

NICD 2008

Epidemiology & Surveillance Unit

BACKGROUND

The Epidemiology and Surveillance Unit facilitates communication and data sharing between the National and Provincial Department of Health and the NICD. The unit provides epidemiologic input to other NICD units through collaborative projects and support of surveillance and epidemiology activities. Unit staff are involved in numerous teaching and training activities and represent the NICD at meetings with the Department of Health. In 2008 the Unit co-ordinated several surveillance programmes including the "viral-watch" respiratory virus surveillance system, the respiratory hospitalisations surveillance programme and the influenza-associated mortality surveillance programme and was involved in the establishment of new surveillance programmes for Severe Acute Respiratory Tract Infections (SARI) and Rotavirus. The Unit is also responsible for publication of the quarterly Communicable Diseases Surveillance Bulletin.

ACTIVITIES, HIGHLIGHTS AND ACHIEVEMENTS

SURVEILLANCE PROGRAMMES

Suspected measles case-based surveillance

The NICD is accredited by the World Health Organisation (WHO) to perform measles and rubella IgM testing for national case-based surveillance. Blood and urine specimens from suspected measles cases nationally are submitted to NICD for confirmation. Approximately 60% of suspected measles cases from Free State Province are tested in that province. The

numbers presented here represent specimens received by the NICD and may differ from those presented by the National Department of Health as they may receive information on cases where no specimens were taken.

During 2008 the NICD tested 4777 specimens from cases of rash and fever for suspected measles case-based surveillance. Of these specimens 42 were from patients with onset of symptoms in 2007. Of the remaining 4735 specimens the largest number, 1025 (21.6%) were from KwaZulu-Natal, followed by 867 (18.3%) from Gauteng. In addition 61 specimens were tested at the NHLS Universitas Academic Laboratory at the University of the Free State (Figure 1). Case-based surveillance requires that both a blood and urine specimen are submitted. During 2008 blood and urine specimens were received from 63% of cases, blood only from 32% and urine only from 5% (Figure 2). Of the 4796 blood specimens 40 (0.8%) were positive for measles IgM antibodies, and 2160 (45%) for rubella IgM antibodies (Table 1).

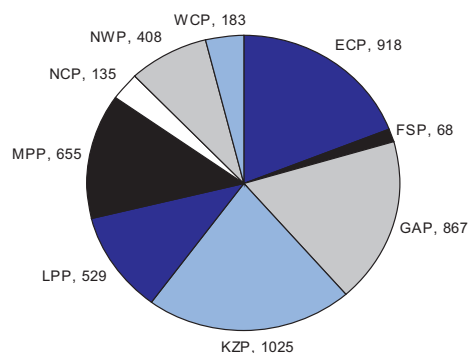


Figure 1: Number of specimens received for measles case-based surveillance by province.

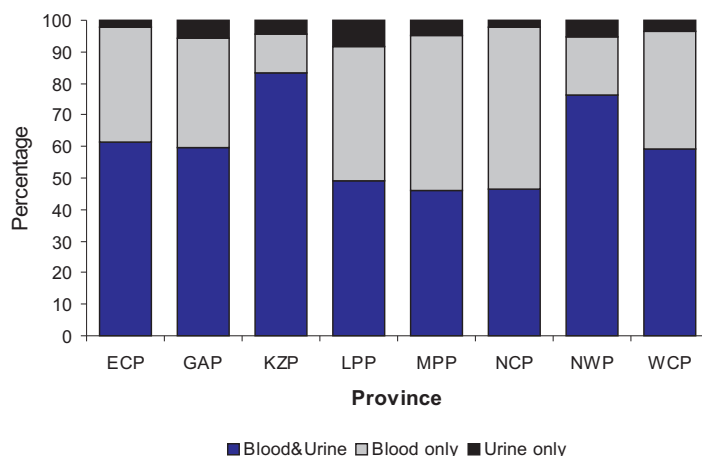


Figure 2: Type of specimens received for measles case-based surveillance by province, South Africa, 2008.

Table1: Number and rate of suspected measles cases with specimens submitted and measles and rubella IgM positive cases from suspected measles case-based surveillance, South Africa, 2007 & 2008

Suspected measles case based surveillance, South Africa, 2007 & 2008											
Provinces											
	Year	ECP	FSP*	GAP	KZP	LPP	MPP	NCP*	NWP*	WCP	TOTAL
Number of cases*	2007	602	70	605	421	407	354	143	221	407	3230
	2008	918	76	868	1025	529	655	135	408	183	4796
Cases/100 000 population	2007	8.5	2.4	6.2	4.3	7.6	9.8	13.0	6.6	8.4	6.8
	2008	13.0	2.6	9.1	10.4	9.2	19.9	14.7	10.5	3.7	9.9
Measles IgM positive	2007	6	1	9	3	2	6	0	1	2	30
	2008	7	1	11	6	1	3	2	5	4	40
Rubella IgM positive	2007	293	20	141	213	119	60	36	65	118	1064
	2008	488	18	301	612	196	304	34	171	38	2162

* Includes specimens tested at UFS

Provinces of South Africa: EC - Eastern Cape, FS - Free State, GA - Gauteng, KZ - KwaZulu-Natal, LP - Limpopo, MP - Mpumalanga, NC - Northern Cape, NW - North West, WC - Western Cape

Measles

Of the 40 patients with positive measles results, the majority were from Gauteng (12 cases), and the Eastern Cape (7 cases). Ages of patients with positive measles results ranged from 9 months to 46 years (median 3 years). Urine specimens accompanied 24 of the 40 specimens with positive measles IgM results. Ten of these were patients with dual measles IgM and rubella IgM positive results, and five were found to be rubella PCR positive. Measles was confirmed by PCR on urine in only one patient. The virus was identified as genotype D8, suggesting importation.

Rubella

There were 2162 rubella IgM positive cases in 2009, an increase from 1064 in 2008 (Table1) (Figure 3). Patients with positive rubella IgM results were aged between 4 months and 75 years (median 7years). This age distribution has been constant since case-based surveillance began. Amongst the 4500 patients with age and sex recorded from whom specimens were submitted 308 were females aged between 12 and 49 years.

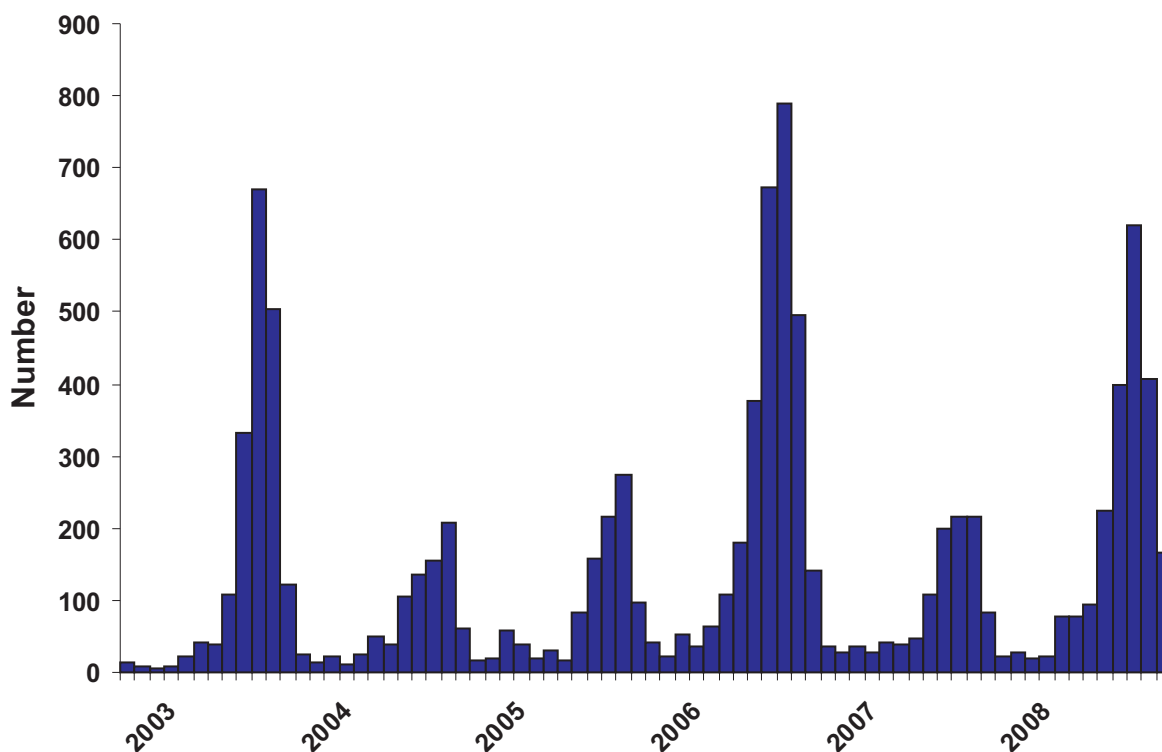


Figure 3: Number of Rubella IgM positive patients by month, South Africa, 2003-2008

Acute Flaccid Paralysis Surveillance

Acute flaccid paralysis (AFP) surveillance, as part of the WHO worldwide campaign to eradicate poliomyelitis, has continued throughout the year. All cases of AFP including Guillain-Barré syndrome, in children less than 15 years of age, or a patient of any age diagnosed as polio by a medical doctor must be regarded as possible polio cases until proven otherwise.

The NICD serves as national isolation laboratory for South Africa as well as six other Southern African countries i.e. Angola, Botswana, Lesotho, Mozambique, Namibia, and Swaziland. During the year 1958 stool specimens were received from patients with AFP from these seven countries. Of these 58 were from patients with onset of paralysis prior to 2008. Of the remainder 667 were from 345 South African cases, and 1233 from the six other countries served by the NICD (Figure 4). In early January a further 18 specimens were received from South African cases with onset of paralysis in 2008, bringing the total number of cases in 2008 to 351.

South African cases: Of the 351 South African cases with onset of paralysis in 2008, one specimen only was received from 53 cases, and two or more specimens from 292. The date of onset of paralysis was known for 309 (88%) cases. Two specimens taken at least 24

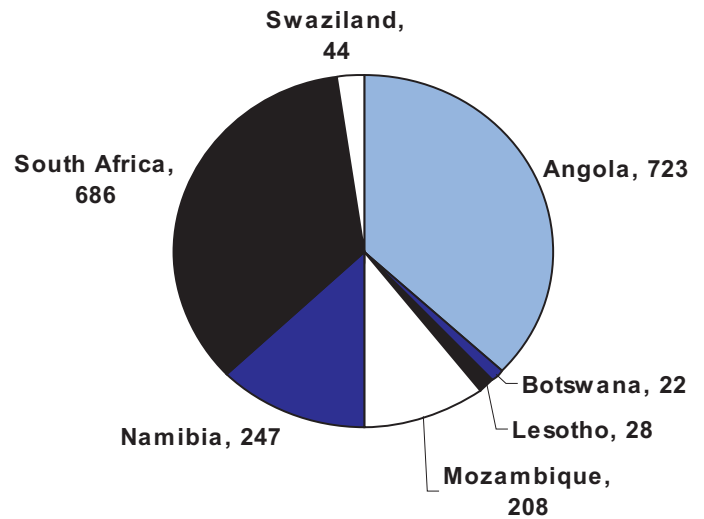


Figure 4: Number of stool specimens from AFP cases received for virus isolation by country.

hours apart and within 14 days of onset were received from 228/351 (65%) cases (range per province 47% to 84%). Non-polio enteroviruses were isolated from 57, and non-enteroviruses from 31 of the 685 specimens (non-polio isolation rate 13%), and poliovirus, identified as Sabin type poliovirus from 9 specimens of four patients (Figure 5).

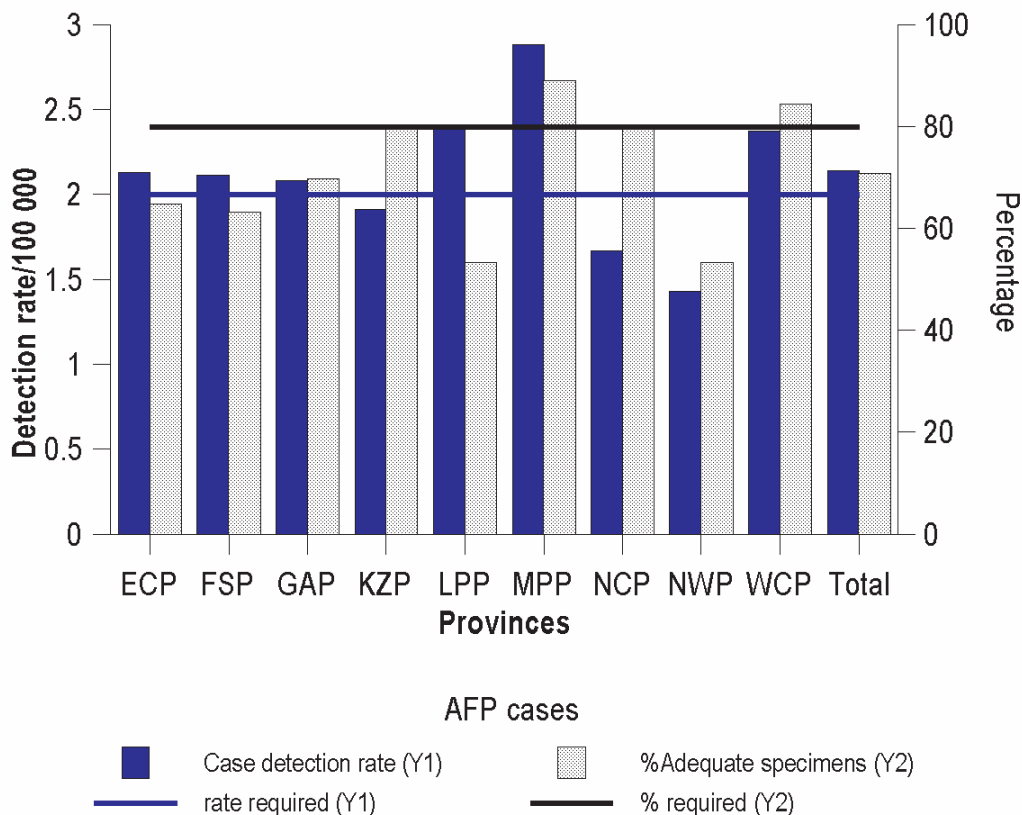


Figure 5: AFP case detection and stool adequacy rate, South Africa, 2008 (only patients from whom stool specimens were received included)

Other southern African countries: Of the 1272 specimens received from the six southern block countries served by the NICD, 39 were from patients with onset of paralysis prior to 2008. Two adequate stool specimens were received from 562 (90%) of the 625 patients with onset of paralysis in 2008 (range per country 74% to 100%). Non-polio enteroviruses were isolated from 139/1233 specimens with a non-polio enterovirus isolation rate of 11% (range per country 2% to 40%). Poliovirus was isolated from 85 specimens, 8 of which were identified as wild type polio 1, 46 as wild type polio 3, and the remainder as Sabin strains. The wild type isolates were from 28 patients in Angola with dates of onset ranging from 10 January 2008 to 30 November 2008.

Respiratory Virus Surveillance

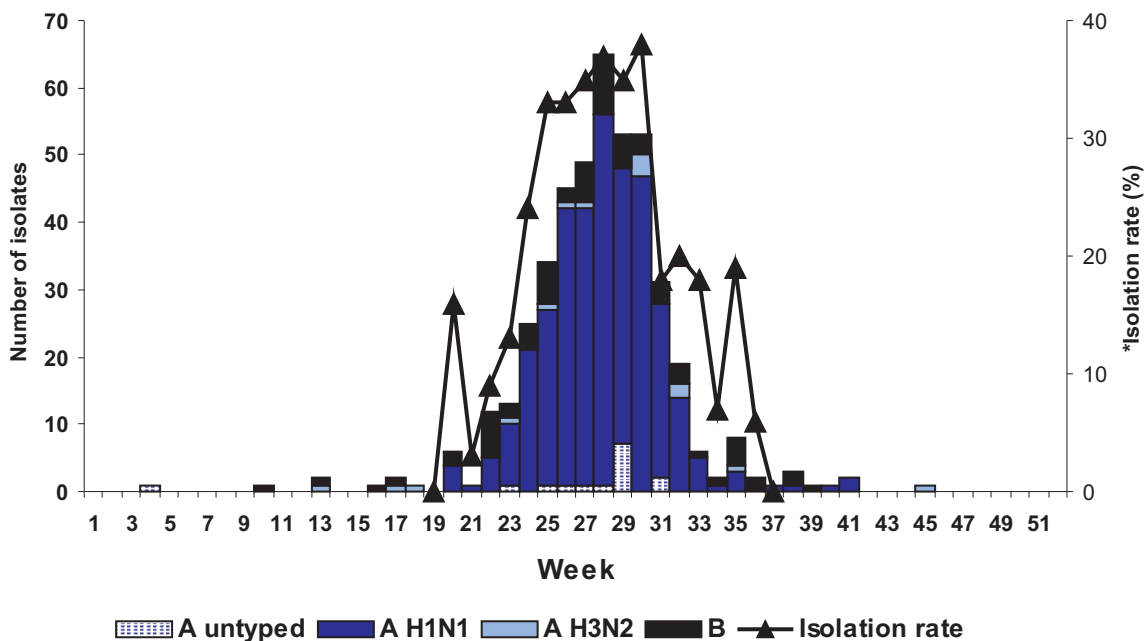
“Viral watch” surveillance system: During 2008 a total of 1637 specimens were received for detection of respiratory virus. Of these 1379 (84.2%) were received from the Viral Watch programme, started in 1984 and expanded substantially in 2005, which was specifically designed to monitor influenza activity in the community, and detect the type of influenza strains prevalent. During 2008 the programme was rolled out in the Northern Cape and North West provinces, adding a further 18 practitioners to the programme, bringing the total country-wide to 170 in all provinces. Throat swabs are submitted from these centres throughout the year from patients with respiratory tract infections of recent onset i.e. within 48-72 hours, and without obvious bacterial cause, and transported to the laboratory in

viral transport medium for isolation of virus. Specimens are tested at the NICD from all provinces other than KwaZulu-Natal and the Western Cape where testing is performed at the provincial virology laboratories, and positive specimens sent to NICD for confirmation, serotyping and sequencing.

A total of 441 influenza isolates were made, of which 398 (90.3%) were from Viral Watch sites. The isolates were further identified as 374 influenza A, of which A/Brisbane/59/07 like (H1N1) accounted for the majority (345). Only 14 of the influenza A isolates were identified as A/Brisbane/10/07-like (H3N2). Both influenza B lineages circulated and 44 of the 67 influenza B isolates were identified as B/Florida/04/06-like (B Yamagata lineage).

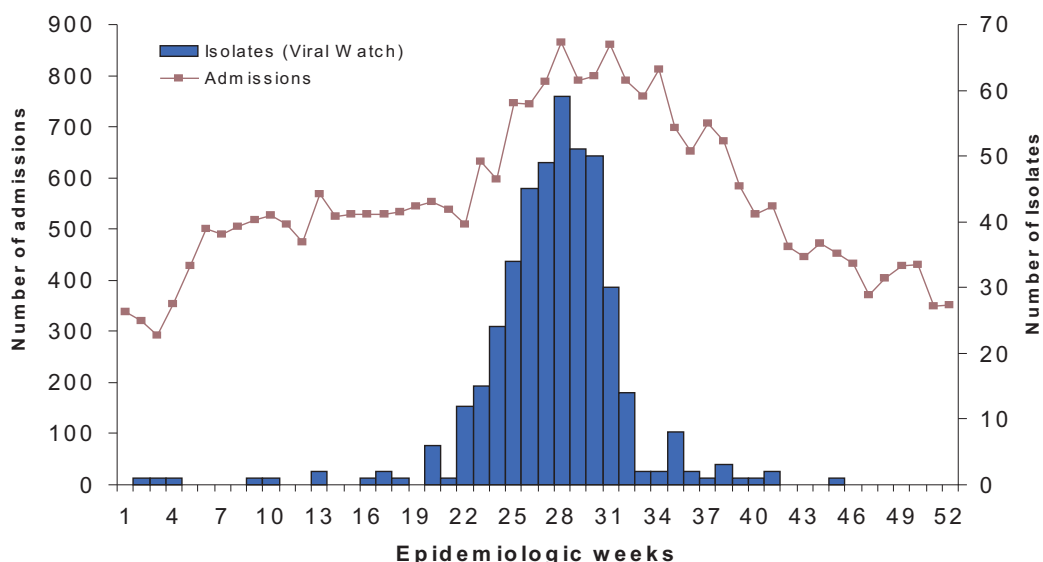
The first influenza isolate of the season was made from a specimen collected on 25 April, and the last from a specimen collected on 7 October. A further 64 respiratory isolations were made during the year including 51 respiratory syncytial virus, 4 parainfluenza type 3 virus, and 7 adenovirus.

Respiratory morbidity data mining surveillance system: During 2008 there were 1037599 consultations reported to the NICD through the respiratory morbidity data mining surveillance system. Of these 2.8% (28775) were due to influenza or pneumonia (ICD codes J10-18). The timing of the peak in respiratory consultations was similar to the timing of the peak in influenza virus isolations (Figure 7).



*Isolation rate calculated on specimens tested at NICD only

Figure 6: Number of influenza virus isolates by virus type and epidemiologic week 2008



* Hospitalisations data from weekly reports of admissions to the Netcare hospital group. Discharge diagnosis is according to ICD coding by clinicians and does not represent laboratory confirmation of aetiology

** Viral isolation data from the Viral Watch sentinel surveillance programme

Figure 7: Number of private hospital admissions* with a discharge diagnosis of pneumonia and influenza (P&I) and viral isolates, South Africa, 2008**

Influenza-associated mortality surveillance programme:

In 2008, a surveillance programme for surveillance of influenza-associated mortality in South Africa was introduced. Monthly mortality incidence for all-cause, all respiratory causes, pneumonia and influenza (P&I), diabetes, ischaemic heart disease, cerebrovascular disease and malignant diseases in the population over 65 years of age is compiled using routine national mortality data from death certificates provided by Statistics South Africa. Data available in 2008 covered the period 1998-2005. The influenza-related excess mortality was estimated using a classical Serfling-type linear regression model, in which mortality in excess of a seasonal baseline is attributed to influenza.

Severe acute respiratory tract infection (SARI) surveillance:

In 2008 funding was obtained and a protocol developed to implement Severe Acute Respiratory-tract Infection (SARI) surveillance from 2009. This will be a prospective hospital-based sentinel surveillance programme for SARI in 4 sentinel hospitals in Gauteng Province, KwaZulu-Natal Province and Limpopo Province. This programme aims to describe trends in numbers of SARI cases at sentinel surveillance sites and determine the relative contribution of influenza and other respiratory viruses to this disease presentation in a setting with a high prevalence of Human Immunodeficiency Virus (HIV). These data will serve to better inform public health policy regarding SARI management, prevention and control in South Africa. In addition, it will assist in planning for future influenza pandemics and will be essential to the assessment of both influenza and pneumococcal conjugate vaccine strategies in South Africa.

Web-based influenza reports: Web-based reporting of current influenza surveillance findings was introduced with weekly reports in the season and monthly reports out of the influenza season being published on the NICD web page.

Rotavirus surveillance

Funding was obtained and a protocol developed to conduct active sentinel surveillance for rotavirus infection at 5 sentinel hospitals in 4 Provinces in South Africa (Gauteng, Mpumalanga, Northwest province and KwaZuluNatal) in collaboration with the NICD Viral Gastroenteritis Unit. The programme aims to estimate the number of hospitalisations due to severe diarrhoea and laboratory-confirmed rotavirus infection in HIV-infected and uninfected children as well as determine the prevalent rotavirus strains in different geographical areas of South Africa. We will monitor trends in these indicators following introduction of the rotavirus vaccine. These data will allow us to monitor the effects of rotavirus vaccine introduction and identify any changes in circulating strain type following vaccine introduction.

RESEARCH PROJECTS

Age-specific prevalence of hepatitis B virus immunity and carriage in Eastern Cape Province 11 years after the introduction of universal infant vaccination:

Ginindza T, Cohen C, Puren A, Schoub BD, Singh B, Masango M. We evaluated the age-specific prevalence of antibodies to hepatitis B virus surface antigen and the prevalence of surface antigen carriage in the Eastern Cape Province using residual sera from specimens submitted from suspected measles cases as part of case-based measles surveillance. Preliminary findings of this project were presented by Mr T Ginindza at the NICD Academic Day on 11 November 2008.

Estimation of influenza-related excess mortality in South African seniors, 1998-2005: Cohen C, Viboud C, Simonsen L, Miller M, Kang J, Bessellar TG, McAnerney J, Blumberg L, Schoub B. We estimated influenza-related mortality rates among South African (SA) seniors ≥ 65 years of age from 1998-2005 and compared these estimates with those of the United States of America (USA). Influenza-related excess mortality was estimated using Serfling linear regression model. Rates of excess all-cause, all-respiratory, pneumonia & influenza, diabetes and cardiovascular disease mortality were substantially higher in SA than in the USA. Preliminary results were presented at the Third European Epidemiology Congress, Vilamoura, Portugal 14-18 September 2008.

An outbreak of measles in South Africa, 2006 - The role of molecular epidemiology: Cohen C, Smit S, van den Heever J, Sebekedi C, Kibuuka D, Mahole M, McAnerney J, Masango M, Kekana E and Hlaaletho D. The epidemiology and molecular characterization of a measles outbreak in the Northwest Province was described. Results were presented at the VVIII IEA World Congress of Epidemiology in Porto Alegre Brazil, 20-24 September 2008.

GROUP FOR ENTERIC RESPIRATORY AND MENINGEAL PATHOGENS-SOUTH AFRICA (GERMS-SA) PROJECTS

The unit participated in the following collaborative projects with the National Microbiology Surveillance Unit (NMSU), Respiratory and Meningeal Pathogens Unit (RMPRU), Enteric Diseases Reference Unit (EDRU) and Mycology Reference Unit (MRU) as part of GERMS-SA:

HIV-infection associated with increased risk of meningococcaemia and higher case fatality rates in South Africa: Cohen C, Singh, E. von Gottberg A, de Gouveia L, Klugman K, Meiring S, Govender N, Martin S for GERMS-SA. We estimated the incidence of invasive meningococcal disease in HIV-infected and -uninfected patients and evaluated whether HIV was a risk factor for mortality and meningococcaemia (as compared with meningitis) in Gauteng Province, South Africa. The incidence of meningococcal disease was elevated in HIV-infected patients as compared to HIV-uninfected patients as was the crude case fatality rate. On multivariable analysis, HIV infection was associated with increased odds of meningococcaemia as compared to meningitis. Findings of this project were presented at several meetings including the VVIII IEA World Congress of Epidemiology in Porto Alegre Brazil, 20-24 September 2008 and the University of the Witwatersrand Academic Day.

High levels of HIV-coinfection in adults with invasive pneumococcal disease, South Africa, 2003 to 2006: Quan V, von Gottberg A, Cohen C, Meiring S, de Gouveia L, and Klugman KP, for GERMS-SA. The

Epidemiology of invasive pneumococcal disease in adults was described.

A Comparison of Cryptococcal Cases with and without Recurrence in South Africa (SA), 2005-2006: Govender N, Cohen C, Meiring S, Quan V, Dawood H, Coovadia Y, Poswa X, Karstaedt A, Hoosen A for GERMS-SA. A comparison between cryptococcal cases with and without recurrence was conducted.

Surveillance for Cryptococcosis in South Africa, 2005-2007: Govender N, Cohen C, Meiring S, Quan V, Patel J, Dawood H, Karstaedt A, Coovadia Y, Hoosen A, Perovic O, and McCarthy K for the Group for Enteric, Respiratory and Meningeal disease Surveillance in South Africa (GERMS-SA). The epidemiology of cryptococcosis in South Africa was described.

Active laboratory-based surveillance for invasive and non-invasive shigellosis in South Africa, 2003 - 2007: predominant serotypes may guide vaccine development: Keddy KH, Sooka A, Crowther P, Govender N, Quan V, Meiring S, Cohen C for Group for Enteric, Respiratory and Meningeal disease Surveillance in South Africa. The epidemiology of invasive and non-invasive shigellosis in South Africa was summarised.

SURVEILLANCE PUBLICATIONS

The Unit continued to take responsibility for publication of the quarterly Communicable Diseases Surveillance Bulletin which aims to be a scientific publication for the regular dissemination of surveillance and outbreak data as well as relevant recent research from the NICD. In February 2008, an Editorial Board was established. The Editorial Board aims to assist with decision making regarding bulletin format and content, to ensure that the bulletin adequately represents the activities of the NICD and to support and advocate for bulletin activities. The bulletin moved to a predominantly web based format with quarterly editions published on the NICD web page.

NICD TRAINING ACTIVITIES

The Unit continued to coordinate the Epidemiology Journal Club and Epidemiology Discussion Group which aim to bring NICD staff involved in epidemiology together in a forum which allows for ongoing education and discussion related to strengthening NICD epidemiology and surveillance activities.

INTERNATIONAL VISITS, TRAINING COURSES AND MEETINGS ATTENDED

Dr Cohen attended the African Regional Training on Sentinel Surveillance for Influenza in Entebbe Uganda from March 11-13, 2008. The meeting aimed to assist African countries in establishing influenza sentinel surveillance programmes.

Dr Cohen visited the National Institute of Health in Bethesda, Maryland, United States of America from 12-30 May and 11-27 November and 2008 to participate in collaborative research. The project involved estimating the burden of excess deaths attributable to influenza in individuals ≥ 65 years and in HIV infected and uninfected adults in South Africa and the United States of America.

Dr Cohen attended the Multinational Influenza Seasonal Mortality Study meeting, 19-20 September, Vilamoura Portugal. This meeting focused on establishing a global network of sites contributing information on influenza epidemiology for the purposes of statistical modelling.

MEETINGS AND SYMPOSIA CONDUCTED

An Influenza Symposium was held at the NICD on 25 and 26 February 2008 at the PRF Training Centre at the NICD. Doctors participating in the viral watch surveillance system, representatives from National and Provincial departments of health and other clinicians were invited. Presentations included report back on surveillance findings to stakeholders and updates as to current developments in the field of influenza.

COLLABORATIONS

RESEARCH AND SURVEILLANCE COLLABORATIONS

Dr C Viboud, Dr L Simonsen, Dr M Miller, National Institutes of Health, Bethesda, Maryland, USA: Estimation of influenza-related excess mortality in South African seniors, 1998-2005.

Prof Shabir Madhi, Dr Michelle Groom: Department of Science and Technology(DST)/ National Research Foundation(NRF): Vaccine Preventable Diseases. Chris Hani Baragwanath Hospital. Severe Acute Respiratory Tract Infections and Rotavirus Surveillance.

DEPARTMENT OF HEALTH COLLABORATIVE ACTIVITIES

Dr C Cohen is a member of the National Certification Committee for the Eradication of Polio and attended quarterly meetings of this committee.

Sr J McAnerney is a member of the secretariate of the National Polio Expert Committee and attended quarterly meetings of this committee.

Surveillance unit staff attended the quarterly EPI Task Group Meetings.

Dr Cohen was appointed as a member of the expert committee for the development of national guidelines for the management of Hepatitis A, B and C.

Dr Cohen attended the DOH/WHO Biennial Planning Health Information, Evaluation, Epidemiology and Research 2007/08 Workplan Meeting. From 26-28 March 2008 at Burgers Park Hotel, Pretoria and gave a presentation on "Measles, polio, influenza and sexually transmitted infections surveillance".

CAPACITY BUILDING

Dr Cohen was co-ordinator for the Infectious Diseases Epidemiology and Disease Surveillance Modules for the Master of Science in Medicine (Epidemiology and Biostatistics) at the University of the Witwatersrand, Johannesburg, South Africa.

Dr Cohen and Sr McAnerney were lecturers for the Field Epidemiology and Laboratory Training Programme.

Dr Cohen acted as an external examiner for the Masters in Epidemiology at the National School of Public Health University of Limpopo.