting telephonically followed by written or electronic notification within 24hrs of diagnosing a case

PLAGUE

Why is surveillance necessary?	Who must notify and when?	Suspected case definition	Probable case definition	Confirmed case definition
Plague is caused by the bacterium *Yersinia pestis*. Humans usually get plague after exposure to saliva or feces of fleas that are carrying the plague bacterium or by handling an animal infected with plague. The last human cases of plague in South Africa were in 1982. Plague is notifiable because it is rapidly fatal (with a 90-95% case fatality rate) and has potential for person-to-person spread through respiratory droplets. Bubonic plague presents with swollen painful lymph nodes in the groin or neck and has a lower mortality, but may spread locally to become septicaemic or pneumonic.	The clinician who suspects the diagnosis should notifiy authorities and the NICD immediately on clinical suspicion. Post-exposure prophylaxis with antibiotics may be administered to contacts of persons with confirmed plague	A person with exposure in a compatible epidemiological scenario, with fever, chills, headache, malaise, prostration, a raised white cell count and any of • regional lymphadenitis in the groin, armpit or neck • septicemia without an evident bubo • pneumonia. **OR** clinical compatible case with clinical specimens that contain Gram-negative coccobacilli that exhibit bipolar-staining with Wayson or Wright's Giemsa stains	A person with clinically compatible illness with • a positive result with immunofluorescence or other validated assay; **OR** • a single serum specimen positive for anti-F1 antibody by ELISA; **OR** • an epidemiological link to a confirmed case.	A clinically compatible case that is laboratory-confirmed by: • Culture Isolation of *Yersinia pestis* from clinical specimens; **OR** • IgG seroconversion in a serum specimen from a clinically compatible case; **OR** A ≥4-fold rise in titre of anti-F1 antibody level over 2 weeks in a serum specimen from a clinically compatible case

Additional notes

Clinicians who suspect plague should contact the NICD 24-hour hotline (082-883-9920) for assistance with specimen collection and diagnosis.

Additional resources

A frequently-asked questions document is available at https://www.nicd.ac.za/plague-frequently-asked-questions-2/.

Vaccinate

YOUR DOG AND CAT

— Beware —

Rabies kills!

THIS ADVICE CAN SAVE YOUR LIFE!

— ENGLISH —

agriculture, forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

What is rabies?

Rabies is a disease that affects the brain and leads to the death of the person or animal involved.

Symptoms vary widely and may include:

- Behavioural changes
- Aggression
- Salivation
- Paralysis.

RABIES AFFECTS ALL ANIMALS!

Spreading of the disease

The virus occurs in great numbers in the saliva of rabid animals.

CONTACT YOUR VET OR ANIMAL HEALTH TECHNICIAN

How to control rabies

- Vaccination is the only protection.
- **Vaccinate** your dogs and cats. Encourage other people to have their pets vaccinated too.
- Do not allow your pet to roam the streets.
- Report all suspect cases to your nearest state veterinarian, animal health technician or to the police.

NEVER TOUCH OR CARESS A STRANGE, INJURED ANIMAL OR ONE WHICH APPEARS TO BE SICK!

If you get bitten

- Thoroughly disinfect the wound.
- Immediately consult a medical doctor or clinic.
- Contact your nearest state veterinarian or animal health technician.

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National Department of Health

Malaria Elimination Programm

Malaria Case Investigation Report:

Treatment adherence and response

Investigation type: Home visit Telephonic Untraceable

SECTION G: MALARIA TREATMENT QUESTIONS TO PATIENT			
1. Did you (the patient / your child) receive malaria treatment?		Yes	No
If YES: Date treatment started?		20YY / MM / DD	
2. What malaria treatment were you given at the health facility? (Check all treatments given)	Yellow tablets (Coartem®)	A pink tablet (Primaquine)	
An injection	A drip		
Other treatment (please specify / describe):			
3. How did you (the patient, your child) feel after the malaria treatment?			
Fully Recovered	Still ill?	Died	
If still ill: What symptoms?			
If still ill: Was the patient sent to hospital? Yes No	*If YES,* Hospital Name:		
4. For each malaria treatment you were given to take at home:			
4a) *For the Coartem® (yellow tablets):* How many tablets were you given? _____ Usually taken with: food / milk / water / nothing How many tablets do you have left?_____	4b) *For the <u>other</u> malaria treatment:* How many tablets were you given? _____ tablets Usually taken with: food / milk / water / nothing How many tablets do you have left?_____ tablets		
5. Did you (the patient / your child) experience any problems with the malaria treatment?		Yes	No
If YES, please describe what symptoms / problems were experienced:			
If YES, *what was the outcome?*			
Fully Recovered	Ongoing	Disability	Died
If ongoing, was the patient sent to hospital? *If YES:*	Hospital Name:		

Please mark applicable areas with an X

Case Investigator Name: _____

health
Department:
Health
REPUBLIC OF SOUTH AFRICA

National Department of Health

Malaria Elimination Programme

Malaria Case Investigation Report

Case Number:

Date of Case Notification: 20YY/MM/DD

Please mark applicable areas with an X

BACKGROUND: GENERAL INFORMATION ON CASE TO BE INVESTIGATED				
1. Reporting Health Facility		2. Diagnosis Date	3a. Patient Name	3b. Patient Surname
		20YY/ MM/ DD		
4. Date of Birth	5. Age	6. Gender	7. Contact Number	
YYYY/MM/DD		Male □ | Female □		
8a. Patient's Residential Address:			8b. Location Description	
Street/dwelling unit/building//				
Locality/ Sector/Section			Homestead Head, Street name, building, location description	
District			Municipality	
8c. Patient's day time address:				
Institution Name				Contact Number
Street name, building, location description				
Locality	Sector/Section			District

SECTION A: GENERAL INFORMATION ON CASE INVESTIGATION			
1. Investigation Date	2. Name of Case Investigator		
20YY/MM/DD	First Name	Surname	
3a. Case Investigation Status	3b. If the case was untraceable, why?	3c. Patient Vital Status	3d. If Deceased, Date of Death
Traced □ | Untraceable □	Contact information incomplete or inaccurate □ | Visited, but patient not found □ | Other (specify)_____ _____ □	Alive □ | Deceased □	20YY/MM/DD
3c. Source of case investigation information	3d. Coordinates of residential dwelling		
Patient □ | Relative of Patient □ Other (specify) _____ □	Latitude: (-) D | D . d | d | d | d | d | d	Longitude: D | D . d | d | d | d | d | d	

SECTION B: QUESTIONS TO PATIENT		
1a. When did the patient start feeling sick?	2a. Has the patient had malaria before?	2b. If YES, when did the patient last have malaria?
20YY/MM/ DD	Yes □ | No □	YYYY/MM/DD
3a. Does the house have a spray inspection card?	4a. Was the patient's house sprayed in the current spray season?	
Yes □ | No □ | Not Applicable □	Yes □ | No □ | Unknown □	
4b. If YES, when was the house sprayed?	4c. If YES, what insecticide was used?	
YYYY/MM/DD	DDT □ | Pyrethroid □ | Carbamate □ | Other (specify) _____ □	
4d. If NO, what was the reason?		

House outside spray area □ | Refusal □ | Sick people inside □ | House was locked □ | Other (specify)_____ □		
5. Occupation of patient		
Mining □ | Farming □ | Driver □ | Student □ | Self-Employed □ | Unemployed □ | Other(specify)_____ □		
6. Has the patient traveled outside their usual place of residence in the past 6 weeks (42 Days) from the Date of Onset of Symptoms?		
6a. Travel inside South Africa:	0 – 7 days	22 – 42 days
Province, District, Town	□	□
Province, District, Town	□	□
Province, District, Town	□	□
6b. Travel outside South Africa:	0 – 7 days	22 – 42 days
Country, Province, Town	□	□
Country, Province, Town	□	□
Country, Province, Town	□	□
7a. Is the household protecting themselves against malaria?	7b. If YES, what protection is the patient using?	
Yes □ | No □	Repellents on skin □ | Coils □ | Aerosol mosquito spray □ | Bed nets □ | Prophylaxis before travel □ | Prophylaxis after travel □ Other (specify)_□ |	

health
Department:
Health
REPUBLIC OF SOUTH AFRICA

National Department of Health

Malaria Elimination Programme

Malaria Case Investigation Report

SECTION C: INVESTIGATION OUTCOME			
1. Initial Case Classification	Notes		
Local □ | Locally Imported □ | Imported □			
2a. Source of infection, if Local	Latitude: **(-)** D | D . d | d | d | d | d | d	Longitude: D | D . d | d | d | d | d | d	Locality/District
2b. Source of infection, if Locally Imported	Province	Locality/District	
2c. Source of infection, if Imported	Country	Locality/City/Town	

SECTION D: TESTS CONDUCTED IN COMMUNITY DURING CASE INVESTIGATION					
1. Were tests conducted in the community?	2a. Total RDT collected	2b. Total RDT positives	3. Total blood smears collected	4. Total DBS collected	5. Number of households visited
Yes □ | No □ Not Applicable □	_____	_____	_____	_____	_____

SECTION E: ENVIRONMENTAL INVESTIGATION		
1. Have all the immediate neighbouring households been sprayed in the spray season?		Yes □ | No □ | Unknown □
2a. Have any potential breeding sites been identified?		Yes □ | No □
2b. If YES, collect GPS coordinates and describe	Latitude: **(-)** D | D . d | d | d | d | d | d	Longitude: D | D . d | d | d | d | d | d
Breeding Site 1: describe		
Breeding Site 2: describe		
Breeding Site 3: describe		
3a. Have any other potential drivers of malaria transmission been identified?		Yes □ | No □ | Unknown □
3b. If YES, describe:		
Describe		
4. Recommendations of interventions		
□ Check IRS quality in index house and neighbouring houses	□ Investigate potential breeding sites	
□ Focal IRS in index house and neighbouring houses	□ Health Promotion	

SECTION F: SUPERVISOR APPROVAL & INVESTIGATION OUTCOME			
1. What is the correct Case Classification			
Local □ | Locally Imported □ | Imported □	1a. Source of infection, if Local		Locality/District
2a. Source of infection, if Locally Imported	Province	Locality/District	
2b. Source of infection, if Imported	Country	Locality/City/Town	
3a. Name of Supervisor		3b. Designation of Supervisor	
First Name	Surname	Chief EHP □ | CDC □ | EHP □ Other □ (specify)_____ |	
3c. Supervisor Signature		3d. Date form approved	
		20YY/MM/ DD	

Date form received for data capturing: 20YY/MM/DD

SOP NMC paper based reporting

Annexure B

Health facility name *(with provincial prefix)*	Health facility contact number	Health district
Patient file/folder number	Patient HPRS-PRN	Date of notification (y y y y - m m - d d)

Patient demographics				**Patient residential address**
First name				Street/dwelling unit/building/ERF number
Surname				Street name, building, location description
S A ID number				Sub-place, suburb, village, postal area
Passport/other ID number				Town/city — Post code:
Citizenship				**Employer/educational institution address**
Date of birth (y y y y - m m - d d)				Institution name
Age	Years	Months (if less than 1yr	Days (if less than 1 month)	Street name, building, location description
Gender	Male	Female		Sub-place, suburb, village, postal area
Is patient pregnant?	Yes	No	Unknown	Town/city — Post code:
Contact number				Contact number

Medical conditions details						
Name of NMC diagnosed			History of possible exposure to NMC in the last 60dys		No	Yes / Unknown
Method of diagnosis	Clinical signs and symptoms ONLY		Rapid test	X-ray	Laboratory confirmed	Other:
Clinical symptoms relating to the NMC						
Treatment given for the NMC						
Date of diagnosis (y y y y - m m - d d)				Date of symptom onset (y y y y - m m - d d)		
Patient admission status	Outpatient	Discharged		Inpatient	Ward name	
Patient vital status	Alive	Deceased		Date of death (y y y y - m m - d d)		

Travel history in the last 60 days			
Did patient travel outside of usual place of residence?	Yes	No	*If yes, complete the travel details below*
Place travelled from	Place travelled to	Date patient left usual place of residence	Date patient returned to usual place of residence
Country/Province/Town	Country/Province/Town	y y y y - m m - d d	y y y y - m m - d d
Country/Province/Town	Country/Province/Town	y y y y - m m - d d	y y y y - m m - d d

Vaccination history *for the NMC diagnosed above (complete only for vaccine preventable NMC)*				
Vaccination status	Not vaccinated	Up-to-date	Unknown	Date of last vaccination (y y y y - m m - d d)

Specimen details			**Notifying health care provider's details**	
Was a specimen collected?	Yes	No	First name	
Date of specimen (y y y y - m m - d d)			Surname	
Specimen barcode/lab number			Mobile number	
			SANC/HPCSA number	Notifier's signature

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National Department of Health

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