EpiSouth
Network for Communicable Disease Control in Southern Europe and Mediterranean Countries
InVS French Institute for Public Health Surveillance – Department of International & Tropical diseases
European Commission

The FIFA 2010 World Cup in South Africa, Health risks and public health implications, May 2010

1. INTRODUCTION

The Republic of South Africa is the 25th largest country in the world (1.2 million km²) with nearly 50 millions inhabitants. It is located at the southernmost region of Africa, with a long coastline along the South Atlantic and the Indian oceans. This geographical situation provides a generally temperate climate, although the low altitude north-eastern regions bordering Mozambique and Zimbabwe have a tropical climate. Winters (May to July) are generally mild and dry. National parks are a major tourist attraction in South Africa. The most visited sites are the Kruger Park (North east, Mozambican border) and the Table Mountain National Park (South West) (cf figure 1).

Figure 1 - South African national parks (SAN Parks).

2. SOUTH AFRICA 2010 FIFA WORLD CUP

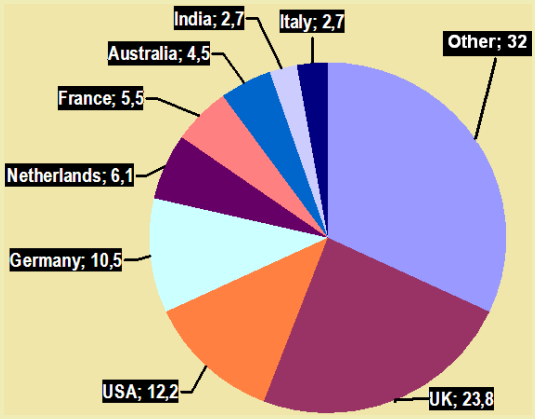
The 19th edition of the FIFA World Cup (FIFA 2010 WC) will be held from 11 June to 11 July 2010 across the country. 64 matches will be played in Bloemfontein, Cape Town, Durban, Johannesburg, Nelspruit, Polokwane, Port Elizabeth, Pretoria and Rustenburg (figure 2). Some 350,000 visitors and participants are expected.

Figure 2 - Host cities for the 2010 FIFA World Cup.

As of 5 February, FIFA had received over one million requests for tickets from 192 countries. Nearly 600,000 individual match tickets have been allocated, 71% of them to South African residents, followed by 8.5% to US residents, 5.2% to UK residents, and 2.9% to Mexican and Australian residents.

In 2009, the 8 leading countries for overseas tourists were: the UK, 446,369 (23,7%); USA, 230,324 (12,2%); Germany, 196,643 (10,4%); The Netherlands, 114,431 (6,1%); France, 103,985 (5,5%); Australia, 82,753 (4,4%); India, 55,203 (2,9%) and Italy, 50,283 (2,7%) (cf. figure 3).

Figure 3 - Distribution of overseas tourists by countries on 2009.



3. FIFA PUBLIC HEALTH PREPAREDNESS

In order to meet the public health needs of the FIFA 2010 WC, the Department of Health and other State departments have started in 1998 to plan specific activities in cooperation with the major sporting bodies. According to South African authorities, the planning addressed communicable disease surveillance, environmental health,

food and water safety, health inspection at country's ports and points of entry, forensic medicine, medical care and pharmaceutical services, disaster planning and response to bio-chemical threat. South African authorities considered the following activities:

- Ensuring security at venues and stadia.
- Ensuring adequate provision of medical care & emergency services at stadia, venues & touristy areas:
  - Setting up medical facilities on site,
  - Training emergency personnel,
  - Developing clinical information databases,
  - Developing contingency plans.
- Reinforcing surveillance:
  - i.e. national and international disease surveillance,
  - Strengthening existing systems & policies ,
  - Developing outbreak indicators,
  - Training surveillance personnel.
- Reinforcing communication:
  - National communication systems dedicated to follow-up on health issues during event,
  - Web-based interface for posting situation updates etc.
- Raising awareness among visitors through information campaigns (e.g. for STI, influenza etc.).
- Monitoring environmental health through:
  - Enhancing monitoring of water quality and food control (including pre-accreditation of food suppliers),
  - Waste management, at FIFA and tourists destinations.
- Enhancing health inspection at points of entry.

Note : *that starting mid-may, regular situation updates on communicable diseases from the various surveillance systems will be provided at www.nicd.ac.za.*

4. FOOD AND WATER SAFETY

Food sold from supermarkets, restaurants and fast food outlets is generally considered safe. It is recommended to be careful when eating food from street vendors or other informal outlets. Travellers' diarrhoea is common. Pre-accreditation of food providers at the official FIFA World Cup centres has been conducted.

Water from taps or faucets is considered safe in the larger urban centres. It is of variable quality in small towns. Drinking water directly from rivers and streams can expose to the risk of waterborne diseases.

5. POTENTIAL RISKS

Table 1: Overview of risks for travellers to South Africa.

	FIFA 2010 WC venues (urban)	**National parks**
Road traffic	+	++
Crime	++	+
Influenza	++, 0 if immunized	+, 0 if immunized
Malaria	0	low with proper prevention
Rift Valley Fever	0	low with proper prevention
Diarrhoeal diseases	+	++
HIV	low with proper prevention	low with proper prevention
Crimean Congo Hemorrhagic Fever	0	low with proper prevention
Filoviruses (*Ebola, Marburg*)	0	low
Measles	0 if immunized	0 if immunized

6. SAFETY AND SECURITY

6.1. ROAD TRAFFIC INJURIES

Road traffic accident rates in sub-Saharan Africa are amongst the highest in the world. Over 14,000 fatalities from car accidents had been recorded for the year 2008 in South Africa. The majority of crashes were pedestrian and hit-and-run crashes. Authorities advise visitors not to drive on unfamiliar rural roads, especially at night.

6.2. CRIME

South Africa has high crime levels, mainly in townships and regions away from normal tourist areas. The vast majority of visitors complete their travels in South Africa without problems; however, visitors should be aware that criminal activity is prevalent. The government reports having set up strong anti-crime initiatives, especially in the context of the FIFA 2010 WC, but the risk of armed robbery, carjacking, mugging, "smash-and-grab" attacks on vehicles, and other incidents cannot be excluded.

7. HEALTH RISKS (South Africa Department of Health

7.1. Non-Communicable Diseases

Winters in South Africa are mild, thus there is no risk of illness due to extreme weather conditions (heat- or cold-related illness). Nevertheless, attendees of sports events should bear in mind to avoid dehydration by drinking (at least some) water. Visitors with chronic illness should consult their physician before departure.

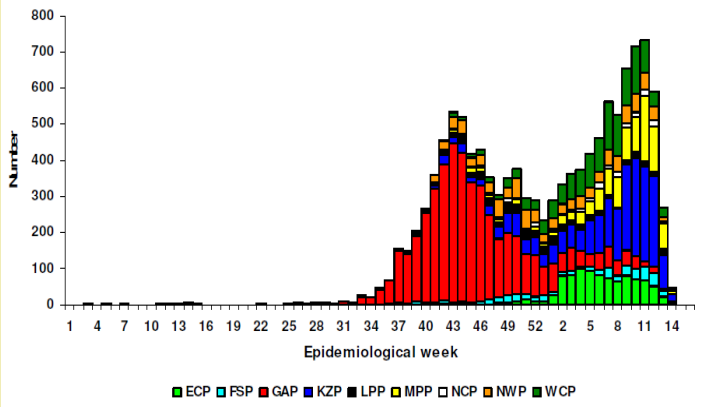
7.2. CURRENT OUTBREAKS

Measles

As of 28 April 2010, 12,227 cases of measles have been confirmed in an outbreak that started in January 2009 (cf. figure 5). Cases have been reported from all 9 provinces, with Gauteng (n=4,711, 38%), KwaZulu-Natal (n=2,274, 18%) and Western Cape (n=1,300, 11%) provinces accounting for the highest proportions. Children under 5 years accounted for 51% (5,987/11,775) of cases, with 25% occurring in those aged 6 to 11 months. A mass campaign for measles (and polio) immunization planned by the National Department of Health started on 12 April 2010. Another is scheduled for 24-28 May 2010. Note that vaccine coverage was estimated around 85% in 2008 among infants younger than 5 years old.

South African health authorities have recommended that all travellers be immunized against measles before travelling to South Africa.

Figure 5 - Measles IgM positive cases per province; South Africa January 2009 to 28 April 2010 (source NICD).



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Rift Valley Fever

Rift Valley Fever (RVF) is a zoonotic, mosquito-borne viral disease of ruminants, most often affecting domestic animals including sheep, goats and cattle. It occurs mainly in Sub-Saharan Africa and Madagascar. Although some cases have been described in humans with history of mosquito bites in an epizootic/epidemic area, the vast majority of human infections are acquired through contact with infected animal tissues/blood. No instances of human-to-human transmission have been reported. At least one case of RFV in tourists has been described in 2007 in a Kenyan citizen returning from South Africa.

RVF was first recorded in South Africa in 1950. Very severe outbreaks occurred in 1955 and between 1974 and 1976. After an absence of outbreaks in the 1990's & early 2000's, and following significant rain in 2008, small and localised outbreaks recurred. RVF was reported in game animals and livestock on farms adjacent to the Kruger National Park.

On 12 February 2010, the 1st laboratory confirmed outbreak amongst animals was identified in the Bloemfontein area of the Free State Province. Progressively, the disease spread further in the country, and has since been confirmed in Northern Cape, Eastern Cape, Gauteng, Mpumalanga, North West and Western Cape Provinces. Domestic animals were affected including sheep, cattle and goats, in addition to small numbers of wild animals (mostly antelopes and buffalos) (cf figure 7).

As of 21 May 2010, the outbreak of RVF has been reported in 7 of the 9 provinces (cf. figure 6 and table 2). 203 confirmed human cases including 20 deaths have been recorded. Of theses, 86% of cases are males and 79% (145/183) of cases reported direct contact with RVF-infected livestock and or a link to farms with confirmed animal cases. The most affected province has been the Free State followed by the Northern Cape Province. For further details cf. NICD communiqué on RFV.

South African authorities have implemented public health control measures, including development of key risk reduction messages for populations at risk and health professionals' guidelines for case identification and reporting, laboratory investigations, clinical case management, hospital infection control, public health measures for prevention and control and animal vaccination in non-affected areas.

The risk of contracting RVF at FIFA 2010 WC venues is very low but travellers should observe preventive measures and avoid contact with animals when visiting rural areas, especially national parks. Moreover, with the current decrease in temperature (onset of colder weather at the end of May), a decline in disease transmission is expected, by reducing mosquito activity.

Figure 6 - Geographic spread of the RVF epizootic in South Africa, as of 30 April 2010 (source NICD).

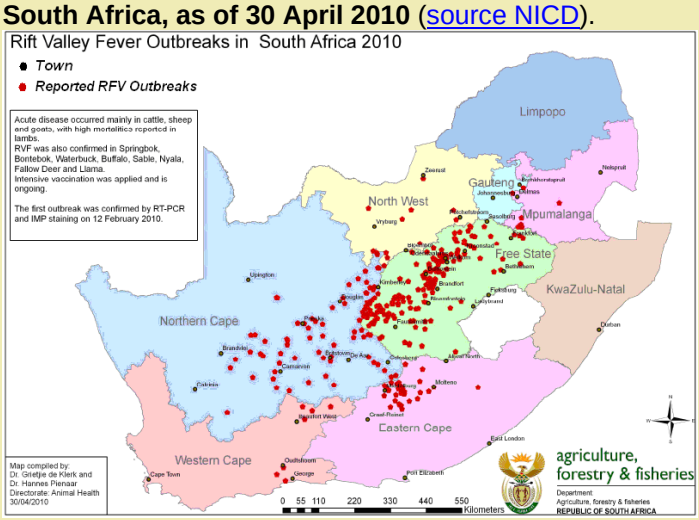

Figure 7 - Human laboratory confirmed RVF cases by date of illness onset and province, South Africa, as of 21 May 2010 (source NICD).

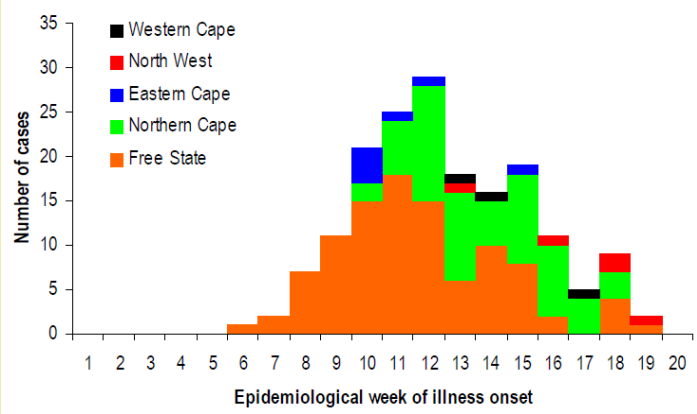

Table 2 - Human laboratory confirmed RFV cases and deaths by province South Africa, as of 21 may 2010 (source NICD).

Province(place exposed)	Cases	Deaths
Eastern Cape	13	0
Free State	114	9
Gauteng	0	0
KwaZulu-Natal	0	0
Limpopo	0	0
Mpumalanga	0	0
Northern Cape	65	8
North West	5	2
Western Cape	3	1
Unknown	3	-
Total South Africa	**203**	**20**

7.3. OTHER COMMUNICABLE DISEASES

Viral hemorrhagic fevers

The risk of vector-borne haemorrhagic fever at the FIFA 2010 WC is expected to be low given the season and generally limited exposure.

Yellow fever

Although there is no risk of contracting yellow fever in South Africa, proof of vaccination in the past 10 years is mandatory for all passengers over one year of age who arrive from yellow fever affected areas/countries.

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Rift Valley Fever

Cf. current outbreaks

Crimean-Congo Hemorrhagic Fever

Crimean-Congo Hemorrhagic Fever (CCHF) is a tick-borne viral disease. Although primarily a zoonosis, sporadic cases and outbreaks of CCHF affecting humans have occurred. In humans, the disease can be severe, with a high case-fatality rate among severe forms.

The disease is endemic in many countries in Africa. It was isolated for the 1st time in South Africa in 1981. Cases were reported in 2001. Three CCHF cases have been confirmed for South Africa since the beginning of 2010. The cases originated from the Free State (n=1) and the Northern Cape (n=2) Provinces.

Marburg hemorrhagic fever

Marburg haemorrhagic fever is a severe and highly fatal disease caused by a virus from the Filoviridae family (same as Ebola). In 1975, the disease was described in a person with recent travel history to Zimbabwe. The patient died while 2 secondary cases recovered.

Transmission of the virus from person to person requires extremely close contact with a patient. The risk of Marburg fever related to attendance of the FIFA WC is very limited.

Lujo virus

A nosocomial outbreak caused by a previously unknown arenavirus was reported in Johannesburg during September and October 2008. The index case was evacuated from Lusaka, Zambia to South Africa for medical treatment. In total, 5 cases were identified that suffered symptoms of viral hemorrhagic fever (without significant bleeding), 4 died. Since then, no further cases have been reported. The risk of occurrence of Lujo infections remains very low.

The risk of vector-borne haemorrhagic fever at the FIFA WC is expected to be low given the season and generally limited exposure.

Vector-borne diseases

The risk of vector-borne diseases is likely to be limited for FIFA-WC attendees at the event sites. South African authorities recommend preventive measures in the case of visits to non-world cup endemic areas.

Malaria

Malaria, a mosquito-borne disease caused by a parasite, is commonly associated with game parks in Africa. However, only two of the South African National Parks are located in malaria risk areas: the Kruger and the Mapungubwe National Parks. Figure 8 shows areas endemic for malaria. The majority of infections are due to *Plasmodium falciparum*. The risk is usually low and seasonal (figure 9). Transmission is uncommon in the winter months i.e. during the FIFA-WC. There have been occasional reports of malaria cases in other parks in the past. If chemoprophylaxis is to be considered, note that the north eastern region is classified as a zone of high prevalence of *P. falciparum* resistance to chloroquine and multi-resistance (group IV of WHO classification).

Figure 8 - Endemic areas for malaria in South Africa. 2010 (sources: NICD, Malaria research programme).

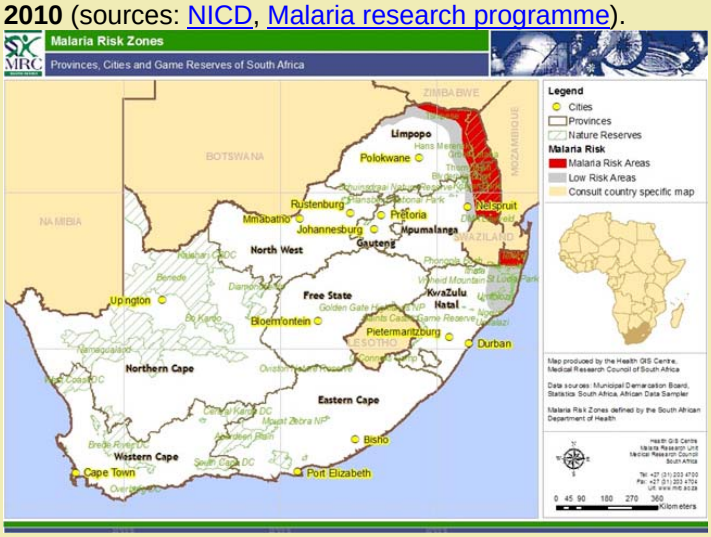
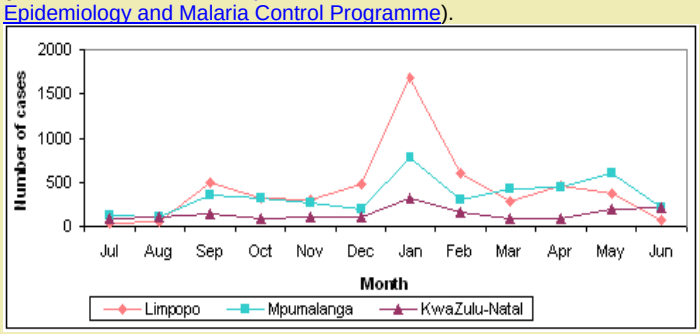


Figure 9 - Malaria cases from malaria-affected provinces by month, South Africa, July 2002- June 2003
(Source: NDOH, Health Systems Research, Research Coordination and Epidemiology and Malaria Control Programme).



Dengue

Dengue is a mosquito-borne infection that causes a severe flu-like illness, and sometimes a potentially lethal complication called dengue hemorrhagic fever. A seroprevalence survey conducted in South Africa suggested that dengue (DEN-1) caused an epidemic in Durban in 1926-1927. There have been no reports of outbreaks in recent years. Considering *Aedes aegypti* is present in some areas, the occurrence of the disease through viraemic travellers entering the country cannot be excluded.

Chikungunya

Chikungunya has previously been described in north eastern parts of South Africa (in 1976). However, there have been no reports of the disease in recent years and data available do not support the hypothesis of current circulation of the virus. The risk for travellers to the FIFA-WC seems therefore limited.

Tick bite fever

Tick bite fever is a common bacterial infection in South Africa. It is transmitted by infected dog, cattle and game ticks. The risk of being infected is low unless tourists visit rural or wilderness areas like game parks or farms. Basic prevention measures such as the use of protective clothing and DEET – containing insect repellent is recommended for prevention of bites by infected ticks. There is no vaccine against tick bite fever, and taking prophylactic antibiotics has not been shown to be effective. Tick bite fever treatment is available in South Africa.

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Sexually transmitted diseases

HIV is highly prevalent in South Africa. According to WHO, around 20% of South African adults aged 15 to 49 years are HIV-infected.

Mass gatherings of the type of the FIFA WC tend to gather large young male populations. Those are more prone to risky behaviour, thus an increased risk of acquiring sexually transmitted infections during FIFA-WC is of particular concern. South African health authorities have recommended safe sex to travellers. Specific awareness campaigns will be launched during the event.

Based on a prevalence study among public antenatal clinic attendees, it is estimated that nationally, 4.9% were infected with syphilis by the end of the year 2000.

The possible increased risk also concerns other sexually transmitted diseases and blood borne viruses, such as Chlamydia, gonorrhoea, Hepatitis B and Hepatitis C, that are prevalent in sub-Saharan Africa. Other risk activities such as are body piercing, injection drug use and tattooing should be avoided.

Vaccine preventable diseases

Due to the overcrowding conditions and proximity brought about by the mass gathering and favoring infectious disease spread, South African authorities have advised travellers to ensure adequate vaccination before attending FIFA 2010 WC. They should refer to the countries' respective immunisation calendars.

Meningococcal disease

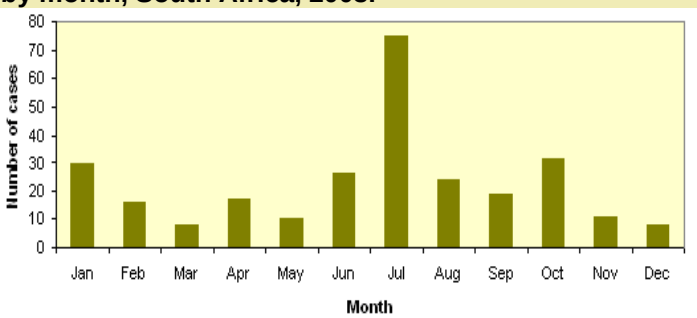
South Africa is not part of the African meningitis belt characterised by very high seasonal incidences of the disease.

In South Africa, the pattern of meningococcal disease is characterized by sporadic cases throughout the year with occasional small clusters and a moderate seasonal increase from May to October (figure 10). Each year 400 - 500 cases of meningococcal disease are reported in South Africa through its surveillance programme.

The predominant serogroup in recent years has been W135, followed by serogroups B and C. Regional differences have been identified (serogroup W135 dominant in Gauteng Province, serogroup B dominant in the Western Cape Province).

While the risk to World Cup attendees is likely to be low, given the expected crowded conditions at some of the venues and the severity and rapid progression of the disease, consideration may be given to pre-exposure vaccination. Note that immunisation is not routinely recommended by South African health authorities.

Figure 10 - Notified cases of meningococcal disease by month, South Africa, 2003.



Poliomyelitis

South Africa is considered polio-free and there have been no wild-type polio cases since 1989. However the country remains vulnerable to imported polio virus. South African authorities require vaccination proof for travelers less than 15 years of age from affected countries.

Measles

Cf current outbreaks

Rubella

An increase in the number of rubella cases was observed in 2009 (2,975 cases) compared with 2008 (1,064). The highest proportion of cases was observed in Gauteng province (n=674, 23%).

Other vaccine preventable diseases

In 2008, 1 laboratory confirmed diphtheria case was reported by Western Cape region Health authorities. This was the 1st case notified in the country since 2005. Contacts were followed-up and found negative for *Corynebacterium diphteriae*.

Respiratory illnesses

Influenza

The FIFA-WC will take place during the winter influenza season in South Africa. The last influenza epidemic (2009) was characterized by a biphasic peak because of the introduction of the pandemic influenza A(H1N1)2009 virus which dominated the season and took over from seasonal influenza (figure 11). As of 15 February 2010, 12,640 confirmed human cases of pandemic A(H1N1)2009 influenza, including 93 deaths, had been reported.

Sentinel influenza surveillance has recently detected the 1st influenza case of the season (influenza B). Sporadic influenza B cases are detected in South Africa outside of the influenza season. The season typically begins during epidemiological week 23 (7-13 June 2010). Transmission has, however, been detected in the past as early as the 2nd week of April (week 15). The number of specimens from persons with respiratory illness received through the surveillance system has begun to increase.

Although transmission in open stadia should be low, influenza outbreaks have been reported at outdoor mass gatherings. High transmission in the general population is expected. Furthermore, it is likely that the influenza A (H1N1) 2009 pandemic strain will cause the majority of infections. These are usually mild, although severe cases may occur mainly in patients with underlying co-morbidity or in young adults.

Some visitors will already be immunised against pandemic influenza, depending on their country of origin. South African authorities have recommended travellers to consult for their need for influenza vaccination. Other preventive measures will be taken on site (educational messaging, availability of tissues and facilities to cleanse hands in common areas, and voluntary isolation of mild cases).

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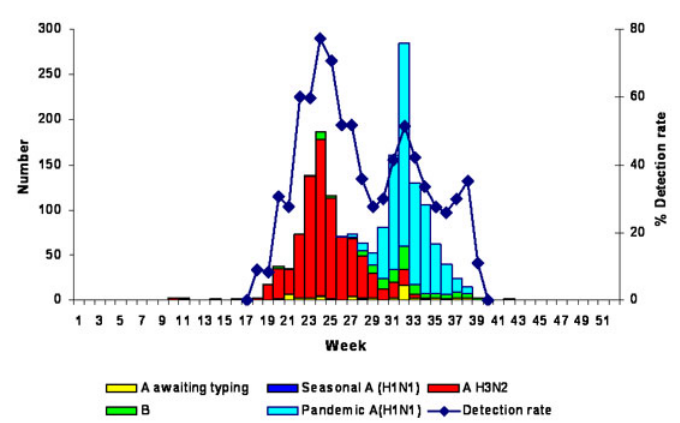
Figure 11 - Influenza virus isolated by virus type and epidemiologic week, South Africa 2009 (sentinel surveillance, source NICD).



Tuberculosis

South Africa has the highest prevalence, incidence and death rate of tuberculosis (TB) per capita worldwide. On average, 40 cases per 100,000 population occurred yearly (between 2004 and 2006). In the past decade, the country has recorded high and increasing rates of multi-drug resistant tuberculosis (MDR-TB) (over 3 per 100,000 population), including an increase in extensively drug resistant-tuberculosis (XDR-TB) (cf. tables3 and 4.).

The risk of contracting TB is highest in people with immunosuppressive conditions such as HIV/AIDS, and persons on corticosteroids or other immune-modulating drugs. Adequate ventilation (mechanical/natural) as well as sunlight reduce the risk of TB transmission. Therefore, the risk of contracting TB in open air stadia where matches will be hosted is low.

Table 3 - MDR-TB cases by province and year (2004-2008), South Africa (source NICD).

	Year					Total
Province	2004	2005	2006	2007	2008	
Eastern Cape	476	574	930	1 128	1,244	4 352
Free State	107	170	204	216	269	966
Gauteng	591	704	714	1 027	896	3,932
KwaZulu Natal	512	1 109	2 402	2 239	1,220	7 482
Limpopo	84	53	76	114	196	523
Mpumalanga	153	123	144	473	553	1 446
North West	133	194	213	390	269	1 199
Northern Cape	155	142	178	194	178	847
Western Cape	1 187	1 183	1 204	1 459	903	5 936
Total	3,398	4 252	6 065	7 240	5 728	26 683

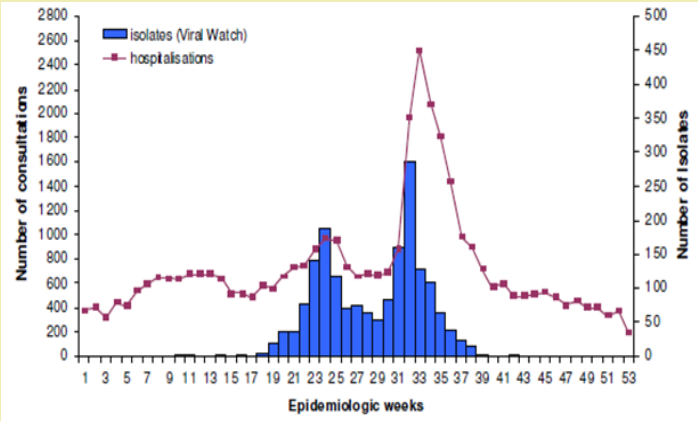
Table 4 - XDR-TB cases by province and year (2004-2008), South Africa (source NICD).

	Year					Total
Province	2004	2005	2006	2007	2008	
Eastern Cape	10	15	66	106	203	400
Free State	2	4	4	6	7	23
Gauteng	37	13	19	43	35	147
KwaZulu Natal	50	213	322	228	155	968
Limpopo	1	0	3	0	2	6
Mpumalanga	0	0	1	11	6	18
North West	6	10	15	10	10	51
Northern Cape	6	8	3	7	11	35
Western Cape	27	21	29	43	51	171
Total	139	284	462	454	480	1 819

Other respiratory illnesses

Considering the temperate climate across most of South Africa, the occurrence of respiratory illnesses and their epidemiological characteristics do not differ significantly from what is observed in winter in Europe (figure 12).

Figure 12 - Private hospital consultations with a discharge diagnosis of pneumonia and influenza (P&I) and viral isolates, South Africa, 2009 (sentinel surveillance, source NICD).



Diarrheal illnesses

Cholera

Cholera is endemic in the south of the African continent. Outbreaks have recently affected Limpopo (5,520 cases), Mpumalanga (6,855 cases), and Gauteng (286 cases) provinces in the north east of the country (table 5). Most cases had also been recorded in this north-eastern region in 2009 (cf figure 13). Note that a severe outbreak affected neighbouring Zimbabwe (bordering Limpopo) in 2008-2009. The risk for visitors is low if they respect hygiene and prevention measures and follow the usual recommendations made to travellers.

Table 5 - Reported cholera cases and deaths in South Africa by province, Nov 2009-Feb 2010 (source NICD).

Province	Total cases*	Laboratory-confirmed cases no.(% of total)†	Deaths
Mpumalanga	6 101	379 (6)	30
Limpopo	4 586	494 (11)	23
Gauteng	265	64 (24)	3
North West	14	14 (100)	0
Western Cape	8	8 (100)	0
KwaZulu Natal	2	2 (100)	1
Northern Cape	1	1 (100)	0
Free State	1	1 (100)	0
Eastern Cape	1	1 (100)	0
Cumulative total	**10 979**	**964 (9)**	**57(CFR=0.52%)**

*This includes both laboratory-confirmed cases and cases meeting the current clinical case definition for cholera (all individuals with acute onset of watery diarrhoea)

†This includes all laboratory-confirmed cholera cases reported to the NICD from NHLS and private laboratories

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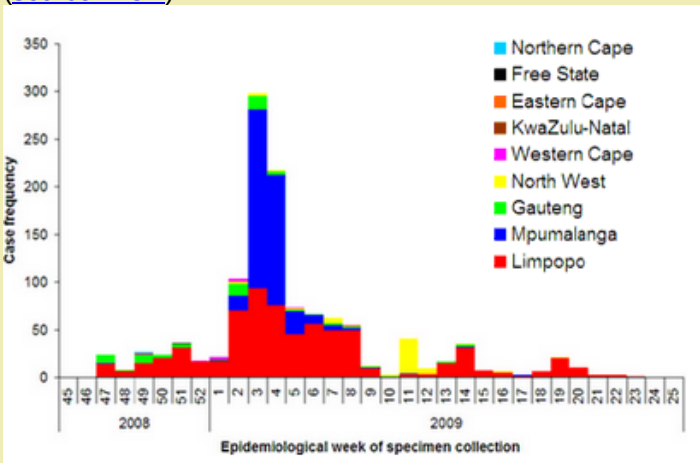
Figure 14 - Laboratory-confirmed cholera cases by epidemiological week of specimen collection and province, South Africa, Nov 2008-Jun 2009 (n=1203) (source NICD).



Others Diarrheal illnesses

- 1,612 laboratory confirmed cases of *Shigella Spp (*non Sd1) and 2 cases of *Shigella dysenteriae* were recorded in 2009.
- Sporadic foodborne outbreaks of hepatitis A have been reported (ex. in Gauteng province and in Western Cape in 2008).

OTHERS

Rabies

Rabies is endemic to South Africa and is mainly related to contact with dogs. Infections in mongoose, cats, cattle, and some foxes have also been documented. Transmission occurs via contact with saliva from infected animals, usually as a result of a bite, scratch or lick to open skin.

A total of 6 human rabies cases have been laboratory confirmed in South Africa since the beginning of 2010. These cases originated from Mpumalanga (n=1); KwaZulu-Natal (n=1), Eastern Cape (n=1) and Limpopo (n=3) Provinces. Fifteen human rabies cases had been confirmed in 2009. Rabies cases were reported from the Eastern Cape (n=7); KwaZulu Natal (n=4); Limpopo (n=2) and Mpumalanga (n=2) provinces. Seven of the cases were linked to dog exposures. Source of exposure was unknown for the remaining cases.

Schistosomiasis

Schistosomiasis (bilharzia) is a major public health problem in South Africa. Over 5 millions people are estimated to be infected by bilharzia and over 30 millions at risk, mainly children (10.8% of population infected in 2003). The disease is endemic in 6 of the 9 provinces. Affected areas include mainly north and east of the Witwatersrand in Gauteng, Limpopo and Mpumalanga Provinces; the lower-altitude areas of KwaZulu-Natal Province; and extend along the coast into the Western Cape Province.

The most common species are *S.haematobium* and *S. mansoni.* South African health authorities have warned visitors against freshwater swimming in rivers, streams or lakes. Swimming in chlorinated pools or in salt water does not present a risk of schistosomiasis.

8. CONCLUSION

Most travellers to South Africa experience no significant health events during their stay. Although it may be perceived as an exotic location for World Cup visitors, it is likely that health risks will not differ markedly from those documented at similar mass gatherings in Europe (in winter). This observation applies primarily to visitors remaining in urban/metropolitan areas (versus remote rural areas), avoiding risky behaviour, and respecting basic hygiene and prevention measures. In the context of an international mass gathering, ensuring adequate immunisation of participants and tourists is fundamental due to the mingling of populations with possibly different susceptibility to infectious diseases. South African health authorities have highly recommended pre-travel physician consultation and appropriate vaccinations for future FIFA 2010 WC visitors. All recommendations were summarised in a guide for FIFA 2010 WC visitors.

In their planning of public health preparedness and response to health threats, South African authorities report not only having considered venues and world cup sites, but also touristy areas likely to be visited by football fans on their journey.

South Africa has previously hosted a number of major international events such as the 1995 Rugby World Cup, the 1996 football African Cup of Nations, the 2003 Cricket World Cup and the Indian Premier League in 2009. It is thus familiar with ensuring public health at large events.

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