Disease surveillance in Guam: a historical perspective

Robert L. Haddock*

**Epidemiologist, Guam Department of Public Health and Social Services, P.O. Box 2816, Hagåtña, Guam U.S.A. 96932, Tel: (671) 735-7299, Fax: (671) 734-2066, Email: robhad@yahoo.com*

Abstract

Passive, active, and syndromic disease surveillance, together with disease registries and surveys, are undertaken by the Guam Department of Public Health and Social Services to provide a rational basis for decision making by health care officials. Each of these activities serves a unique purpose in the process of detecting and confirming or disproving the presence or extent of disease on the island and evaluating the effectiveness of control measures. (PHD, 2005 Vol 12 No 2 Pages 121 - 126)

Introduction

Public health surveillance has been defined as the ongoing systematic collection, analysis, and interpretation of health data that are necessary for the planning, implementation, and evaluation of public health practice.[1] The primary purpose of disease surveillance is to facilitate the timely identification and effective treatment of disease and the prompt control of disease outbreaks. In addition to tracking the general health of a community, surveillance programs may be set up to study specific disease problems such as antimicrobial resistance, emerging infectious diseases, and food borne illnesses or they may be designed to track diseases of special public health importance such as cancer, tuberculosis or influenza.

Disease Surveillance on Guam

Disease surveillance data available from the era of the Spanish occupation of Guam (1668-1898) are limited to occasional reports of disease outbreaks by the island's military governors or published comments by infrequent visitors to the island.[2,3] In the years following the capture of Guam by American forces in 1898, available disease surveillance statistics are primarily those contained in the annual report of the island's naval Governor to the U.S Department of the Navy.[4] In addition to a general review of conditions on the island, these reports summarized annual statistics for births, deaths, and hospital admissions.

Miraculously, original records of births and deaths on Guam since November of 1901 have survived despite subsequent earthquakes, typhoons and war. These records were written in Spanish until April, 1905, when the Naval Governor of Guam decreed that future official records would be recorded in English. Many of the diagnoses recorded on early death certificates are archaic (eg. phythsis) or colloquial (eg. guha). In contrast to current practice in that era, deaths that occurred in the remoter villages of Guam were frequently certified by village mayors or corpsmen assigned to village dispensaries. In some cases, no cause of death was specified – this was especially the case during the 1918 influenza epidemic when many died before receiving any medical attention. Beginning on January 1, 1955, Guam adopted a U.S. standard death certificate format which provided space for recording multiple underlying or contributing causes of death and since that time all death certificates are completed by an attending physician or the island's medical examiner, a physician trained in forensic pathology. Coding of the cause of death information provided on death certificates is performed by the Mortality Medical Classification Branch, National Center for Health Statistics, Research Triangle Park, North Carolina.

No original records survive from the period of the Japanese occupation of Guam (December 10, 1941 through July 21, 1944). However, beginning in January, 1945, and as late as January, 1953, births and deaths that had occurred during this period were duly recorded by village mayors through interviews with parents of children who had been born during this era or surviving relatives of those who had died. Understandably, "cause of death" information on death certificates from this period is frequently vague or missing altogether.

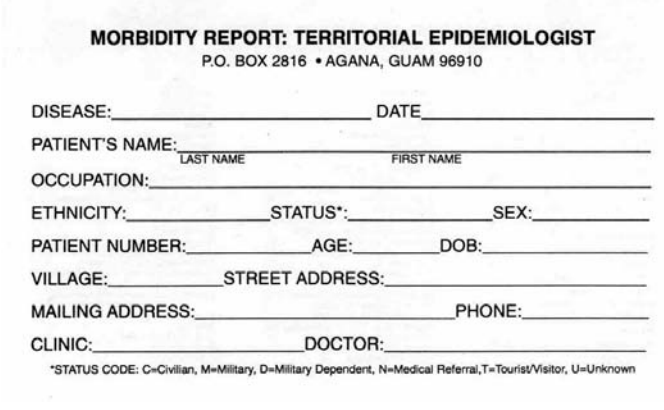
Guam morbidity records are less complete than are birth and death records. Although the requirement that the American military governors of Guam report annually to their superiors in Washington, D.C. resulted in the preservation of much useful information from an earlier period, the establishment of civilian government on Guam in 1950 began a period of significant gaps in this data.

Current practices

From 1970 onward the Office of Vital Statistics of the Guam Department of Public Health and Social Services

(GDPH&SS) has published an annual summary of birth and death statistics.[5] Beginning in 1972 with the establishment of the position of Territorial Epidemiologist in the health department, an effort was also made to provide for more systematic collection and preservation of disease morbidity data. Since that time communicable case data has been collected on 3"x5" cards with fields for disease diagnosis, date reported, patients name (or other unique identifier), date of birth, sex, civil status

Figure 1



MORBIDITY REPORT: TERRITORIAL EPIDEMIOLOGIST
P.O. BOX 2816 • AGANA, GUAM 96910

DISEASE:_____ DATE_____
PATIENT'S NAME:_____
LAST NAME FIRST NAME
OCCUPATION:_____
ETHNICITY:_____STATUS*:_____SEX:_____
PATIENT NUMBER:_____AGE:_____DOB:_____
VILLAGE:_____STREET ADDRESS:_____
MAILING ADDRESS:_____PHONE:_____
CLINIC:_____DOCTOR:_____
*STATUS CODE: C=Civilian, M=Military, D=Military Dependent, N=Medical Referral,T=Tourist/Visitor, U=Unknown

(civilian, military, military dependent, medical referral, or tourist/visitor), ethnicity, occupation, residence location, phone number and reporting clinic and physician (see Figure 1). The use of these report cards is encouraged by the Epidemiologist because of their ease of filing and storage, but reports are also accepted over the phone (in which case the person receiving the call will fill out a report card) or by faxing a facsimile of the report card. In addition, some health care providers may report data on forms of their own design if this will avoid duplication of paper work. Morbidity reports were tallied by hand until 1992 when these data were first computerized.

Annual morbidity summaries are provided to national (Centers for Disease Control and Prevention), international (World Health Organization-Western Pacific Region, Secretariat of the Pacific Community), and regional (Palau, Federated States of Micronesia, Commonwealth of the Northern Mariana Islands) health agencies as well as local health care providers. Local physicians are also informed, by email or media releases, of local or international health-related events which may impact their professional activities or the health of Guam residents. After 1994 an annual morbidity summary has also appeared in the vital statistics publication.

The backbone of Guam's present disease surveillance program is the routine reporting of diseases specified on an official list of "notifiable" diseases specified by law (see Figure 2). This is a "passive" surveillance system that depends on health care providers to initiate reports. On Guam the bulk of these reports are received from the Infection Control Department of the island's sole civilian hospital, health department clinics, several large private clinics, military public health authorities, private medical laboratories and school health nurses. As elsewhere, many physicians in private practice infrequently participate unless they encounter a suspected case of an unusual or particularly alarming disease such as SARS or measles. [6]

Figure 2: OFFICIAL GUAM REPORTABLE DISEASE LIST
Authority: Chapter 3, Title X, Guam Code Annotated

CLASS I DISEASES

Class I diseases include those with potential for rapid spread or requiring prompt action for effective control and must be reported Immediately by phone in addition to usual morbidity card report - do not wait for laboratory confirmation.

Acute flaccid paralysis
*Anthrax
* Botulism
Cholera
Dengue
Diphtheria
Encephalitis, viral
Food or fish poisoning (2 or more related cases)
* Hemorrhagic fevers (all forms)
Measles (Rubeola)
Meningococcal disease
Pertussis
* Plague
Poliomyelitis (acute)
Rabies (in man or animal)
Rubella (including congenital)
SARS
*Small Pox
*Tularemia
Typhoid fever
Typhus
Yellow fever

*Indicates diseases that may be used as bioterrorism agents.

CLASS II DISEASES

Individual cases of Class II may be reported by morbidity report card. Please report unusual outbreaks or apparent epidemics by phone.

AIDS *I* HIV
Amebiasis
Brucellosis
Campylobacteriosis
Chancroid
Chickenpox
Chlamydia trachomatis
Coccidioidomycosis
Conjunctivitis, viral or bacterial
Cryptosporidiosis
Cyclosporiasis
Eosinophilic meningoencephalitis
Enterococcus sp., vancomycin resistant (VRE)
Escherichia coli 0157:H7
Food or Fish poisoning (isolated cases)
Giardiasis
Gonococcal infection
Granuloma inguinale
Haemophilus influenzae, invasive disease
Hansen's disease (Leprosy)
Hemolytic-uremic syndrome
Hepatitis A, B, C, _ or unspecified viral
Herpes simplex Type 2
Human papillomavirus (HPV)
Kawasaki syndrome
Legionellosis
Leptospirosis
Lyme disease
Lymphogranuloma venereum
Malaria
Meningitis, aseptic
Meningitis, bacterial
Mumps
Myocarditis
Paravovirus B 19 (Fifth disease)
Rheumatic fever (active) and
poststreptococcal glomerulonephritis
Salmonellosis (non-typhoid)
Scabies
Scarlet fever
Shigellosis
Staphylococcus aureus (MRSA or VRSA)
Streptococcal disease (Group A)
Streptococcus pneumoniae, penicillin resistant (PRSP)
Streptococcal sore throat
Syphilis (including congenital)
Tetanus
Toxic-shock syndrome
Trichinosis
Tuberculosis
Vibriosis

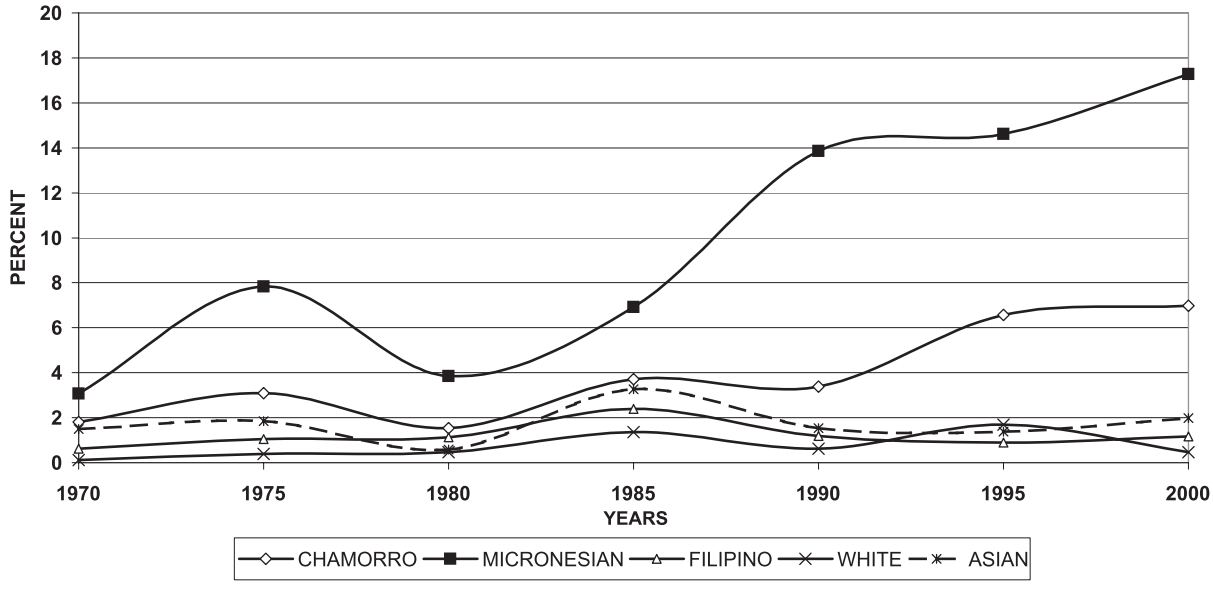
Recognizing that no list can include every disease that could possibly pose a threat to the residents of Guam, the Guam Department of Public Health and Social Services encourages the reporting of any additional disease cases with potential for serious public health impact or which may merit epidemiologic investigation.

In the event that a disease with significant potential for causing an epidemic on Guam is reported (especially Class I diseases such as measles, dengue, and pertussis; see Figure 2), public health staff will initiate “active” surveillance. This may take the form of calls to physician offices, door-to-door canvassing of the neighborhood in which a case resides by public health nurses or environmental health specialists, contacting passengers on the airline flight that carried a case, etc., all to locate possible additional cases and, if appropriate, to check the immunization status of possibly exposed contacts. The information collected during the course of these activities is then used during deliberations by an ad hoc committee to determine the best approach to control the outbreak; e.g., are emergency vaccination clinics necessary and, if so, which population groups should be targeted, what types of media releases are appropriate, etc.

Surveillance data may also be useful in evaluating the effectiveness of health programs and policies and in helping to determine how the provision of health care services may need to be changed. For instance, largely for economic reasons the number of public health clinic sites providing pre-natal care decreased from 11 village-level clinics in 1970 to 3 “full-service” centralized clinics in 2003. During the same period, the percent of births to Chamorro mothers who had no prenatal care increased from 1.8% to 7.0% and a similar trend was observed among Micronesian mothers (mothers from islands of Micronesia other than Guam) whose “no prenatal care” rate increased from 3.1% to 17.3% (see Figure 3). In this instance data suggests that changes in the provision of public health pre-natal care services may have decreased the availability of these services, at least to certain population groups, and that the manner in which this service is provided needs to be re-evaluated.

In 1974 the investigation of an unusual food poisoning incident led to discovery of the first case of cholera to be identified in Micronesia.[7] Because it was suspected that additional unidentified cases of cholera might be

Figure 3: Percent of new mothers with no prenatal care before delivery by ethnicity, Guam, 1970 - 2003 (5-year means)



NOTE: 1975 births to mothers evacuated from Viet Nam are excluded from the data.
This table has been compiled from data extracted from Annual Statistical Reports, Office of Vital Statistics (1970-1997), and from additional data provided by the Office of Planning and Evaluation, Department of Public Health and Social Services.

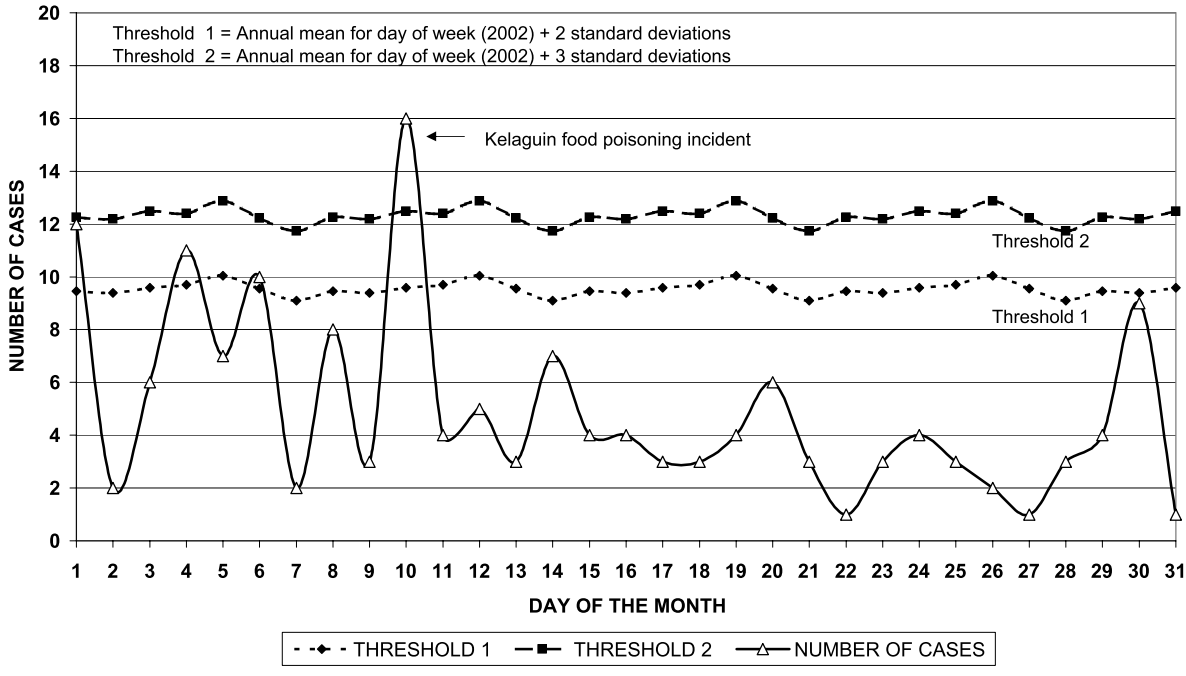
occurring on the island, a program of syndromic disease surveillance (monitoring groups of signs and symptoms rather than specific, clinical, or laboratory-defined diseases)[8] was initiated. The Guam Memorial Hospital Emergency Department Log is reviewed several times a week and the number of cases comprising the following clinical syndromes are tallied; diarrhea, gastroenteritis (including enteritis, colitis, appendicitis, etc.), acute respiratory disease, chronic respiratory disease (including asthma, chronic obstructive pulmonary disease (COPD), etc.), rash illness accompanied by fever, influenza or flu syndrome, conjunctivitis, total patients, and total patients admitted to hospital. Using EpiInfo 6[9] software, this information is recorded by day of week, week of year and year, thereby making it easy to calculate the means for each variable for any time period (see Table 1). Although there have been numerous introductions of cholera to Guam from foreign sources since the initial case, none of these have resulted in local epidemics on the island (most likely the result of adequate sanitation rather than good surveillance). Syndromic surveillance is useful at such times to determine if a disease outbreak may or may not have occurred or is ongoing (see Figure 4, syndromic surveillance related to an incident of apparent food poisoning in which it is clear that the disease was not being propagated on the island and Figure 5, syndromic surveillance related to reported cases of influenza and "flu syndrome" in which it is clear that propagation of the outbreak was occurring).

Table 1 – Guam Memorial Hospital Emergency Department syndromic data for the 15th week of 2005 as it appears in an EpiInfo6 printout

REC	DAY	WEEK	YEAR	DIA	GAS	RESP	ASTH	CPOX	RASH	FLU	CON	TOTAL	ADMIT
1785	SUN	15	2005	0	5	14	1	0	0	0	0	69	7
1786	MON	15	2005	0	2	9	0	0	0	0	0	56	16
1787	TUE	15	2005	0	4	11	3	0	0	0	1	68	8
1788	WED	15	2005	0	1	1	1	0	0	0	0	51	12
1789	THU	15	2005	0	2	7	2	0	0	0	0	56	12
1790	FRI	15	2005	0	2	7	2	0	0	0	0	75	17
1791	SAT	15	2005	0	3	6	1	0	0	0	0	69	11
1792	TOT	15	2005	0	19	55	10	0	0	0	0	444	83

NOTE: Abbreviations used for field titles include DIA (diarrhea), GAS (gastroenteritis, enteritis, etc.), RESP (acute respiratory disease, URI, pneumonia, etc.), ASTH (asthma, COPD, etc.), CPOX (chickenpox), RASH (rash accompanied by fever), FLU (influenza or flu syndrome), CON (conjunctivitis), TOTAL (total number of patients seen in the ED), and ADMIT (number of patients admitted to hospital).

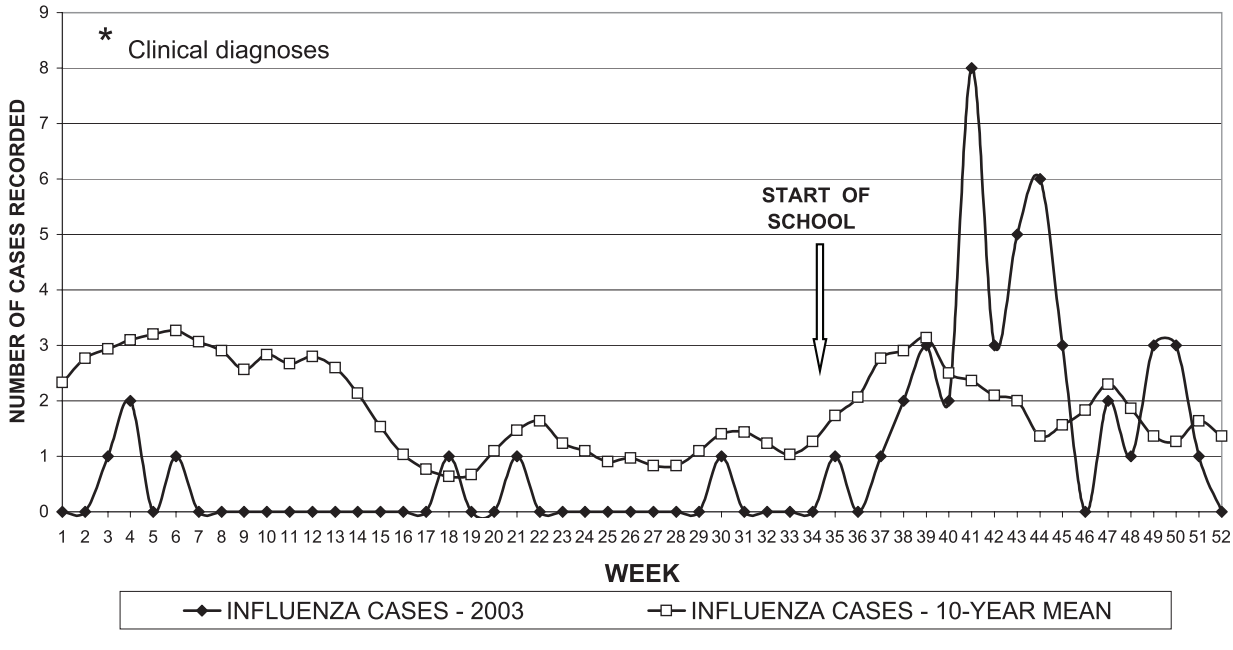
Figure 4. Syndromic surveillance for diarrhoea and gastroenteritis, Guam Memorial Hospital Emergency Department, January 2003



Registries are a form of surveillance most appropriate for diseases that may persist (or whose diagnostic tests may persist) for periods greater than 1 year. Examples include infectious diseases such as tuberculosis or HIV and non-communicable diseases such as diabetes and cancer. GDPH&SS maintains tuberculosis, Hansen's disease, hepatitis, HIV/AIDS and syphilis registries.

The Guam Cancer Registry (GCR) was established within the GDPH&SS in 1998. For 5 years the GCR operated as an unfunded mandate without any dedicated staff and activity was largely limited to the passive collection of new case reports from the local hospital, the Guam Chapter of the American Cancer Society, and the Office of Vital Statistics (death certificate data). In 2004 an agreement between the DPH&SS and the University of Guam was formalized placing the GCR within the Cancer Research Center of Guam. With the assistance of funding from the Cancer Research Center of Hawaii and the National Institutes of Health, additional staff was hired. This will facilitate patient follow-up and medical record review thus providing more current and detailed information on the status of Guam cancer patients. Local researchers will now be able to conduct studies such as

Figure 5: Influenza* and "Flu syndrome" surveillance using the Guam Memorial Hospital Emergency Department log, 2003



cancer patient survival rates and the efficacy of cancer treatment regimens that may lead to improved health for the people of Guam.

Finally, surveys may be conducted for the purpose of augmenting other forms of disease surveillance. Surveys typically are used to determine the prevalence of a disease or condition, rather than incidence, and are particularly useful for purposes such as determining the level of disease burden of chronic conditions such as diabetes in a community. Surveys have infrequently been utilized on Guam because they tend to require the commitment of significant resources which are viewed as already overtaxed. A significant exception to this observation is the federally-funded annual Behavioral Risk Factor Survey (BRFS) which collects information on the health status and health-affecting life habits of island residents of all ages.

Discussion

The use of local and situation appropriate surveillance methods and techniques are necessary if the information supplied to those responsible for protecting the health of Pacific island communities is to be relevant and useful in making their decisions. Although the islands of the Pacific are becoming increasingly sophisticated in the employment of modern technologies such as electronic communications and use of the computer, only those programs tailored to the realities of local resources will have a good chance of being successfully adopted and surviving the conflict between the perception of what is necessary and the realities of local economic and political pressures. Clearly some programs that are successfully instituted in metropolitan centers such as New York or London will not be appropriate in the Pacific and each country or territory must come to grips with the question of what surveillance activities will best serve the needs of their own community.

Clearly some programs that are successfully instituted in metropolitan centers such as New York or London will not be appropriate in the Pacific

References

1. Remington PL, Goodman RA. Chapter 3: Chronic disease surveillance. In: Brownson RC, Remington PL, Davis JR (editors) Chronic Disease Epidemiology and Control. APHA, Washington, DC; 2005: 37.

2. Driver, MG. Reports concerning the Mariana Islands: The Memorias of 1890-1894. Translated and annotated by Marjorie G. Driver. MARC, University of Guam. 2000.

3. Freycinet, RM de. A woman of courage: the journal of Rose de Freycinet on her voyage around the world 1817-1820. English translation by Marc Serge Rivière. National Library of Australia 2003.

4. Governor of Guam. Annual Reports, 1901-1940. Photocopies in Micronesian Area Research Center, University of Guam.

5. Annual Statistical Report. Office of Vital Statistics, Guam Department of Public Health and Social Services, Hagåtña. 1970 - 1997.

6. Annual Summary of Notifiable Diseases. Office of Epidemiology and Research Department of Public Health and Social Services, Government of Guam. 2004

7. Haddock RL. Cholera in a Pacific Island. J Diarrhoeal Dis Res 1987;5(3):181-183.

8. Henning KJ. Appendix B: Syndromic Surveillance. In: Smolinski MS, Hamburg MA, and Lederberg L (editors). Microbial Threats to Health: Emergence, Detection, and Response. Committee on Emerging Microbial Threats to Health in the 21st Century. National Academies Press, Washington, D.C. 2003.

9. Dean AG, Dean JA, et al. EpiInfo Version 6.04d: a word processing, database, and statistics program for epidemiology on microcomputer. Centers for Disease Control and Prevention, Atlanta. GA, U.S.A. 2001.

An organised money market has many advantages. But it is not a school of social ethics or of political responsibilty
(R. H. Tawney – 1926)