

The development of passive health surveillance by a sentinel network of family practitioners in South Africa

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Objective. For the South African Sentinel Practitioner Research Network (SASPREN), a volunteer network of family practitioners in South Africa, to develop a health surveillance system through the surveillance of important health events.

Motivation. The incidence of important preventable diseases and the burden of disease are not reliably known in South Africa, both in the public and private sector. Incidence rates determined at primary care level could help with planning and delivery of appropriate health services and monitoring of the impact of intervention programmes.

Methods. Altogether 183 sentinel practitioners were recruited in nine provinces, from 2 478 doctors invited to participate. Of these 120 were active in reporting all their new cases of 13 selected health events to the study centre on mailed postcards. After data-capturing, incidence rates were calculated for defined periods. Feedback was given to the sentinels through a newsletter and personalised reports.

Results. A network of sentinel family practitioners has been established in South Africa, and can provide incidence rates for both diseases and interventions through a simple and cheap surveillance system. The calculated rates demonstrated periodic trends for certain events, as well as inter-provincial, -gender and -population group differences.

Conclusions. As the validity of the dataset and its generalisation to the whole population is uncertain, its usefulness as point estimates of incidence rates is unknown. This information serves as an important pointer for further research. The trends of these rates may provide a valuable tool for monitoring the impact of public health policies.

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South Africa, like the rest of sub-Saharan Africa, has a shortage of mortality and morbidity information.¹ The health of a nation depends largely on the quality of the information systems that support its public health system. Public health surveillance (PHS) is an important component of such a system, and entails the ongoing systematic collection, analysis and interpretation of outcome-specific data for use in the planning, implementation and evaluation of public health practice.² Three crucial elements of PHS have been identified: (i) the systematic collection of pertinent data; (ii) the orderly consolidation and evaluation of these data; and (iii) the prompt dissemination thereof to those who need to know.²

The possible sources of PHS information are described elsewhere.^{1,2} Each source has its own inherent strengths and limitations, and no single source can provide all the necessary data. Primary care providers can provide timely information for PHS because they usually provide the first professional judgement for medical problems that are seen in early stages. They are particularly well placed for detecting epidemics of infectious diseases,^{3,4} but have also proved effective in supplying data on chronic diseases for health interventions.⁵

Sentinel networks of family practitioners are important sources of public health information in many Western countries.² Such networks have been operating in the UK, the Netherlands and other countries for more than 30 years.² In South Africa a similar network, the Southern African Sentinel Practitioner Research Network (SASPREN), was founded in 1991.⁶ SASPREN has conducted several short-term studies,⁷ and undertook a pilot surveillance project during 1993.

The aim of the present study was to develop the infrastructure and methodology for conducting ongoing passive health surveillance through a network of family practitioners (within SASPREN) in a developing country in order to provide public health authorities with information on the incidence of selected health events in family practice/primary care.

Methods

A volunteer network of sentinel family practitioners was established, covering the whole of South Africa. Some of them agreed to report all new cases of selected health events on a weekly basis. Surveillance started on 6 November 1995 and is still in progress.

Sentinels were recruited during 1995 via postal invitation to a large group of family practitioners. The membership list of the South African Academy of Family Practice/Primary Care, address lists of the university departments of family medicine and the database of the Medical Association of South Africa were used. A total of 2 478 invitations were sent out during the first round. These were later followed up by telephonic recruitment in the Northern Cape, and an invitation flyer at the National Family Practitioners' Congress, September 1996.

The network steering committee selected 13 health events (Table I) for surveillance on the basis of the responses to a letter to the national and provincial health departments, academic departments of community health and family

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medicine, and medical professional groupings. The letter invited suggestions for priority health events to be reported through a sentinel family practitioner network.

Table I. Health events selected by SASPREN for surveillance during 1996

Asthma
Hypertension
Diabetes mellitus
Acute myocardial infarction
Depression
Domestic (family household) violence
Pap smear
Sexually transmitted disease syndrome
Testing for HIV status
Suspected tuberculosis as primary diagnosis
Measles
Underweight in child < 6 years
Acute gastro-enteritis in child < 6 years

Sentinels were provided with a detailed instruction booklet, which included a case definition of each event, as well as the report cards for 1 year. The case definitions were based on current consensus.

The sentinels had to mark all new cases of the events by age group, gender and population group (only black African or other*) on a simple pre-printed grid, as well as their total number of consultations for the week. All patients seen by the practitioner had to be included (including the public sector patients of those private practitioners with such appointments). The postcards were then posted by pre-paid mail to the study centre at Tygerberg, where the data were collated.

Data capturing was undertaken by a part-time research assistant, using a custom-designed software programme. Data analysis and presentation were carried out by means of a standard computer spreadsheet. Since the population served by each sentinel was unknown, incidence rates were calculated by using the number of reported consultations or contributing sentinels as denominators. Rates were determined weekly, monthly and quarterly on a provincial and national basis, using the denominators for the period in question.

All sentinels received a monthly report, comparing their own reported notification rates to their province's and the national rates, as well as *The Sentinel*, a quarterly newsletter. The newsletter was used to disseminate the results of surveillance, and to improve the quality of reporting through feedback about problem areas. Non-responding sentinels were promptly followed up by telephone in order to maximise the response rate.

Results

Sentinels

A total of 186 sentinels had joined the network by the end of 1996 (Table II). The aim to recruit at least 20 per province was achieved in all but three provinces. One hundred and twenty (64.5%) participated in surveillance at some stage

during the year. Almost half (53%) of them practised in cities, the rest in towns (43%) or small settlements (4%). Most practised in the private sector (87%), with 28% also holding state appointments (mostly district surgeons). The rest (13%) worked in public sector facilities (hospitals and community health centres).

Table II. SASPREN sentinel status at the end of 1996

Province	SA pop. (%)	No.	Active (%)	Avg. active/wk (%)
Eastern Cape	16.5	25	18 (72.0)	9 (15.0)
Free State	6.9	15	10 (66.7)	6 (10.0)
Gauteng	16.7	30	20 (66.7)	11 (18.0)
KwaZulu-Natal	20.9	22	12 (54.5)	6 (10.0)
Mpumalanga	6.9	21	13 (61.9)	7 (11.7)
Northern Cape	1.7	21	7 (33.3)	4 (6.6)
Northern Province	12.5	4	2 (50.0)	2 (3.3)
North-West	8.6	7	7 (100)	4 (6.6)
Western Cape	8.8	41	31 (75.6)	17 (28.3)
Totals	100.0	186	120 (64.5)	60 (100)

SA pop. % = the proportion of the population of South Africa resident in that province; No. = the number of registered sentinels in the province; Active (%) = the number and the percentage of sentinels (of the registered sentinels) who were contributing at any stage during the period; Avg. active/wk (%) = the average number and % of sentinels who were contributing per week is the proportion of the total average per week.

Most of the sentinels (79%) had more than 10 years of experience as medical practitioners, while 42% had a postgraduate qualification in medicine. The mean age was 44.4 (SD 9.99) years with a median of 43 years.

Responses

The average weekly response was from 60 sentinels (50% of those who agreed to participate). During the first 4 weeks of surveillance (November/December 1995), which was used as a 'washing-in' period, there was a sharp decline in responses. The response rate stabilised thereafter, but showed another sharp decline during the same period of 1996. Eighty-nine sentinels contributed more than 20 weeks of surveillance during 1996.

Consultations, notification rates and trends

A total of 496 771 consultations were covered during 1996, during which 47 375 events were notified. The national notification rates for the different events are tabulated in Table III. Sexually transmitted disease syndrome and gastro-enteritis in children under 6 years are responsible for almost half of the notifications, together constituting almost 5% of the daily workload of the sentinels.

Marked inter-provincial differences were noted with each event. The example of domestic violence is presented in Fig. 1. The Eastern Cape (11.01/1 000 consultations) and Northern Province (7.26/1 000 consultations) had the highest reported rates, while the lowest were in KwaZulu-Natal (1.66/1 000 consultations).

* At the specific request of researchers at the Medical Research Council in order to monitor the emergence of chronic diseases of lifestyle in the black African population.

Table III. National notification rates for events during 1996 surveillance

Event	Total notifications	Notifications/ 1 000 consultations	Notifications/ sentinel
Myocardial infarct	313	0.63	4.54
Measles	615	1.24	8.91
Underweight < 6 years	769	1.55	11.14
Diabetes mellitus	1 345	2.71	19.49
HIV testing	2 065	4.16	29.93
Asthma	2 292	4.61	33.22
Domestic violence	2 364	4.76	34.26
Tuberculosis (suspected)	3 034	6.11	43.97
Depression	3 104	6.25	44.99
PAP smear	3 752	7.55	54.38
Hypertension	4 900	9.86	71.01
Gastro-enteritis < 6 years	7 709	15.52	111.72
STD syndrome	15 113	30.42	219.03

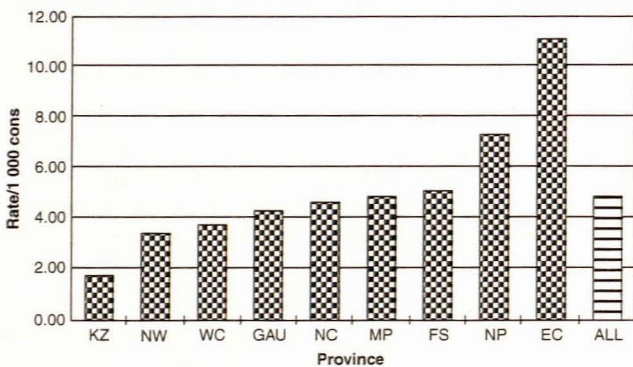


Fig. 1. Home violence, 1996 — provincial notification rates.

The weekly and 4-weekly notification rate was determined for each event. Marked changes in trends were noted in the case of an infectious disease like measles (Fig. 2), showing possible epidemic periods in months 3, 4 and 9, exceeding the mean rate of 1.24 cases /1 000 consultations per year. The chronic diseases did not demonstrate any trend changes over the year, as was to be expected.

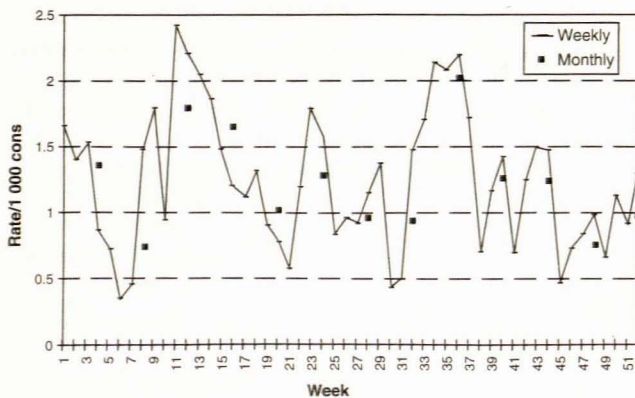


Fig. 2. Measles, 1996 — national trend in notifications.

Age/sex distribution

The age-group and sex distribution of hypertension is shown in Fig. 3 as an example of the information derived from this type of PHS. The main difference between the black and other (white, Asian and coloured) groups is the greater proportion of younger (less than 45 years) age groups presenting with the risk factor. Both female groups demonstrated a similar characteristic relative to their male counterparts.

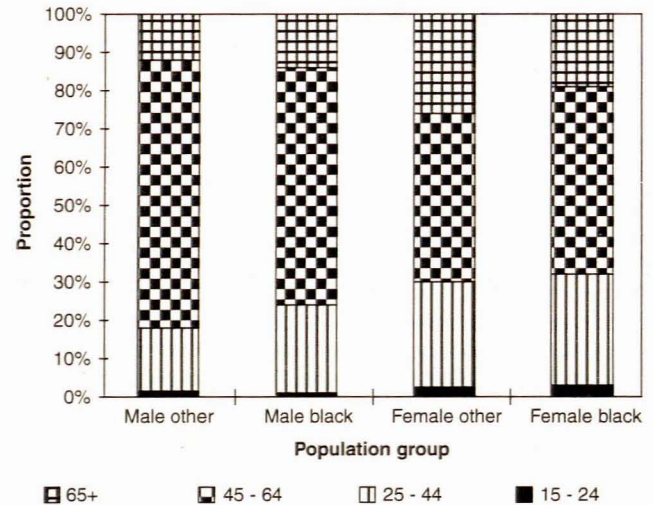


Fig. 3. Hypertension, 1996 — age/sex distribution of notifications by population group.

Age-specific incidence rates could not be calculated because of the absence of age-specific consultation totals.

Conclusions

The study has proved that surveillance by a sentinel network of family practitioners is feasible in a developing country like South Africa. This network has the potential to be a very useful and cost-effective source of public health information.

The key benefits of this system are: (i) data are provided from first-contact medical care; (ii) the response time is relatively quick (less than 1 month from data-capturing to analysis) compared with the register of notifiable diseases;¹ (iii) the cost of generating data is relatively low because sentinels receive no compensation and a cheap postal system is used; and (iv) data-capturing is performed by highly motivated volunteers, leading to greater accuracy and completeness.³

Some of the most important biases affecting passive surveillance systems,¹ also applicable to our system, are: (i) not all persons affected may visit the doctor, which leads to underestimation of the numerator; (ii) the data are mainly from private practices, catering for only about 34% of the population's routine first-contact health care;⁹ (iii) the problem of linking a 'case' to its appropriate catchment population;^{1,9-15} and (iv) the geographical distribution of the sentinels, which is not representative of the population distribution.^{16,17}

Some of these biases can be addressed,^{16,17} thus improving the validity of the data source. A number of these issues will be the focus of the next phase of the development of the surveillance system.

1. There has to be selection of those health events that will provide meaningful additional information to public health planners. This selection will require substantially more involvement from both public health managers and sentinels.³ Certain events may be more suitable for periodic reporting (mainly the chronic diseases), which may make room for inclusion of more acute conditions for continuous reporting.

2. The geographical distribution of the sentinels has to be improved in order to optimise generalisability to the whole population per region and nationally. This objective may require defining indicators for clustering geographical entities¹⁷ and sampling of practitioners on that basis, within the constraints of a volunteer system. The number of sentinels will also have to be improved in some provinces. Another strategy may be to provide reimbursement of some sort to participating practitioners, as is the case in some European networks.

3. The reliability of reporting has to be ascertained. Although volunteer sentinel networks are generally more accurate than compulsory systems,³ a good measure of the reliability of the data can improve the usefulness thereof.

4. The time delay between data-capturing at practice level and at central station level can be up to 6 weeks because of postal delays and the inability of some sentinels to post the postcards. Electronic means of data-capturing have been shown to improve the time delay but may lead to a lower rate of compliance.^{3,4} This option may become more viable in future when there is greater availability of computer equipment and computer literacy at family practice level improves.

5. The determination of an accurate or useful practice denominator has been extensively studied, but remains a problem, even in countries where compulsory registration exists.^{1,9-15} The problem is more pronounced in South Africa, given the lack of basic information on population numbers and patterns of health care utilisation. Estimates of incidence rates based on the 1994 October Household Survey¹⁹ have been made, but are of limited value in the provinces with few sentinels. Further experimentation with the best available options is needed.

6. The data have to be disseminated to all who need to act thereon. The sentinels have been reached through the newsletter and personal reports, but public health managers have not been included, given the limited value of the information at this stage. Effective mechanisms for communication with public health managers at both regional and national level have to be established and the adequacy or otherwise of detailed reportage must be explicitly discussed and declared.

7. Finally, the system has to be sustained by long-term funding. The appointment of professional network staff, including statisticians and epidemiologists, will be essential in the near future. The main beneficiaries of the information will be the public health authorities, and it seems reasonable to expect that they will be interested in sustaining such a relevant and cost-effective source of health information. This support will ensure the integration of the sentinel

surveillance information with existing public health information systems.

An important benefit of the surveillance system has been the highlighting of research questions at primary care level. The unexpectedly very high notification rates of STD syndrome and domestic violence, for example, are a case in point. These findings deserve exploration and are the focus of further short-term studies planned by SASPREN.

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