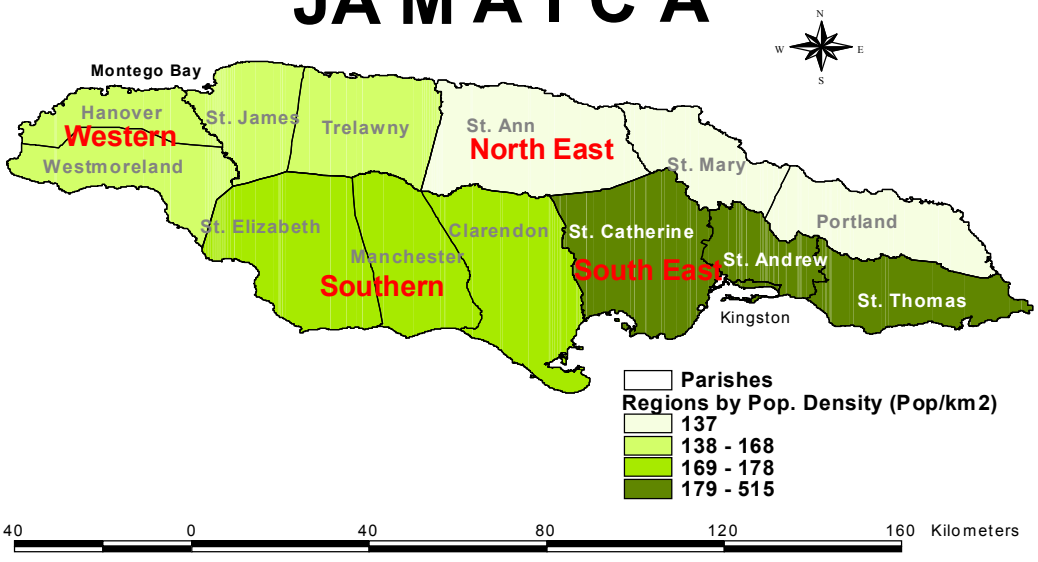
National Surveillance Manual for

JAMAICA



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Ministry of Health
Jamaica
November 2009

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Director, Disease Prevention and Control

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Director, Health Promotion and Protection Division

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Chief Medical Officer

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Preface

Surveillance is public health officials' most important tool for detecting and monitoring both existing and emerging health problems. Without adequate surveillance, they cannot know the true scope of existing health problems and may not recognize new diseases until many people have been affected. Notifiable diseases are ones that are considered important enough to be routinely reported to the National Surveillance Unit (NSU). However, it is acknowledged that completeness of reporting varies by disease and type of health care provider. Even when reporting takes place, variability in the data suggests that health workers may be using different surveillance methods, terminology, reporting schedules and approaches to case investigation. Furthermore, the surveillance system may become driven by the need to collect and move data, with not enough attention being given to the use of information by each level of the health service for decision-making.

This manual, which describes the operation of the epidemiologic surveillance system for notifiable events, represents one of a number of recent initiatives to strengthen the national surveillance system. Its purpose is to promote the best use of public health resources through the development of effective and efficient surveillance systems and specifically, standardization in the reporting and field investigation of notifiable events. It is intended to serve as a guide for persons undertaking surveillance responsibilities for the first time and as a reference for those who are already familiar with the surveillance process.

The manual outlines some general surveillance concepts and provides a framework for describing the components of the Jamaican notifiable diseases / health events surveillance system in the first nine sections. Sections ten to thirteen describe disaster surveillance, hotel surveillance, port health surveillance, International Health Regulations and Surveillance of Severe Acute Respiratory Infection (SARI). Sections fourteen and fifteen provide a list of glossary terms for quick read and references and websites of interest. The various investigation forms are included in the Appendix section.

Historically, public health surveillance has focused on communicable diseases, which has been continued in this manual. However, we also decided to include a modicum of surveillance for chronic non-communicable diseases including indicators on nutrition, tobacco use and physical activity/inactivity among others. It is also anticipated that surveillance for environmental health indicators will be added in future updates as the surveillance system evolves in scope, settings, content and participating entities.

This manual is a dynamic piece of work; therefore, as feedback is received from users of the manual, appropriate changes and updates will be made for the next revision.

Dr. MoHammed Imana
Consultant Epidemiologist

Dr. Eva Lewis-Fuller
Director, Health Promotion and Protection Division, Ministry of Health

Acknowledgments

This manual is a product of many years of work by the past and current staff of the National Surveillance unit. The individuals that worked tirelessly to see the birth of this manual are too numerous to mention by name, so to all of them, we say a very special thank you.

The Ministry of Health also wishes to extend special thanks to the PAHO/WHO Representative in Jamaica, Dr Ernest Pate and Dr Jean-Marie Rwangabwoba, PAHO Advisor for Disease Prevention and Control, for the funding and technical direction of the project to finalize the surveillance manual.

To Dr Mohammed Imana, we owe a special debt of gratitude for agreeing to lead the effort to finalize this document which has long been overdue.

Special mention must also be made of Ms. Zahra White, our Surveillance Officer, who carried out the task of collecting comments, amending the document and formatting it to its present state. Also, the working groups made up of various categories of health workers involved in Surveillance from the regions, parishes and laboratories provided the reviews and comments through an iterative process, without which the Surveillance manual would not have attained the level and scope achieved.

We would also like to thank Dr. Tamu Davidson for her contribution on the section on chronic non-communicable diseases.

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Dr. Sonia Copeland
Director, Disease Prevention and Control

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Dr. Eva Lewis-Fuller
Director, Health Promotion and Protection Division

Acronyms and Abbreviations

A	Annually (Re: Frequency of Reporting)
ABH	Annotto Bay Hospital
AFP	Acute Flaccid Paralysis
AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Clinic
BHC	Bustamante Hospital for Children
BRH	Black River Hospital
CAREC	Caribbean Epidemiology Center
CD	Communicable Disease
CEO	Chief Executive Officer
CMO	Chief Medical Officer
CNCD	Chronic Non-Communicable Diseases
CNO	Chief Nursing Officer
CRH	Cornwall Regional Hospital
DOTS	Directly Observed Treatment, Short Course
DPC	Disease Prevention and Control
DPT	Diphtheria – Pertussis- Tetanus
EHU	Environmental Health Unit
EID	Emerging Infectious Diseases
EOC	Emergency Operation Centre
EPI	Expanded Programme on Immunization
FALH	Falmouth Hospital
FBI	Foodborne illness
GE	Gastroenteritis
HAS	Hospital active Surveillance
HCL	Health Corporation Ltd
HD	Health Department
HIB	Haemophilus Influenza type b.
HIV	Human Immunodeficiency Virus
HPE	Health Promotion and Education
HPPD	Health Promotion and Protection
ICD	International Classification of Diseases
IHD	Iscaemic Heart Disease

IHR	International Health Regulations
IMCI	Integrated Management of Childhood Illnesses
KPH	Kingston Public Hospital
LPH	Linstead Public Hospital
LTH	Lionel Town Hospital
M	Monthly (Re: Frequency of Reporting)
MMR	Measles Mumps Rubella
MO	Medical Officer
MO(H)	Medical Officer of Health
MOH	Ministry of Health
MPH	May Pen Hospital
MRH	Mandeville Regional Hospital
NAC	National Advisory Committee
NCH	National Chest Hospital
NERHA	North East Regional Health Authority
NHF	National Health Fund
NHH	Noel Holmes Hospital
NHSSP	National Health Services Strategic Plan
NPHL	National Public Health Laboratory
NSU	National surveillance Unit
PAH	Port Antonio Hospital
PAS	Patient Administration System
PAHO	Pan American Health Organization
PCR	Polymerase chain reaction
PHD	Parish Health Department
PHI	Public Health Inspector
PHN	Public Health Nurse
PJH	Percy Junor Hospital
PMH	Princess Margaret Hospital
PS	Permanent Secretary
PTMH	Port Maria Hospital
Q	Quarterly (Re: Frequency of Reporting)
RD	Regional Director
RGD	Registrar General's Department

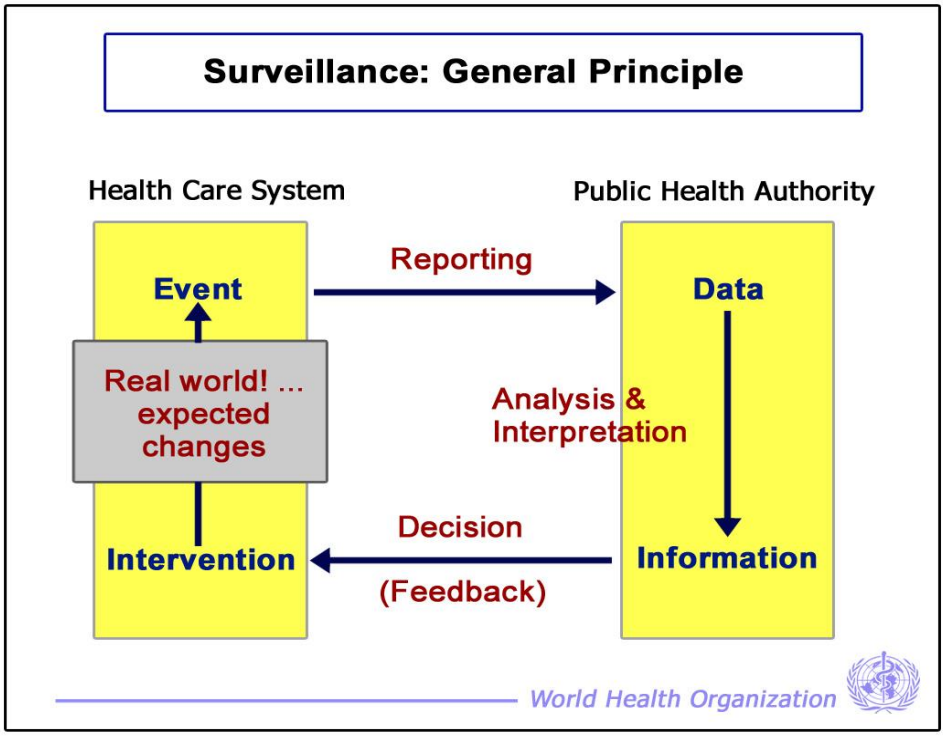
RHA	Regional Health Authority
RSO	Regional Surveillance Officer
RSU	Regional Surveillance Unit
RTD	Regional Technical Director
SARI	Severe Acute Respiratory Illness
SAVH/ SPGH	Savanna-la-Mar Public General Hospital
SERHA	South East Regional Health Authority
SRHA	Southern Regional Health Authority
STH	Spanish Town Hospital
STI	Sexually Transmitted Infection
UHWI	University Hospital of the West Indies
VBD	Vector-borne Disease
VJH	Victoria Jubilee Hospital
WHO	World Health Organization
WRHA	Western Regional Health Authority

Introduction to surveillance

Surveillance is defined by WHO and the US Centers for Disease Prevention and Control (CDC) as the ongoing systematic collection, analysis and interpretation of outcome specific data for use in planning, implementation, monitoring and evaluation of public health practice. Surveillance systems should gather data from relevant sources then validate and analyze this data to generate useful information to be used for public health action (Figure 1.1).

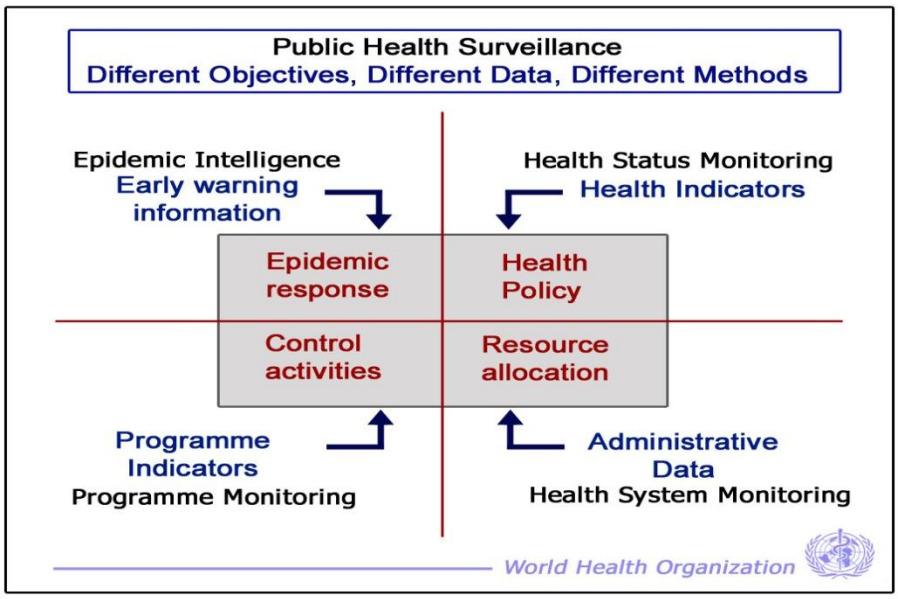
Key message: The purpose of any surveillance system is to provide information for action. The best surveillance system in the world is worthless unless the public health professionals responsible for reviewing the data respond to what they see.

Figure 1.1: General principle of surveillance



A surveillance system aimed at timely and effective response to unusual disease situations (such as epidemics) relies on timely and accurate data reporting. If a surveillance system is to inform effective control measures, programmes must be monitored using appropriate programme indicators. Surveillance systems inform health policy by monitoring health status using appropriate health indicators. In planning resource allocation, the administrative data in the health system must be monitored.

Figure 1.2: Outline of Public Health Surveillance



Objectives, sources of data and methods

Surveillance facilitates the early detection of unusual events, clusters and outbreaks to initiate appropriate control activities to limit the spread of adverse health conditions, ultimately reducing morbidity, mortality and negative economic impact. It can be used, for example, to identify risk groups and guide the implementation of relevant intervention activities such as educational messages. Surveillance can also be used to evaluate the effectiveness of national programmes and provide a basis for shaping public health policy.

As shown in the World Health Organization (WHO) framework, surveillance systems need to collect different types of data, different types of information and use different methods to achieve different objectives (Figure 1.2).

1. Epidemic response objective: Information is needed for monitoring trends (to generate baseline rates) and the early detection of unusual events, clusters, outbreaks and epidemics so timely and relevant response can be initiated. For example, an increase in the number of cases of fever and neurological symptoms should trigger an investigation to determine source and aaetiology; and relevant response for control.

2. Control activities objective: Programme indicators are needed to monitor the effectiveness of programmes, for example, vaccine coverage rates are important to monitor the performance of an immunization programme.

3. Health policy objective: Monitoring health status is necessary for developing health policy. For example, due to the high reported cases of HIV/AIDS in Jamaica, the government expanded the National AIDS Programme to include the prevention of mother to child transmission (PMTCT), the provision of free care and treatment of people living with HIV/AIDS.

4. Resource allocation objective: Epidemiological and administrative data are needed for appropriate resource allocation. For example, in recognition of the increasing burden of Malaria and its negative impact on health status and investment, the Ministry will increase the allocation of resources for Malaria treatment and control.

In order to generate a complete and accurate picture of a given health situation the surveillance process requires data from several sources such as:

- Vital statistics
- Morbidity and mortality reports
- Case investigations
- Disease registries
- Outbreak reports
- Laboratory reports
- Sentinel/HAS reports
- Environmental reports
- Agricultural (animal and plant health) reports
- Surveys
- Censuses
- Class 1 Notifications
- Class 2 and Class 3 Reports
- Port health surveillance (airports, seaports)
- Hotel Surveillance Reports

(For further information on data sources refer to "Public Health Surveillance; A Caribbean Communicable Disease Surveillance Manual for Action", CAREC, 1999, pages 23-24)

Types of Surveillance systems:

Passive: A passive surveillance system is one in which it is the responsibility of the data provider to send surveillance data to the next level in the system. Health care providers send reports to a designated public health agency in compliance with a known set of rules or regulations. The most commonly used passive systems are disease notification systems, which require disease reports to be sent from health care providers to a central public health agency. Reports of deaths and disease registries are other examples of passive surveillance.

Active: An active surveillance system is one in which data is routinely requested or collected from the data provider. Such systems seek out data from selected groups or networks put together for specific purposes. Examples of active systems include Class 1 disease HAS and repeated or serial health surveys. The essential feature of active surveillance is that staff of the health agency calls and/or visits the sites to gather information on a set group of suspected and confirmed diseases/events, conditions and clinical syndromes.

Passive surveillance requires less human and financial resources than Active surveillance. The National communicable disease surveillance system can be classified as an active/passive system. While the HD of each parish is expected to send data to NSU in specified timeframes, NSU contacts all reporting sites that have not met the reporting deadline and solicit the relevant data from them.

Key Message: Passive surveillance is good for establishing baseline rates and monitoring trends over time, place and person, especially for diseases of moderate to high prevalence. It is not good for accurate estimates of disease burden or for detecting outbreaks requiring immediate response. (That's when you turn to active surveillance. But remember, active surveillance requires more resources and commitment if it is to remain active.)

Active surveillance is most often used for diseases of special interest, for example, with high case fatality rate, subject to elimination and /or eradication, and with emerging or re-emerging diseases such as measles, polio, malaria, yellow fever, dengue hemorrhagic fever, SARS, TB and Highly Pathogenic Avian Influenza.

Surveillance systems can also be classified as **syndromic or disease based systems**. As the names suggest, syndromic systems conduct surveillance of syndromes and disease systems conduct surveillance of diseases with specific aetiologies. Syndromic surveillance is particularly useful as an early alert system for changing disease situations. Surveillance of diseases is more useful for monitoring trends.

Key Message: Syndromic surveillance is good for early detection of and response public health threats. It better suits frequent reporting mechanisms (e.g., weekly or daily) allowing for a timely response. Timeliness is of the essence when it comes to disease outbreaks, whether natural or intentional. Disease surveillance, on the other hand, is good for monitoring disease trends and is important for evaluating programs and planning interventions.

Laboratory surveillance is necessary for case detection and confirmation of cases and for monitoring specific trends. It is also important for evaluating programs and planning mid to long-term interventions.

Syndromic and laboratory surveillance should not be considered mutually exclusive but rather complementary to each other.

The surveillance system can also be structured in terms of sources of information being exhaustive or based on sentinel sites. An exhaustive system is one which collates information from all health care facilities whereas a sentinel-based system collects information from selected sites based on their representation of the parish in terms of communities served and conditions seen.

Ideally, a good surveillance system should combine components of the different types of surveillance: active, passive, laboratory, syndromic and disease-based

Attributes of Surveillance Systems

When planning or evaluating a surveillance system, the following attributes can be used to gauge the overall usefulness of the system (see glossary):

- Simplicity
- Flexibility
- Acceptability
- Representativeness
- Timeliness
- Sensitivity
- Positive Predictive Value (PPV)
- Negative Predictive Value (NPV)

Section 2

National Policy

The surveillance system has evolved over time in Jamaica. Prior to 1976 disease reporting in Jamaica was mainly the responsibility of the Statistics Unit (now the Health Information Unit). Specific surveillance activities were initiated in 1976 following an outbreak of food poisoning due to the accidental contamination of counter flour with Parathion, an organophosphate insecticide. The Epidemiology Unit became operational in 1977 during an outbreak of Dengue Fever. Its mandate included communicable disease surveillance and control, outbreak investigation and quarantine. In the 1980s, HIV/AIDS surveillance and control, disaster preparedness and research were added to the unit's responsibilities.

The national Surveillance policy in Jamaica is to improve the health status of all its citizens by reducing the morbidity and mortality and associated costs of communicable diseases and class1 health events.

The Ministry of Health (MoH) vision speaks to a society of : "Healthy People". It envisages a health system that is client-centred, responsive and guarantees access to quality health care for every person in Jamaica and which takes into account the specific needs of the vulnerable. It also seeks to provide information and to educate the populace, to facilitate individuals taking responsibility for their own health, making informed decisions and adopting healthy lifestyle practices. Overall, the MoH wants to ensure that the highest quality of services for health promotion, protection and care are accessible to all persons in Jamaica in order to achieve optimal health, at an affordable cost to the government.

The goal of the surveillance system in Jamaica is to prevent and control the occurrence of communicable diseases and class 1 health events.

Regulations Governing Surveillance in Jamaica

The following legislation forms the basis for surveillance in Jamaica:

- The Public Health Act, Sections 8 and 14

  Section 8: The Minister may at any time call upon a Local Board to investigate any disease of human beings present in their respective parishes, and to do whatever is necessary for arresting the spread of that disease.

  Section 14: (1) The Minister may make regulations generally for carrying out the provisions and purposes of this Act, and in particular, subject to section 7, but without prejudice to the generality of the foregoing, may make regulations in relation

  (a) notifiable and communicable disease, the treatment and prevention thereof and the isolation of patients suffering there from;

  (b) the prevention, mitigation and suppression of disease, including the disinfection, closing, or destruction of buildings in which infected persons have lodged or resided, and the restriction of movement of persons into and out of infected areas;

(c) vaccinations and inoculations;

(d) air and soil pollution;

e) the collection and publication of epidemiological and other data pertaining to public health; occupational diseases and employment health hazards;

f) occupational diseases and employment health hazards

g) the importation, preparation, and distribution of food or drink intended for human consumption, in so far as it concerns public health;

h) the inspection and prevention from contamination of food and drink intended for human consumption, the analyzing and testing of samples of such food and drink by an official analyst, the issuing of certificates in relation thereto, and the condemnation, seizure and disposal of such articles as are unfit for human consumption;

i) the control and destruction of rodents, mosquitoes and other insects, termites, and other vermin;

j) prescribing any fees in respect of any examination, certificate, license or other matter under this Act;

k) prescribing any forms for the purposes of this Act;

l) prescribing any other matter or anything which may be, or is required by this Act to be prescribed by the Minister.

(2) Regulations made under subsection (1) may be applicable to the entire Island or to such part thereof may be specified therein.

- International Health Regulations, WHO (See Section12)

Section 3

Description of the National Surveillance System

Mission Statement for National Surveillance Unit

To promote health as well as to prevent and control diseases by providing epidemiological expertise to the Ministry of Health and by identifying and encouraging appropriate health behaviour in our population.

Purpose

The purpose of the surveillance system is to collect, collate, analyze and interpret data for action on

(a) reportable communicable diseases or health events as stipulated in the Public Health Act and
(b) syndromes under surveillance at sentinel sites.

Objectives

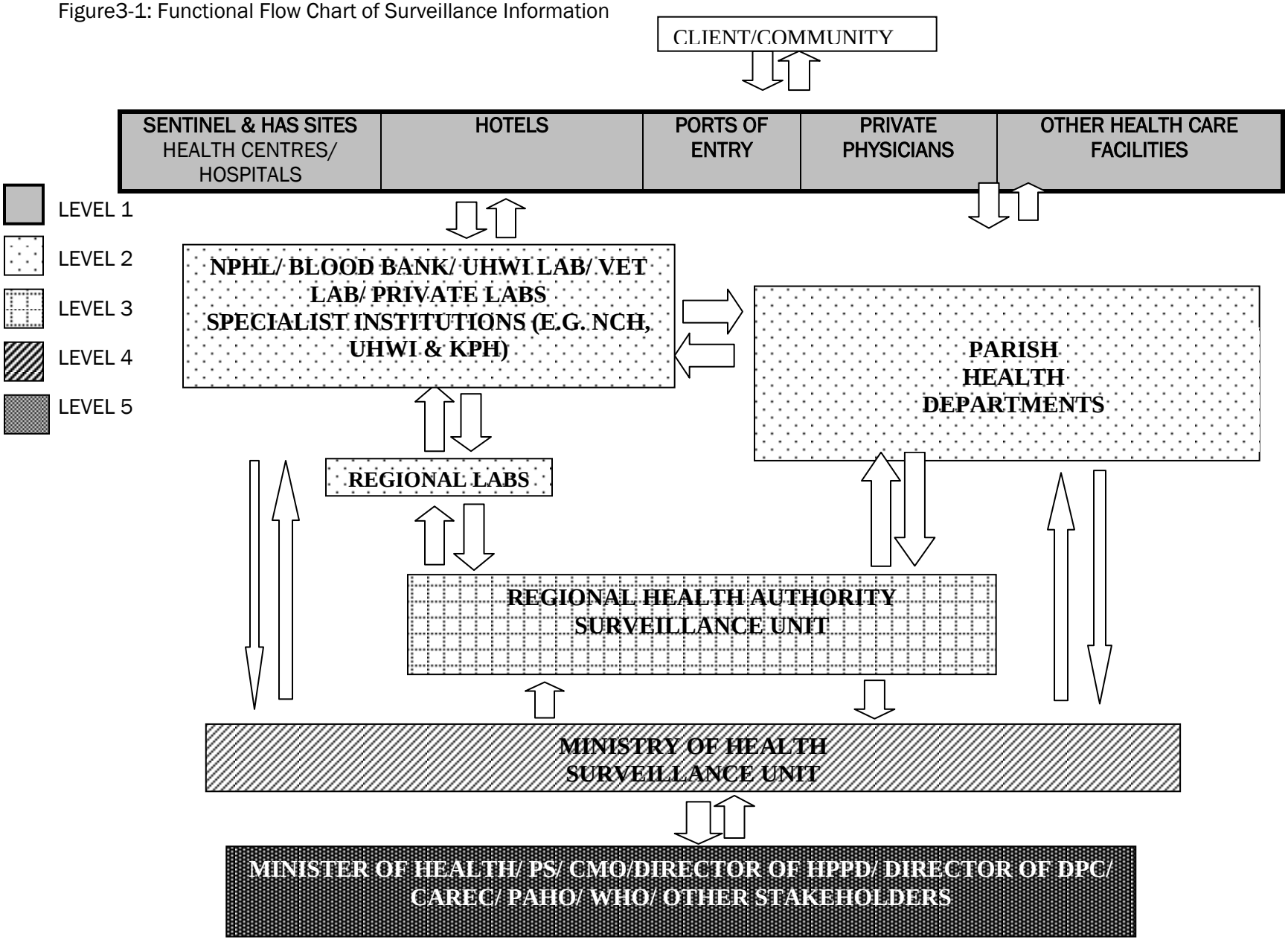
The objectives of the surveillance system are:

- Outbreak detection and response
- Estimate the magnitude of the health problem and monitor trends in disease and selected health events
- Provide data to support systematic programme planning, monitoring and evaluation
- Provide data and information to support priority-setting, guidelines, policies and legislation towards disease prevention and control
- Assist with validation and evaluation of regional and national surveillance systems
- Strengthen the regional and national surveillance systems
- Information communication to inform those who need to know and enable appropriate action to protect and improve the health of the population
- Test hypotheses about aetiologies, determinants of health and sources of outbreaks
- Detect changes in health practice
- Assess quality of health care
- Identify research needs

Figure 3-1 below demonstrates the flow of surveillance information between the various levels, both nationally and internationally

Levels of Flow of Surveillance Information

Figure3-1: Functional Flow Chart of Surveillance Information



Levels for Flow of Surveillance Information

Level 1 (Sentinel/HAS Sites, Hotels, Ports of Entry, Private Physicians, Other Health Care Facilities)

Facilities where clients are most likely to initiate first contact, these include all health centres in all the parishes and all the hospitals on the island.

Function

- Collation of pertinent surveillance data on client
- Perform surveillance activities
- Instituting patient care and management
- Making appropriate referrals

Level 2 (Laboratories, Parish Health Departments)

Health Personnel at this level seldom come in direct contact with the client, except in the laboratories and National Chest Hospital. However, by virtue of their surveillance expertise, they will liaise with level 1 to get appropriate client data for processing and referral to level 3. The areas in level 2 include Health Departments, National Public Laboratory, UHWI, NCH , Blood blank, Veterinary lab and Private labs.

Functions

- Collate aggregate client information from level 1 facility or directly from clients
- Verify the information collected
- Assist with surveillance activities of case/cases detected at level 1
- Maintain regular contact with Health Personnel at Levels 3 and 4
- Transfer collated information to level 3 and 4 in a timely manner.
- Conduct investigation on notified cases
- Perform active surveillance for some selected diseases/health events
- Perform data analysis
- Conduct investigations on notified cases and implementation of policy decisions

Level 3 (Regional Surveillance Units)

The RSUs operate at level 3 but with some added responsibility. Its functions include but are not limited to the following:

- Collation of notification data from levels 1 and 2.
- Review of notification data
- Assist with investigation on exceptional cases
- Perform data analysis
- Transform data into information
- Develop prevention action and strategies
- Disseminate data information
- Monitoring and evaluation of Parish Health Departments
- Provide support and resources for surveillance at levels 1 and 2
- Interact with level 5 in terms of policy formulation

Level 4 (National Surveillance Unit)

The NSU operates at level 4 but with some added responsibility. Its functions include but are not limited to the following:

- Collation of notification data from levels 1, 2 and 3.
- Review of notification data
- Assist with investigation on exceptional cases
- Perform active surveillance for some selected diseases

- Validation of all data from levels 1&2&3
- Transform data into information
- Develop prevention and control action and strategies
- Disseminate data information
- Interact with level 5 in terms of policy formulation, development of guidelines, protocols etc.
- Perform data analysis
- Monitoring and Evaluation of RHAs' and HDs' programmes and interventions
- Support implementation of policy decisions at levels 2 and 3
- Monitor drug supplies available for specific diseases at levels 1 and 2
- Liaise with level 5 and HCL to procure additional drugs and supplies for specific diseases as necessary

Level 5 (Minister of Health, Permanent Secretary, CMO, Director of HPPD, Director of DPC, CAREC, PAHO)

Health personnel at this level are involved with policy formulation and dissemination of information e.g. through the media. They include the Honourable Minister of Health, Permanent Secretary, Chief Medical Officer of Health and the Director of Health Promotion and Protection. At this level, decisions are made regarding advisories, declaration of warnings, alerts, or amendment of legislation to address specific public health threats

Table 3-1: Parish, Regional and National level syndromic and disease data and information reporting schedules

	Parish*	Regional Health Authority*	National Level
Monday,	• Collection and compilation of data for previous week	• Continue activities from previous week	• Preparation of Bulletin for data received in previous week • Data entry/ Update of national registers
Tuesday	• Review and sign off of notifications and parish report by MO(H) • Transmission of notifications, completed investigation reports and weekly parish report to RSU & NSU	• Collection and compilation of data submitted by the parishes • Sign off by epidemiologist/ RTD on notifications	• Collection and compilation of data submitted by the parishes • Sign off by MO(H)on notifications and investigation reports • Data entry/ Update of national registers • Liaise with laboratories with regards to specimen collection
Wednesday*	• Data entry/ Update of Parish Registers • Distribution of notifications for investigation • Review and sign off on completed investigations by MO(H) for submission to RSU and NSU • Filing of notifications and investigation reports by disease category • Transmission of notifications and completed investigation reports • Analysis of data	• Data entry/ Update of Regional Registers • Review and sign off on completed investigations by epidemiologist/ MO(H) • Evaluation and analysis of data for the region • Filing of notifications and investigation reports by disease category. • Monitor and track sample collection and submission of specimens.	• Transmission of weekly surveillance syndromic report to CAREC • Data entry/ Update of national registers • Initial review of weekly parish reports
Thursday*			• Analysis, interpretation & in-depth review of the reports received that week (previous week's data) to determine trends by parish and country • Review and editing of Weekly Surveillance Bulletin for data received the previous week • Data entry/ Update of national registers
Friday*			• Data entry/ Update of national registers • Corrections made to Surveillance Bulletin and submitted for copying. • Dissemination of Weekly Surveillance Bulletin electronically and hard-copy to In-country stakeholders

Analysis and Interpretation

Data is entered into electronic databases. A weekly report showing the cases of diseases and conditions under surveillance produced at Health Departments and submitted to the RSU & NSU is compiled by the NSU into a weekly bulletin. Monthly, quarterly and annual reports are also produced at levels 2-4 and disseminated to the relevant persons and agencies.

Dissemination

All reports are reviewed internally by the National Epidemiologist before dissemination.

Table 3-2: Dissemination of reports

REPORT	RECIPIENT	METHOD OF DISSEMINATION
Weekly syndromic surveillance report	CAREC	Email, Fax
Weekly Surveillance Bulletin	*Intra-Ministry personnel and other In-country stakeholders	
Weekly EPI reports	CAREC	Email, Fax
Monthly/4-Weekly surveillance report (syndromic and disease specific)	CAREC	Email, Mail, Fax
Monthly Disease-specific Programme Area Report	*Intra-Ministry personnel and other In-country stakeholders	Email,
Quarterly HIV/AIDS	*Intra-Ministry personnel and other In-country stakeholders	Email, Fax
Annual Communicable Disease report/EPI reports	CAREC	Email
Annual Surveillance Report	*Intra-Ministry personnel and other In-country stakeholders	Hard copy
Annual HIV/AIDS/STI reports	*Intra-Ministry personnel and other In-country stakeholders	Email
Annual Hansen's Disease Report	CAREC, PAHO/WHO	
Annual TB report	*Intra-Ministry personnel and other In-country stakeholders, CAREC, PAHO/WHO	Email
Annual Malaria Report	PAHO/WHO	
Alerts	*Intra-Ministry personnel and other In-country stakeholders, CAREC, PAHO, WHO	Email, Telephone, Fax

*Intra-Ministry personnel include the Hon. Minister of Health, CMO, PS and other select technical personnel. In-country stakeholders include the Regional Health Authorities, Parish Health Departments and Planning Institute of Jamaica, among other agencies.

Use of data

Data will be used nationally to inform policies and direct action for prevention and control and elimination of diseases e.g. vaccination, prophylaxis, outbreak control and therapy. It may also be used at all levels for

- monitoring and evaluation
- estimation and projections

- assessing program needs
- allocating resources
- advocacy
- identifying and setting priorities
- developing guidelines, policies and legislation
- identifying training needs
- research purposes
- determine endemic levels for a communicable disease

Evaluation

For the purpose of evaluation, there should be pre-established indicators. These indicators must be simple and easy to measure. These indicators will assist with the evaluation of the surveillance system as it relates to timeliness, completeness, data quality and sensitivity of the surveillance system. It will also evaluate the status of diseases targeted for elimination or eradication such as measles, poliomyelitis and rubella.

Indicators should be expressed as simple counts, proportion, rates or ratios. The following indicators will be used along with others to evaluate the surveillance system in Jamaica.

- Proportion of reporting sites submitting weekly or monthly surveillance reports on time to the HD.
- Proportion of HD submitting weekly or monthly surveillance reports on time to the RHD/NSU.
- Proportion of measles/poliomyelitis/rubella cases reported to the HD/RHD/NSU using the appropriate reporting form
- Proportion of suspected outbreak notified to the RHD/NSU within 48 hrs of making the determination
- Proportion of HD with current trend analysis for selected diseases and syndromes.
- Proportion of confirmed outbreaks with Regional/National public health response
- Proportion of outbreaks detected at Regional and national levels through analysis of surveillance data from parishes and those that were missed by the parish level.

The national surveillance system will be evaluated both internally and externally. Internal evaluation will be conducted annually while external evaluation will be done every 3-5 years. The evaluation will cover process, content and impact. The guidelines for evaluating a surveillance system produced by CDC CAREC and Jamaica will be used.

Reporting Sites

The following sites have been selected as reporting sites for the purpose of reporting disease to the HD, RHA and NSU. The criteria used for selecting a sentinel sites include the following:

- representative of the geographic area served
- easily accessible by all the population served
- perform all the relevant surveillance functions
- should have information about the population served
- must have information on the total number of patients seen daily and their presenting signs and symptoms
- should have adequately trained staff.

All sentinel sites must report their sentinel data **weekly** to the next level

Table 3-3: List of reporting sites

Regional Health Authority	Parish	Population*	Name of Institution	Sentinel site	HAS
South East Regional Health Authority	Kingston & St. Andrews	663,649	Bustamante Hospital for Children	√	√
			Edna Manley Health Centre	√	X
			Glen Vincent Health Centre	√	X
			Harbour View Health Centre	√	X
			University Health Centre	√	X
			University Hospital of the West Indies	√	√
			Bellevue Hospital	X	√
			Kingston Public Hospital	X	√
			Victoria Jubilee Hospital	X	√
			Medical Associates Hospital	X	√
			Andrews Memorial Hospital	X	√
			National Chest Hospital	X	√
			Nuttall Hospital	X	√
			St. Joseph's Hospital	X	√
	St. Catherine	496,555	St. Jago Park Health Centre	√	X
			Christian Pen Health Centre	√	X
			Old Harbour Health Centre	√	X
			Greater Portmore Health Centre	√	X
			Linstead Health Centre	√	X
			Linstead Hospital	X	√
			Spanish Town Hospital	√	√
	St. Thomas	93,887	Morant Bay Health Centre	√	X
			Isaac Barrant Health Centre	√	X
			Princess Margaret Hospital	√	√
North East Regional Health Authority	Portland	81,932	Buff Bay Community Hospital	√	X
			Manchioneal Health Centre	√	X
			Port Antonio Health Centre	√	X
			Port Antonio Hospital	√	√
	St. Mary	113,882	Highgate Health Centre	√	X
			Gayle Health Centre	√	X
			Annotto Bay Health Centre	√	X
			Port Maria Health Centre	√	X
			Port Maria Hospital	√	√
			Annotto Bay Hospital	√	√
	St. Ann	172,755	Brown's Town Health	√	X

Regional Health Authority	Parish	Population*	Name of Institution	Sentinel site	HAS
			Centre		
			Claremont Health Centre	√	X
			Ocho Rios Health Centre	√	X
			Moneague Health Centre	√	X
			St. Ann's Bay Health Centre	√	X
			St. Ann's Bay Hospital	√	√
			Alexandria Community Hospital	√	√
Western Regional Health Authority Western Regional Health Authority (cnt'd)	Trelawny	75,330	Dewar Health Centre	√	X
			Ulster Spring Health Centre	√	X
			Albert Town Health Centre	√	X
			Falmouth Health Centre	√	X
			Falmouth Hospital	√	√
	St. James	183,711	Catherine Hall Health Centre	√	X
			Mobay Type V Health Centre	√	X
			Dr. Surgi's Clinic	√	√
			MoBay Hope	√	X
			Cornwall Regional Hospital	√	√
	Hanover	69,660	Lucea Health Centre	√	X
			Green Island Health Centre	√	X
			Hopewell Health Centre	√	X
			Sandy Bay Health Centre	√	X
			Dr. Stair's Clinic	√	X
			Noel Holmes Hospital	√	√
	Westmoreland	144,437	Darliston Health Centre	√	X
			Whitehouse Health Centre	√	X
			Negril Health Centre	√	X
			Savanna-la-Mar Health centre	√	X
			Savanna-la-Mar General Public Hospital	√	√
Southern Regional Health Authority	St. Elizabeth	150,547	Santa Cruz Health Centre	√	X
			Southfield Health Centre	√	X
			Maggoty Health Centre	√	X
			Black River Hospital	√	√
	Manchester	190,194	Mandeville Comprehensive Clinic	√	X
			Porus Health Centre	√	X
			Cross Keys Health Centre	√	X
			Percy Junior Hospital	√	√
			Mandeville Regional Hospital	√	√
	Clarendon	245,580	Chapelton Hospital	√	X
			May Pen Health Centre	√	X

Regional Health Authority	Parish	Population*	Name of Institution	Sentinel site	HAS
			May Pen Hospital	√	√
			Lionel Town Hospital	√	√
Laboratories			National Public Health Laboratory		
			UHWI Laboratory		
			Bustamante Hospital for Children Laboratory		
			Spanish Town Hospital Laboratory		
			St. Ann's Bay Hospital Laboratory		
			Cornwall Regional Hospital Laboratory		
			Mandeville Regional Hospital		
			Veterinary Services Division - Public Health Laboratory		
			Biomedical Laboratories		
			Central Medical Laboratories		

(Population figures are based off of 2007 census data from Statistical Institute of Jamaica)

Section 4

Notifiable Diseases and Syndromes

The diseases/health events listed in this manual are distributed among three classes according to their surveillance and reporting benefit. Three classes of notifiable diseases / health events have been defined for Jamaica. They are classes 1, 2 and 3.

Class 1 diseases / health events are of highest priority because of their potential to cause high morbidity and / or mortality. They are mainly infectious diseases and account for just over three-quarters of all notifiable conditions. Health care providers must report Class 1 diseases / health events on suspicion to the Medical Officer of Health at their Parish Health departments within 24 hours of contact.

Class 1 diseases/health events include:

- Diseases subjected to International Health Regulations
- Diseases under international surveillance
- Diseases/Events of national and international importance
- Vaccine Preventable Diseases
- Diseases/Events of national interest
- Any exotic or unusual communicable disease
- Case report universally required by International Health Regulations or as a disease under surveillance by WHO.

An outbreak of a communicable disease normally not normally classified as Class 1, but which has the potential to cause high morbidity or mortality may result in its reporting status being upgraded to Class 1.

Class 2: This class includes diseases that are based either on the relative urgency for investigation of contacts and source of infection or for starting control measure in the Jamaican context. Health care providers must report Class 2 diseases weekly on a line listing submitted to the Medical Officer of Health at their Parish Health Departments.

Class 3: Health care providers must report monthly totals for Class 3 diseases to the Medical Officer of Health at their Parish Health Departments. A line listing may also be used to report the cases to the next level.

National/Regional Requirements

Table 4-1: Disease and syndrome under surveillance in the Jamaica

DISEASE	CLASS	CATEGORY
Fever and Rash		Syndromic
Fever < 5 years		
Fever ≥5 years		
Gastroenteritis < 5 years		
Gastroenteritis ≥5 years		
Accidents < 5 years		
Accidents ≥5 years		
Violence < 5 years		
Violence ≥5 years		
Fever and Respiratory Symptoms < 5 years		
Fever and Respiratory Symptoms ≥5-59years		
Fever and Respiratory Symptoms ≥60years		
Fever and Hemorrhagic Symptoms		
Fever and Neurological Symptoms (Hospital sentinel only)		
Fever with Jaundice (Hospital sentinel only)		
Acute Flaccid Paralysis/ Poliomyelitis	1	Vaccine-Preventable Disease
Anthrax	1	
Cholera	1	
Congenital Rubella Syndrome	1	Vaccine-Preventable Disease
Congenital syphilis	1	
Dengue Haemorrhagic Fever/Shock Syndrome	1	
Diphtheria	1	Vaccine-Preventable Disease
Hepatitis B	1	Vaccine-Preventable Disease
HIV/ AIDS	1	Sexually Transmitted Infection
Legionnaire's Disease	1	
Leprosy (Hansen's Disease)	1	
Malaria	1	
Measles	1	Vaccine-Preventable Disease
Meningitis/ Encephalitis	1	

DISEASE	CLASS	CATEGORY
Meningococcal Infection (due to Neisseria meningitidis)	1	
Neonatal Tetanus	1	Vaccine-Preventable Disease
Plague	1	
Rabies (in humans)	1	
Rheumatic Fever	1	
Rubella	1	Vaccine-Preventable Disease
SARS CoV	1	
Tetanus	1	Vaccine-Preventable Disease
Tuberculosis (Extra-pulmonary)	1	
Tuberculosis (Pulmonary)	1	
Typhoid and Paratyphoid Fevers	1	
Viral Hepatitis B	1	
West Nile Virus	1	
Whooping Cough	1	
Yellow Fever (Urban or Sylvatic)	1	Vaccine-Preventable Disease
Dengue Fever	2	
Influenza	2	
Viral Hepatitis A	2	
Bacterial Vaginosis	3	Sexually Transmitted Infection
Campylobacter	3	
Chancroid	3	Sexually Transmitted Infection
Chicken Pox	3	
Chlamydia	3	Sexually Transmitted Infection
E. coli (EHEC)	3	
Genital discharge syndrome	3	Sexually Transmitted Infection
Genital Ulcer syndrome	3	Sexually Transmitted Infection
Gonorrhoea	3	Sexually Transmitted Infection
HSV	3	Sexually Transmitted Infection
LGV	3	Sexually Transmitted Infection
Mumps	3	Vaccine-Preventable Disease
Non-Specific Urethritis (NSU)	3	Sexually Transmitted Infection
Salmonellosis	3	
Shigellosis	3	
Syphilis	3	Sexually Transmitted Infection
Trichomonas	3	Sexually Transmitted Infection
Unspecified STI	3	Sexually Transmitted Infection
Leptospirosis		

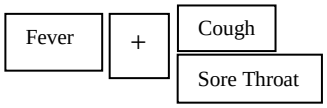
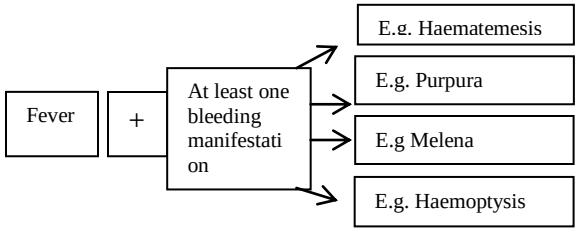
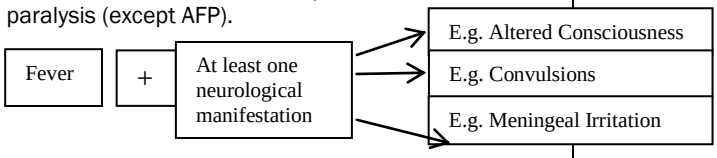
Table 4-2: Case definitions for some commonly seen diseases and health events in Jamaica

	Disease	Case Definition	Specimen/Laboratory
1.	Accidental Poisoning	Any case of suspected poisoning (e.g. bleach or kerosene ingestion) considered to have occurred by accident	For suspected Lead poisoning- Blood in purple top tube to Government chemist at Hope, Kgn 6 (927-1829). For other agents, seek advice from NSU
2.	Acute Flaccid Paralysis/Polio	Acute onset of flaccid paralysis in the absence of trauma	One stool specimen to UHWI laboratory (virology) **and** one stool specimen to NPHL (Enteric Bacteriology Section) on ice within 14 days of onset of paralysis.
3.	Congenital Rubella Syndrome	Congenital cataracts, glaucoma, deafness, microphthalmia, microcephaly, congenital heart defects, meningoencephalitis (as single or combined effects), URTI.	1. Blood/ Serum specimen to NPHL (immunology section) or UHWI (virology) in red top tube. 2. Throat swab or urine sample for viral culture to UHWI (virology lab)
4.	Congenital Syphilis	Failure to thrive, snuffles, skin peeling, dactylitis, fever, anaemia, jaundice, hepatosplenomegaly	Serum specimen to NPHL or CRH laboratory for VDRL/MHATP
5.	Dengue	Acute onset of fever **and two or more** of the following: headache, retro-orbital pain,myalgia, arthralgia, rash, haemorrhagic manifestations	Serum specimen to NPHL
6.	Dengue Haemorrhagic Fever	A case of fever or history of fever within the past week and haemorhagic tendencies as evidenced by **at least one** of the following: • Positive tourniquet test • Petechiae, ecchymoses, or purpura • Bleeding from mucosa, GI tract, injection sites, or others and • Thrombocytopenia (100,000 mm^3 or less) and • Plasma leakage	As for dengue plus organ specimens such as heart, liver, kidney and spleen if the patient should die.
7.	Diphtheria	Acute pharyngitis or laryngitis with a tonsillar or laryngeal pseudomembrane.	Culturette swab of throat to NPHL, CRH or UHWI.
8.	Encephalitis	Acute onset of headache, high fever, meningeal signs, stupor, disorientation, coma, spasticity, tremors, occasional convulsion (especially in infants) and spastic, but rarely flaccid, paralysis.	Acute and convalescent serum specimens to UHWI (virology) (Refer patient to secondary care institution)

	Disease	Case Definition	Specimen/Laboratory
9.	Fever and Rash	Fever (>38°C or 101°F) or recent history of fever and rash.	One serum specimen taken within 4-5 days of onset of rash, to NPHL (immunology section).
10.	Food-borne Illness (outbreak)	An incident in which 2 or more people experience a similar illness, after ingestion of a common food or drink	Stool and /or vomitus, or rectal swab (if stool unavailable) Leftover food or other food should be sent to NPHL in sterile container
11.	Haemophilus Influenzae Meningitis	Sudden onset of fever, vomiting, convulsions, listlessness, neck rigidity and bulging fontanelle.	See Meningitis (# 19).
12.	Hepatitis B	Anorexia, abdominal pain, nausea, vomiting, jaundice.	Serum specimen to NPHL (immunology section)
13.	HIV/AIDS	Severe weight loss (≥10%of body weight), fever, diarrhoea (>1 month duration), lymphadenopathy, oral thrush or other signs of immunosuppression.	Serum specimen to immunology unit of the NPHL or CRH lab. (pre- and post-test counseling required).
14.	Leprosy (Hansen's Disease)	Sharply demarcated anesthetic skin patches (usually hypopigmented)	Refer to dermatologist for specialist testing and skin smear.
15.	Leptospirosis	An acute and often severe bacterial zoonotic disease that frequently affects the liver and other organs. It is characterized by fever, headache, myalgia of calves and/ or thighs, conjunctival suffusion, meningitis and jaundice	Acute blood, urine, CSF or tissue for ELISA IgM. Sample should be sent to NPHL.
16.	Malaria	Intermittent fever with chills and headache, especially in those who recently traveled to malaria endemic areas.	Thin and thick blood smear on glass slide to NPHL (parasitology section).
17.	Maternal Death	Any death of a woman while pregnant or within 42 days of termination of pregnancy	
18.	Measles	See fever and rash (# 9).	See fever and rash (# 9).
19.	Meningitis	Sudden onset of fever with signs and symptoms of meningeal involvement	1. Blood and CSF to hospital bacteriology laboratory or NPHL for culture. 2. For suspected viral aetiology, send stool, a rectal swab, a throat swab, or acute and convalescent serum specimens to UHWI virology.
20.	Meningococcal Meningitis	Sudden onset of fever, intense headache, nausea, vomiting, lethargy, and frequently, petechial rash.	See Meningitis (# 19)
21.	Ophthalmia	Purulent conjunctivitis in any neonate	Culturette swab of discharge to

	Disease	Case Definition	Specimen/Laboratory
	Neonatorum		NPHL or CRH (Bacteriology)
22.	Pertussis-like Syndrome	Paroxysms of coughing, characteristic high pitched aspiratory whoop	Naso-pharyngeal swab in Stewarts Medium at room temperature to NPHL or CRH. Nose aspirate may also be sent but would have to be sent immediately. **Contact laboratory before shipment.**
23.	Rheumatic Fever	Recurrent inflammatory disease affecting large joints (arthritis), the heart (carditis), the brain (chorea), the skin (erythema marginatum) and subcutaneous tissue (subcutaneous nodules) occurring as sequelae of streptococcal upper respiratory tract infection.	Serum for ASTO titres to NPHL or CRH lab.
24.	Rubella	See fever and rash (#9.)	
25.	SARI	*Refer to Chapter 13*	
26.	Tetanus	Children-difficulty in sucking, opisthotonus; Adult-difficulty swallowing, followed by muscle spasm and rigidity, trismus.	Appropriate specimen from debridement or wound swab to NPHL or CRH (bacteriology section) lab.
27.	Tuberculosis	Persistent cough (>3 weeks), fever, night sweats, and weight loss.	3 consecutive early morning sputum sample or gastric washing (for children) or relevant biopsies specimen to NPHL or CRH (bacteriology section) lab.
28.	Typhoid	Insidious onset of sustained fever, headache, malaise, and anorexia.	Whole blood, clotted blood or stool specimen in glycerol saline to NPHL, CRH labs (Enteric Section), Spanish Town Hospital Lab., or BHC laboratory.
29.	Yellow Fever	An illness characterized by: Acute onset of fever followed by **two or more** of the following symptoms: Headaches or backache, Muscle pain, Nausea and/or vomiting, fatigue/lethargy And at least one of the following: Jaundiced, reduced amounts of urine production, bleeding from nose, gums or skin, blood in vomit, stool or urine	Acute blood sample in sterile tube sent to NPHL Convalescent sample 2 to 3 weeks after the first sample. All specimen must be accompanied by patient identification, clinical data, and recent YF immunization history

Table 4-3: **CASE DEFINITIONS FOR SYNDROMES AND CONDITIONS UNDER SURVEILLANCE**

DISEASE/ SYNDROME	DEFINITION	SPECIAL NOTE
Fever	A person presenting with a body temperature of >38^0*C* /100.40^0*F* (or recent history of fever) with or without an obvious diagnosis or focus of infection (as persons may have concurrent infections). A person may also have headache, retro-orbital pain, myalgia, arthralgia, nausea or vomiting.	Infections from presumed viral infection should be included in surveillance. If no thermometer is available, a patient that was or complained of being 'hot to touch' may be considered to have fever. These conditions for fever should also be applied to the other fever syndromes below.
Fever with Rash	A person presenting with fever of 38^{o}C /100.40^{0}F (or recent history of fever) and rash.	There should be no obvious cause of one or both symptoms, indicating that the symptoms are related to each other. This case definition will capture suspected measles, rubella, dengue and roseola cases.
Gastroenteritis (GE)	A person presenting with 3 or more loose stools within 24 hours.	
Violence	Any injury for which the cause is intentional, e.g. gunshot wounds, stab wounds, etc.	
Accidents	Any injury for which the cause is unintentional, e.g. motor vehicle, falls, burns, etc	
Fever and Respiratory Symptoms	A body temperature of >38^0*C* /100.40^0*F* (or recent history of fever) in a previously healthy person with or without respiratory distress presenting with either cough **or** sore throat. 	Cases of upper and lower respiratory tract infections should be counted as fever and respiratory.
Fever and Haemorrhagic Symptoms	A body temperature of >38^0*C* /100.40^0*F* (or recent history of fever) in a previously healthy person presenting with at least one haemorrhagic (bleeding) manifestation with or without jaundice (e.g. haematemesis **or** purpura **or** haemoptysis **or** melena.) 	Fever with haematuria and epistaxis should **not** be counted.
Fever and Neurological Symptoms	A body temperature of >38^0*C* /100.40^0*F* (or recent history of fever) in a previously healthy person with or without headache and vomitting. The person must also have meningeal irritation, convulsions, altered consciousness, altered sensory manifestations or paralysis (except AFP). 	Any person that is a case of suspected meningitis, encephalitis or meningo-encephalitis should be counted as fever and neurological symptoms.
Fever and Jaundice	A body temperature of >38^0*C* /100.40^0*F* (or recent history of fever)in a previously healthy person presenting with jaundice.	
Admitted Lower Respiratory Tract Infections (LRTI)	Any person admitted to hospital with a diagnosis of Lower Respiratory Tract Infection/ Pneumonia	
Deaths from LRTI/ Pneumonia- like Illnesses	Any person who has died whose cause of death is listed as LRTI/Pneumonia	

No definitive time period is given for *recent history of fever*. This is left to the discretion of the clinician who will take into account the disease(s) being queried.

Relationship of Syndromes to Diseases

Table 4-4: Syndromes and possible associated pathogens/diseases

Syndromes	Potential Pathogen/Diseases
Undifferentiated fever	1. Dengue 2. Leptospirosis 3. Malaria 4. Influenza 5. Enterovirus 6. Parvovirus B19 7. Oropouche 8. Mayaro 9. Measles 10. Mumps
Fever and Respiratory symptoms	1. Influenza. 2. Respiratory syncytial. 3. Metapneumovirus 4. Hantavirus 5. Leptospirosis 6. SARS CoV 7. Legionelosis
Fever and haemorrhagic symptoms	1. Dengue hemorrhagic fever 2. Leptospirosis 3. Yellow fever 4. Bacterial (meningococcal,) 5. Malaria 6. Hantavirus 7. Arenavirus 8. Other haemorrhagic fevers e.g. Lassa fever, Ebola virus, Marbury virus)
Fever and neurological symptoms	1. Enteroviruses (Polio and other enteroviruses) 2. West Nile virus 3. Bacterial or viral meningitis 4. Malaria 5. St Louis encephalitis virus 6. Herpes simplex. 7. Dengue
Gastroenteritis	1. *Salmonella* 2. *Shigella* 3. Rotavirus 4. Norwalk 5. Enterotoxigenic E. coli 6. E. coli 0157:H7 7. Staphylococcus aureus 8. Foodborne chemical toxins
Fever and Rash	*1. Measles* *2. Rubella* *3. Dengue*

	4. *Scarlett Fever* 5. *Chicken pox (Varicella)*
Fever and Jaundice	1. *Hepatitis A, B or C* 2. *Dengue fever* 3. *DHF* 4. *Leptospirosis*
Acute Flaccid Paralysis	1. *Poliomyelitis* 2. *Guillian Barré Syndrome*

Forms for Surveillance

The following national surveillance forms can be found in the Appendix section

- Class 1 Notification form
- Weekly Parish Surveillance Report Form
- Case investigation forms
- General surveillance line listing
- Syndromic surveillance

Table 4-5: Guideline for the use of surveillance forms

Type of form	When to use	Frequency of reporting
Class 1 Notification form	Whenever a class 1 disease is identified	Within 24 hours/daily
Case investigation forms	During case/early outbreak investigation	Daily during early outbreak investigation or within 48hrs of completing a case investigation
Weekly Parish Surveillance Report Form	To submit parish data	Weekly by Tuesday afternoon
General surveillance line listing	During an outbreak investigation	Daily during early outbreak or within 48hrs when the outbreak has been drastically reduced
Syndromic surveillance	Whenever a syndromes under surveillance is identified	Use daily at Health Centres Send aggregate numbers to HD/RHA/NSU weekly
Post disaster surveillance form	During and after disaster	Use to capture and transfer information to the next level on a daily basis

Section 5

Role of Laboratory in Surveillance

The control and detection of emerging and re-emerging infectious diseases requires rapid and specific identification of the pathogens and their source. Functional laboratory surveillance is a key component of an effective and efficient communicable disease surveillance system. The laboratory plays a critical role in CD surveillance by providing data for:

- Trend analysis at regional and national level
- Outbreak identification
- Assessment of interventions and
- Support for early warning system (syndromic surveillance)

Although many methods of laboratory confirmation are available, only one or two will be offered by the laboratories based on balance between sensitivity and practicability. The NPHL and UWI laboratory are able to provide most of the diagnostic tests required for disease confirmation in Jamaica. However, some sophisticated diagnostic tests that are not available will be sent to the appropriate reference laboratory in accordance to the existing laboratory protocol and standard operating procedures (SOP).

Table 5-1: Tests currently conducted in the National Public Health Laboratory and UWI Lab

TEST	TURN AROUND TIME*
Serology	
• HAV	1-7days (Once per week)
• HBV	Rapid test 1 day ELISA1-7 days once per week
• HCV	Rapid test 1 day ELISA 1-7 days once per week
• HIV	Rapid test 1 day ELISA twice per week
• HTLV 1	1-7days once per week
• VDRL	daily
• FTA	Twice per week
• RA	1-7days Once per week
• CRP	1-7days Once per week
• ANA	Once per week
• DNA	Once per week
• WIDAL	Once per week
• MONO/EBV IgM, IgG	Once per week
• Cryptococcus antigen	Rapid test 1 day
• Rubella IgG	Once per week
• Rubella IgM	Once per week
• CMV IgG/ IgM	Once per week

TEST	TURN AROUND TIME*
• TOXO IgG	Once per week
• TOXO IgM	Once per week
• Herpes I and II IgG	Once per week
• TORCH	Once per week
• Helicobacter pylori • urea breath test	1-2days
• ASTO	Twice per week

Table 5-1 Contd. UHWI

TEST	TURN AROUND TIME* UHWI
Bacteriology	
• Group A Streptococcus	2-4 days
• Group B Streptococcus	2-4 days
• Clostridium spp • Clostridium difficile toxin	4-5 days 1 day
• Chlamydia trachomatis (PCR)	Not yet available
• Haemophilus influenzae	2-4 days
• Neisseria gonorrhoea	2-4 days
• Neisseria meningitidis	2-4 days
• Salmonella Typhi	3-4 days
• Salmonella other	3-4 days
• Shigella • Campylobacter	3-4 days 4-5 days
• Streptococcus pneumoniae	2-4 days
• Streptococcus pyogenes	Same as group A streptococcus
• Staphylococcus aureus	2-4 days
• Coagulase Negative Staphylococcus	2-4 days
• TB smear	1-2 days
• M. tuberculosis	Culture not yet available
• MOTT	Not yet available
• Vibrio parahaemolyticus	2-4 days
• All non-fermenters including pseudomonas	2-4 days
Parasitology and fungal testing	
• Helminths	2-3 days
• Protozoa	2-3 days
• Candida	2-4 days
• KOH preps	1 day
• Cryptococcus culture	2-4 days
• Dermatophytes	1-3 weeks
• Aspergillus	2-4 days

**Time from when specimen is processed at UWI lab until test result is known*
Other tests are sent to reference laboratories such as CAREC.

NPHL

TEST	TURN AROUND TIME*
Serology	
• HAV	1-7days
• HBV	1-7days
• HCV	1-7 days
• HIV	1-3 days
• HTLV I& II	1-7days
• VDRL	1 day
• TPPA	1-7 days
• RA	1-7days
• CRP	1-7days
• ANA	1 week
• DNA	1-2 weeks
• WIDAL	Not available
• Cryptococcus antigen	1 day
• Rubella IgG	1-7days
• Rubella IgM	1-7days
• CMV IgG/ IgM	1-7days
• TOXO IgG	1-7days
• TOXO IgM	1-7days
• Herpes I and II IgG	1-7days
• TORCH	1-7days
• Helicobacter pylori • urea breath test	Not available
• ASTO	1-7 days
• Leptospirosis	1-7 days

Table 5-1 Contd. **NPHL**

TEST	TURN AROUND TIME* NPHL
Bacteriology	
• Group A Streptococcus	2-3 days
• Group B Streptococcus	2-3 days
• Clostridium spp	3-4 days
• Chlamydia trachomatis	Not available as yet
• Haemophilus influenzae	2-4 days
• Neisseria gonorrhoea	2-4 days
• Neisseria meningitidis	2-4 days
• Salmonella Typhi	3-4 days
• Salmonella other	3-4 days
• Shigella	3-4 days
• Streptococcus pneumoniae	2-3 days
• Streptococcus pyogenes	Same as group A streptococcus
• Staphylococcus aureus	2-3 days
• Coagulase Negative Staphylococcus	2-4 days
• TB smear	24 hrs
• M. tuberculosis	Culture not yet available
• MOTT	Not yet available
• Vibrio parahaemolyticus	Not routinely available
• All non-fermenters including pseudomonas	2-3 days
Parasitology and fungal testing	
• Helminths	4 days
• Protozoa	4 days
• Candida	2 days
• KOH preps	Not yet available
• Cryptococcus culture	2-4 days
• Dermatophytes	Not yet available
• Aspergillus	3-4 days
• Malaria	

**Time from when specimen is processed at NPHLI lab until test result is known*

Other tests are sent to reference laboratories such as CAREC and UHWI.

Laboratory request forms

Current CAREC laboratory request form can be found in the appendix J.

Section 6

The National Surveillance Committee and Response Team

The surveillance response teams will be parish based to ensure timely response to disease outbreaks. In the event of a multi-parish or multi-region outbreak, regional and/or national teams will be constituted under the leadership of the Regional Epidemiologist or National Epidemiologist as the case may be. This national or regional team will use the core of the parish response team that exists in the parishes.

Members of a Parish response team:

- Medical Officer of Health
- Medical Officer
- Senior Public Health Nurse/Public Health Nurse
- Chief Public Health Inspector/ Public Health Inspector
- Parish Surveillance Nurse/ Officer
- Epidemiological Clerk/ Data entry personnel
- Community Health Aide
- Contact Investigator
- Health Education Officer
- Laboratory Technologist
- Administrative Staff for Procurement
- Others will be co-opted as deemed necessary.

Members of a Regional response team:

- Regional Epidemiologists
- Regional Surveillance Officers
- Regional Senior Public Health Nurse
- Regional Environmental Health Officer
- Regional Health Education Officer
- Director of the Regional Laboratory
- SMO, Regional Hospitals
- Parish MOs(H)
- Parish SPHNs
- Parish Chief Public Health Inspectors
- Others will be co-opted as deemed necessary

The RTD will give oversight

Members of National response team:

- National Epidemiologist
- Director, Health Promotion and Protection Division
- Director, Emergency and Disaster Management and Special Services
- Regional Technical Directors
- Senior Medical Officers (Health)
- MO(H), Surveillance Unit

- National Surveillance Officers
- Regional Epidemiologists
- Parish MOs(H) [of affected parishes]
- Director, Environmental Health Unit
- Director of National Public Health Laboratory
- Consultant Microbiologist, NPHL
- Consultant Microbiologist, UHWI
- Others will be co-opted as deemed necessary

Terms of Reference for response teams:

- The parish response team will take the lead in all outbreak investigation confined to that parish
- The regional response team will take the lead if more than one parish within that region is involved
- The national response team will take the lead if more than one region is involved
- The regional response team will collaborate with the parish response team in all outbreaks by providing guidance and extra support staff if needed
- The national response team will collaborate with the regional and parish response teams by providing guidance and extra support if needed.
- In all outbreaks involving exotic diseases or diseases under international concern, the national response team shall take the lead irrespective of the parish or region where the outbreak is occurring.
- The response team will meet as frequently as necessary, but not less than weekly, to review communicable disease data and respond appropriately, until the situation has been resolved.
- The parish response team will primarily be responsible for active case detection, investigation and implementation of control measures.
- The regional response team will be responsible for the development of regional outbreak preparedness and response plans to allow timely resource mobilization from the central level or partners and timely response if an outbreak is declared.
- The national response team will be responsible for the review and consolidation of regional plans and resource mobilization for the implementation of regional plans.

National Advisory Committee on Communicable Disease

The National Advisory Committee on surveillance will meet monthly to review data and other issues pertaining to surveillance in Jamaica. A similar Committee should be established at the regional and parish levels.

Members of the National Advisory Committee on Surveillance in Jamaica:

- PAHO Representative
- Chief Medical Officer
- Chief Nursing Officer, MOH
- Director of Health Promotion and Protection Division

- MO(H) – Surveillance
- National Epidemiologist
- Surveillance Officers, NSU, MoH
- Director, Environmental Health Unit
- Regional Epidemiologists
- Food Safety Specialists
- TB Coordinator
- Senior Medical Officer, National HIV/ STI Programme
- Director, Family Health Services
- Director, National Public Health Laboratory
- Head of Department, Microbiology, UHWI laboratory
- Training Coordinator, MoH
- Director, Health Promotion and Education
- Director, Veterinary Public Health, MoH
- Water and Sewage Representatives
- Microbiologist, UHWI
- Microbiologist, NPHL
- Infectious Disease Consultants, UHWI and KPH

Others (including individuals from other departments, ministries and organizations) will be co-opted as deemed necessary.

The National Advisory Committee on surveillance in Jamaica will meet monthly to review and discuss the information presented from all the parishes and regions.

- This meeting should be chaired by the National Epidemiologist
- The minutes of the meeting should clearly reflect task assignments, timelines and any other issue discussed as it relates to surveillance.

Epidemiology Meeting Guidelines

Monthly epidemiology meetings are important avenues through which to discuss and disperse information pertaining to diseases in the country, region and parish. In order to better standardize these meetings throughout Jamaica, these guidelines have been developed.

- It is recommended that epidemiology meetings should be held monthly to determine the burden of notifiable diseases and health events in the parishes and for early detection of changing trends and outbreaks. These meetings should also serve as a forum for field staff to discuss investigations of diseases and control measures put in place. The MO(H) should chair these meetings.

- Parishes/regions are expected to have visual representations of data e.g. line graphs, bar charts, and spot maps for diseases, events and syndromes of significance to them e.g. gastroenteritis, typhoid, tuberculosis, ophthalmia neonatorum, etc. This is in order to facilitate early detection of rising numbers. These should be updated weekly or more frequently as the situation demands, for example, in outbreaks.
- Registers of all Class I diseases notified should be kept (by disease) to enable quick access to details on the cases, e.g. date of onset, laboratory investigations and reports, final classifications, outcomes etc.
- A list of diseases notified, date of notification and persons (PHI/PHN) responsible for the investigation should be done monthly and taken to each meeting.
- Copies of the weekly parish surveillance reports submitted to the NSU for the previous four weeks (or a summary) should be circulated and discussed at the meetings.
- At each meeting, the following should be discussed:
    - Any problems with the collection, investigation or submission of these reports
    - Line graphs and spots maps of CD/health events and their trends
    - Review of outstanding investigation reports
    - Overview of completed investigation reports
- A list of actions required should be prepared for dissemination to all concerned at all levels
- This meeting also provides an ideal opportunity to provide training and updates on topical and/or relevant issues in surveillance.

An accurate record of all reports, presentations and discussions shared in the meeting should be maintained and circulated to participants of the meeting.

Section 7

Case and Outbreak investigations

Investigations

The surveillance and response to communicable diseases, outbreaks and emerging infectious diseases and events implies 2 different types of investigation.

A) OUTBREAK INVESTIGATION can be triggered by:
   - The monitoring of TRENDS of reported syndromes from the Sentinel Sites
   - Alerts from Health Practitioners
   - Media reports
   - Public
   - Notification from PUBLIC HEALTH
   - Rumours

B) CASE INVESTIGATION can be triggered by:
   - Health practitioners
   - Public
   - Rumours
   - Media
   - Notification of cases from Sentinel Sites, Hospital Wards, or Laboratories
   - Research activity

A flow chart for investigations and public health interventions is shown in figure 6-1.

Outbreak Investigations

Principles and Objectives: Regardless of any diagnostic orientation (i.e., laboratory positive cases may have been notified in accordance with the outbreak); the investigation will involve a multidisciplinary team composed of members from the NSU, RHAs and parish health departments. Health personnel from the community clinics, hospitals, private institutions, NGOs and other agencies may also be involved. The investigation will follow the usual 10-step process (see section 6.4).
The objectives will be:

1. To control the spread of the outbreak (and identify the aetiologic agent, when applicable)
2. To guide the implementation of preventive measures
3. To evaluate and strengthen the surveillance system towards early identification
4. To better understand the disease or event involved (relationships between infectious agent, host and environment)
5. To train public health personnel in Applied Epidemiology

Case Investigations

Principles: The main principle of a case investigation is to diagnose potentially emerging infectious disease and to detect as early as possible, the potential start of an outbreak. A case investigation may also be done on any event or occurrence of public health concern.

The first objective, in any situation, will be to actively search for similar cases, especially outside of the Sentinel Sites surveillance system. From there, two scenarios will be considered:

(i) Other cases are detected – an assessment of the epidemic risk or risk of exposure to the population will determine if the investigation should then be equivalent to an outbreak investigation.

(ii) No other cases are detected – the investigation will then be looking at ruling out or better understanding a potentially emerging infectious disease, together with a close assessment of the related epidemic risk, or potential event of public health and/or international concern.

The availability or not, of an aetiologic (laboratory) diagnosis or agent at the time of the case investigation will determine what objectives to aim at and the appropriate protocol to follow.

If the diagnosis is known:

Objective No. 1 – To actively search for other cases

Activities:

a) review existing recent epidemiological data from health centres,
b) actively collect the missing information from non-reporting health centres
c) further seek reporting physicians' judgment about similar cases

Objective No. 2 – To assess the epidemic risk, or exposure risk of events of public health concern

Activities:

d) investigate around the index and other existing cases
e) collect samples appropriately, according to the situation (i.e. clinical, environmental, animal)

Objective No. 3 – To guide further public health interventions

Activities:

f) Develop response plans and implement control measures that would be guided by information obtained through activities under objectives 1 and 2 above.

If the diagnosis is NOT known

Objective No. 1 – Confirm the diagnosis and/or formulate a case definition

Objective No. 2 – To actively search for other cases
Activities:

a) review existing recent epidemiological data from health centres
b) actively collect the missing information from non-reporting health centres
c) further seek for reporting physicians' judgment about similar cases

Objective No. 3 – To fully investigate to rule out or better understand a potentially emerging infectious disease or condition of public health concern

Activities:

a) Consult partners for assistance e.g. PAHO/ CAREC, CDC
b) Collect samples to facilitate further testing

Objective No. 4 – To Guide further public health interventions

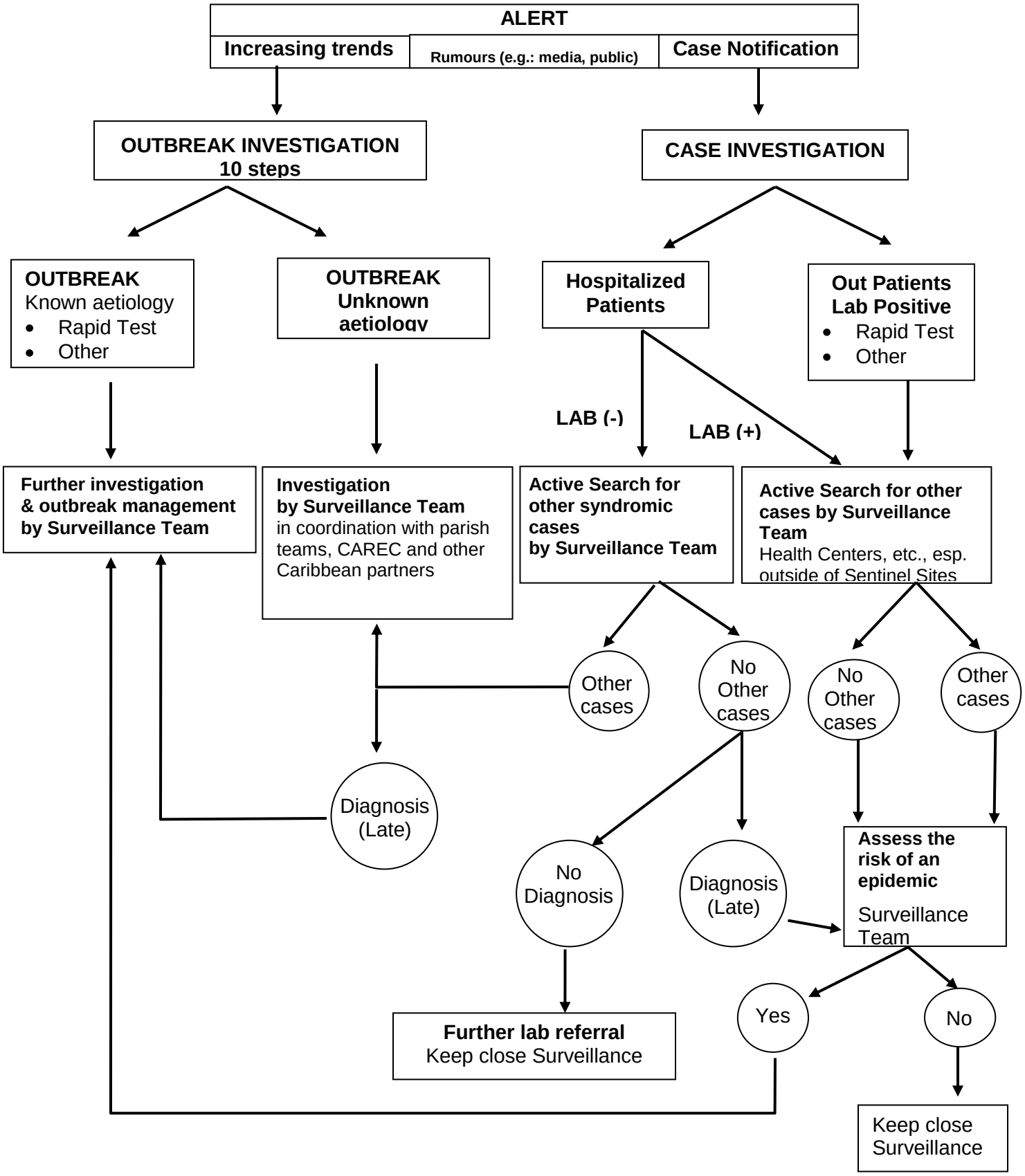
Activities:

f) Develop response plans and implement control measures that would be guided by information obtained through activities under objectives 1 and 2 above.

In the event where investigated cases are found to be isolated cases for which no diagnosis has been made, further laboratory investigations should be pursued, in keeping with available information, technology and resources at the time.

Finally, when no epidemic risk is identified (e.g. isolated or unrelated cases of a known aetiology occurring in a low-risk environment) the Surveillance Team still has to ensure that adequate and close monitoring is maintained, in order to quickly detect any significant changes in the epidemiological situation.

Figure 7-1: Flowchart for investigations and public health interventions



What is an Outbreak?

An **outbreak or epidemic** is defined as the occurrence of disease clearly in excess of what is normally expected. The words outbreak and epidemic mean exactly the same thing, however the word epidemic usually conveys a greater sense of panic than the word outbreak, and depicts a wider spread. It should be noted that when there is a single case of a disease that has been previously eradicated or eliminated in Jamaica for more than 5 years, this constitutes an outbreak. For other diseases that regularly occur in the country (i.e. endemic), the determination of an outbreak should be based on a number of factors such as epidemic threshold, seasonality and regional distribution.

The existence of an outbreak could have serious implications, not just for the persons affected, but also for the wider community. All outbreaks should be reported immediately to the RSU and NSU.

The CMO is responsible for declaring an outbreak in Jamaica based on evidence gathered from the surveillance system as presented by the key technical officers such as the National Epidemiologist, Regional Epidemiologist and the Medical Officer of Health at the parish level.

The criteria for declaring an outbreak is over can be different for each disease. The CMO will declare the outbreak over when the threat to the health of the public has been minimized and there is no further evidence that the spread is continuing.

During an outbreak, it cannot be business as usual. The intensity of surveillance must be increased and cases must be reported daily or in real time. It is not cost effective to continue laboratory testing of cases when the aetiology of the outbreak has been determined unless if such testing is required for the further management of the case. It is advisable to test only the first 5-10 cases or until the aetiology of the outbreak is determined and then resume testing again once the number of cases have been drastically reduced (by about 75%) to determine if the outbreak is over.

Once the outbreak is over, the intensity of surveillance activities can return to the pre-outbreak level.

The Four Goals of an Outbreak Investigation

I. Case management – this activity aims to minimize the effects of the disease causing the outbreak, in other words minimize the occurrence of severe morbidity and mortality.

II. Containment of infection – which aims to break the chain of transmission and prevent the further spread of infection from those who are affected to those who are not, in the local, national and international environment.

III. Active search for new cases – this is to monitor the development of the outbreak and assess the effectiveness of control measures being implemented. Some ways in which this could be achieved would be through the dissemination of case definitions to all health workers or by visiting hospitals and/or clinics to examine medical records.

IV. Protection of susceptible individuals – this is the identification of risk factors and populations in danger of contracting the disease and then using methods

(e.g. immunization, public education) to protect these groups from becoming infected.

Ten Steps of an Outbreak Investigation

There are ten key steps that must be performed in a successful outbreak investigation. These steps are the guidelines how to approach the investigation. They do not necessarily need to be conducted sequentially, in fact, often more than one step may be performed at the same time. These ten steps are:

1. **Confirm** that an outbreak exists – this can be done by comparing current disease data with earlier data on the disease in question. If no past data are available, you may need to rely on the knowledge and experience of local health staff.
2. **Verify** the diagnosis – this may be done by reviewing the clinical findings and/or the lab results.
3. Make a quick **assessment** of the patients – this step will require the formulation of a case definition which will outline the criteria for inclusion as a suspect, probable or confirmed case.
4. **Relate** the cases in some way – you will need to relate the cases in terms of;
   4.1. person – Are they male or female? How old are they?
   4.2. place – Where did the exposure occur? Is there a common travel history among the cases?
   4.3. time – What is the time of exposure and onset of illness for the cases?
5. **Formulate a hypothesis** – this hypothesis should be as precise as possible and be used to guide the investigation. It should incorporate all clinical, laboratory and epidemiologic facts of the investigation, as well as known factors about the disease process.
6. **Plan and conduct** a detailed epidemiologic investigation – standardized investigation forms should be used for data collection. Case-control studies involving controls (persons who are not cases) should also be conducted for comparative analysis. This will help to identify the agent to which cases were exposed to more frequently than controls and thus what was likely to have made the cases ill.
7. **Analyze** the data – this should be done as soon as possible after data are collected. Attack rates or rate for occurrence of illness among cases should be compared to that among controls.
8. **Formulate a conclusion** – conclusions should be based on all relevant evidence.
9. Put **control measures** in operation – these measures should be practical, be put into place immediately and plans should be made to evaluate their effectiveness.
10. **Write a report** – this report should be clear, precise and usable. It should also include both short and long term recommendations and should be disseminated to appropriate decision-makers.

Management of an outbreak

When planning the activities to be conducted during the investigation, you must find a balance between what is ideal and what is achievable, between what is needed and what you can provide and afford.

Management issues in the investigation of an outbreak include:

- Identification of relevant persons to be involved in the declaration that an outbreak exists.
- Flow of information to relevant health providers that an outbreak is occurring and advise them how to proceed.
- Consideration at each stage of the investigation, as to who else needs to be informed and provide regular updates to relevant persons.
- Dissemination of information to the community where appropriate.
- Involvement and dissemination of information to the media as deemed appropriate by the designated authorities.
- Consideration of the capability and capacity of the laboratories you will utilize for support in your investigation.
- Consideration of the availability of medical supplies that might be needed for your investigation, e.g. Vaccines, antibiotics or oral rehydration solutions, and procurement of additional supplies.
- Appealing for assistance early. You may receive assistance from various levels, internal sources, external sources, the Caribbean Epidemiology Centre (CAREC/PAHO/WHO) and other international organizations, such as Centres for Disease Prevention and Control (CDC).
- Declaration that the outbreak is over.
- Maintenance of surveillance activities to monitor the disease or syndrome that was investigated.

Case definition for purpose of outbreak investigations

A **case definition** is a standard set of criteria to be used for deciding whether someone should be classified as a case of the disease under investigation. The case definition must

- include information relating to person, place and time
- include signs and symptoms
- be clear as to whether suspected, probable or confirmed cases of disease will be utilized
- be clear as to whether a case is to be confirmed **clinically**, by **laboratory**, or by **epidemiologic linkage**

If the team wants to be sure to capture all cases, the case definition should be fairly broad, with minimal criteria for exclusion. Many investigations often start with a fairly loose case definition and this definition becomes more precise as the investigation proceeds.

Outbreak Investigation Team (Refer back to Section 6 above)

Investigating an outbreak is not a one-man job - it is a team effort, with each member of the team having a specific function. The National Response Team (see p. 35) has a crucial role to play too.

In Jamaica, the roles and functions of the response teams (see p. 35) include:

- A **team leader**, who should have strong epidemiologic skills (in the parish outbreaks, MO(H) of the parish will be the lead investigator and may call in help from the regional or national level. He or she may also request that the National Epidemiologist take the lead if necessary. In the case of multi-regional or national outbreaks, the National epidemiologist (or his designate determined by the Chief Medical Officer or Director of Health Promotion and Protection) will be the lead investigator.
- Public Health Nurses to collect and collate data on cases and controls during the time of the outbreak, as well as to collect and collate past data so that disease events over time can be observed and reported on.
- Environmental Health Officers/ Public Health Inspectors to conduct site investigations and collect data and samples when appropriate. In an outbreak of food borne illness, these sites may be food establishments or hotels.
- Health Educators/Promoters/Coordinators for planning of health promotion at national level and within the communities, and to work in collaboration with the Communications Unit.
- Designated and authorized spokespersons to communicate with the media so that clear, consistent messages are delivered to the public. It is important that the public receives accurate information from the MoH, which is not necessarily the type of information that sells newspapers, etc. (see MoH risk communication protocol page 52)
- Data entry support so that data can be analyzed and information generated as the investigation proceeds.
- Statistical analysis support to assist with analysis of data and the production of relevant tables, charts, etc. for reports.
- Somebody to provide assistance with GIS mapping, where relevant.
- Laboratory support to confirm the aetiologic or causative agent responsible for the outbreak.
- Clinical specialist(s) to provide advice and guidelines on diagnosis and protocols for patient care and management.

Of course, depending on the availability of resources and the size of the outbreak, one team member may perform more than one of these roles. While each person has specific expertise, within the context of investigating an outbreak, you may be assigned other responsibilities by your team leader.

Outbreak Report

Sharing information on an outbreak for your own reference as well for colleagues and other relevant institutions is a crucial component of the investigation. Thought should

be given to publishing the results in a journal as information and experience gained from an outbreak investigation is used to prevent additional outbreaks locally and in other areas. The following format can be used as a template when writing a report which is a mandatory requirement at the end of each outbreak or case investigation. The team leader is responsible for ensuring that the report is produced in a timely manner, and the national epidemiologist will decide on its distribution.

Introduction

- Background
- Reason for investigation/ Rationale

Objectives of Investigation

Methods

- Dates of investigation
- Site(s) of investigation
- Case finding – indicate what was done regarding case finding
- Lab specimens collected
- Describe response and intervention

Results

- Date and location of first known case (index case)
- Results of additional case finding
- Lab analysis and results
- Describe key features of results of time, place and person analysis
- Results of response and evidence of impact

Discussion

- Based on result, describe the events leading to the outbreak
- Emphasize the lessons learnt from the incident
- Limitations of the investigation

Conclusion and Recommendations

- Emphasize the lessons learnt from the incident
- Make recommendations for action at each level: local/parish, regional and central/ policy formulation level

Appendices

- Questionnaires
- Maps
- Investigation forms
- Reference

(See Caribbean Outbreak Reporting Tool Appendix H)

Risk communication protocol

The 3 Paradigms to remember:

1. When people are insufficiently alarmed about a serious hazard, the task is to increase their concern and motivate them to take appropriate actions.
2. When people are excessively alarmed about a small hazard, the task is to diminish their concern and deter them from unnecessary and potentially harmful actions.
3. When people are justifiably alarmed about a serious hazard, the task is to harness their concern and guide their actions.

Remember only one spokesperson at a time

At the Parish level:

- The MOH or Parish Manager should be the spokesperson. In some rare circumstances this task can be delegated.
- The target audience should be specific and confined to the parish that they serve.
- They should use a news medium that only serves their target population.
- They must clearly state in their communication that the outbreak or health events is localized to their parish.
- They must not speak for the region or the country.
- The message should be developed using recommendations in the MOH communication plan.
- As a rule of the thumb, they must not speak on diseases or health events that have international and regional implication unless first clearing with the MOH. Some examples include Cholera, Yellow Fever, Malaria, Plague, SARS, outbreaks in a hotel, outbreak of vaccine preventable diseases.
- A copy of official communication must be shared with the RHA and MOH.
- When diseases or health events span across more than one parish, communication will be coordinated through the RHA or MOH as the case may be.

At the Regional level:

- The RD/RTD/SMO/CEO of the region should be the spokesperson. In some rare circumstances this task can be delegated.
- The target audience should be specific and confined to the health region that they serve.
- They should use a news medium that only serves their target population.
- They must clearly state in their communication that the outbreak or health events is localized to their health region
- They must not speak for the other health regions or the country.
- The message should be developed using recommendations in the MOH communication plan.
- As a rule of the thumb, they must not speak on diseases or Health events that have international implication unless first clearing with the MOH. Some examples include cholera, yellow fever, Malaria, plague, SARS, outbreak of vaccine preventable diseases.

- A copy of the official communication should be shared with the MOH.
- When diseases or health events span across more than one health region, communication should be coordinated through the MOH.
- When the event is over, there should be an official communication to say so and to give further directives on future communications on the subject matter.

At the Central level:

- The Honorable Minister/CMO/Permanent Secretary/Director of Health Promotion and Protection should be the spokesperson. In some instances this task can be delegated.
- The target audience is the entire Island
- The central level should ensure that the communication is well coordinated with the regional and parish level spokespersons
- Inputs from the parish and regional level should be encouraged and incorporated.
- When the event is over, there should be an official communication to say so and to give further directives on future communications on the subject matter.

The NSU or health personnel involved with surveillance should be involved in putting the message together and should be cognizant of the 3 communication paradigms.

NB: If in doubt of what to do refer to MoH policy on Communication or call the MOH.

OUTBREAK INVESTIGATION CASE STUDY

(Taken from CDC website www.epicasestudies.cdc.gov . Answers are included in the Appendix)

Salmonella in the Caribbean

A Classroom Case Study

Original investigators: Lisa Indar-Harrinauth,[1, 2] Nicholas Daniels,[3] Parimi Prabbakar,[1] Clive Brown,[1] Gail Baccus-Taylor,[2] Edward Commissiong,[2] H. Reid,[4] and James Hospedales[1]

[1]Caribbean Epidemiology Centre, Pan American Health Organization/World Health Organization
[2]Food Technology Unit, Department of Chemical Engineering, University of the West Indies
[3]Foodborne and Diarrheal Diseases Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention
[4]Trinidad Public Health Laboratory, Trinidad

Case study and instructor's guide created by: Jeanette K. Stehr-Green, MD

Reviewed by: Frederick J. Angulo, DVM, PhD, Stephanie M. DeLong, MPH, Lisa Indar-Harrinauth, PhD, MSc, James Hospedales, MBBS, MSc, MFPHM, Robert Tauxe, MD, MPH, James Flint, MPH, Roderick C. Jones, MPH, Eleni Galanis, MD, MPH

NOTE: This case study is based on real-life investigations undertaken in Trinidad and Tobago in 1998-1999 and published in Clinical Infectious Diseases and the West Indian Medical Journal. (See Appendix for abstracts.) Some aspects of these investigations (and the circumstances leading up to them) have been altered to assist in meeting the desired teaching objectives and some details have been fabricated to provide continuity to the storyline.

Target audience: public health practitioners with knowledge of basic epidemiologic concepts, especially non-epidemiologists (e.g., laboratorians, environmental health specialists, sanitarians, public health nurses, veterinarians, MPH students)

Level of case study: basic

Teaching materials required: graph paper, calculator

Time required: 3-4 hours

Language: English

Training materials funded by: the Centers for Disease Control and Prevention (National Center for Infectious Diseases, Food Safety Initiative, Public Health Practice Program Office, and Epidemiology Program Office/Division of International Health)

August 2004

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service
Centers for Disease Control and Prevention
Atlanta, Georgia 30333

Salmonella in the Caribbean

Learning objectives:

After completing this case study, the student should be able to:

1) describe the signs and symptoms, means of diagnosis, and control of salmonellosis
2) describe how *Salmonella* serotyping can be used in public health practice
3) given a disease, describe the desired characteristics of a surveillance system for that disease
4) discuss how the inclusion of the laboratory in the surveillance of a disease impacts the characteristics of the surveillance system and the usefulness of the data
5) calculate the incidence of a disease if given the number of cases and population size
6) characterize a health problem by time, place, and person (e.g., perform the descriptive epidemiology)
7) create and interpret a graph
8) interpret the measure of association for a case-control study

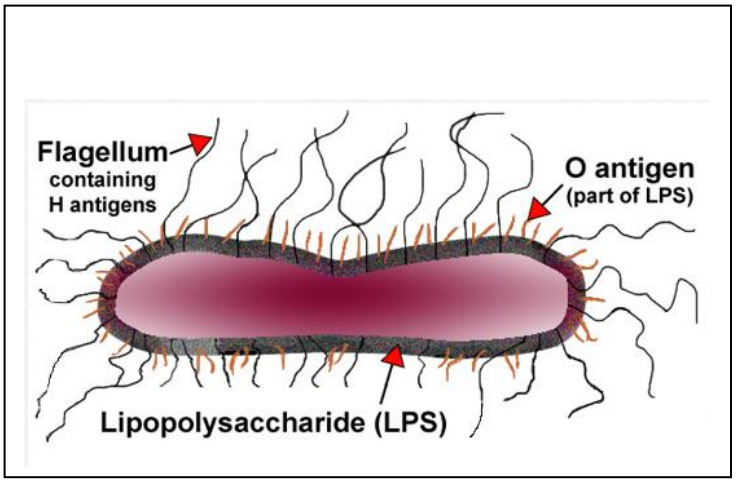
Part I – Background on *Salmonella*

Salmonellosis is a gastrointestinal illness caused by bacteria from the genus *Salmonella*. The illness is characterized by the sudden onset of headache, abdominal pain, diarrhea (which may be bloody), nausea, and sometimes vomiting. Fever is almost always present. The illness typically lasts for 5-7 days and usually does not require treatment unless the patient becomes severely dehydrated or the infection spreads from the intestines. In the immunocompromised host or an overwhelming infection in a normal host, *Salmonella* may spread to the blood stream and other body sites, and can cause death unless treated promptly with antibiotics.

Salmonella live in the intestinal tracts of humans and other animals, including mammals, birds, and reptiles. *Salmonella* are usually transmitted to humans by eating foods contaminated with animal feces. Implicated foods are typically those of animal origin, such as beef, poultry, milk, or eggs, but all foods, including vegetables, may become contaminated. The incubation period for salmonellosis is usually 12-36 hours, but can be as long as a week.

Question 1: How is salmonellosis diagnosed? How does the method of diagnosis impact our understanding of the occurrence of salmonellosis in the community (e.g., burden of disease, trends over time, high-risk populations)?

Figure 1. *Salmonella* surface antigens



The genus *Salmonella* consists of only two species: *S. enterica* and *S. bongori*. The latter species, however, is very rare.

Members of the species *Salmonella enterica* can be divided into smaller groups (i.e., serotypes) based on two structures on the cell surface: the O antigen and the H antigen. The O antigen is a carbohydrate antigen in the lipopolysaccharide of the bacterium's outer cell membrane. The H antigen is a protein antigen in the bacterium's flagella. (Figure 1)

O antigens and H antigens are detected using antisera that react with a single antigen or group of related antigens. All *Salmonella* serotypes can be designated using a formula based on the O and H antigens they express. Many serotypes are also given a name (e.g., *Salmonella* Typhimurium, *Salmonella* Agona, *Salmonella* Muenchen). (NOTE: The serotype name is capitalized and not italicized.)

Although extensive serotyping of surface antigens can be used for identification of a *Salmonella* isolate, the reagents are costly, the process is time-consuming, and the results are not likely to affect treatment of the individual patient. As a result, in many countries clinical laboratories perform only a few O antigen reactions that allow them to group an isolate into broader, less specific categories called serogroups. The isolate is then forwarded to a state or national reference laboratory for complete serotyping.

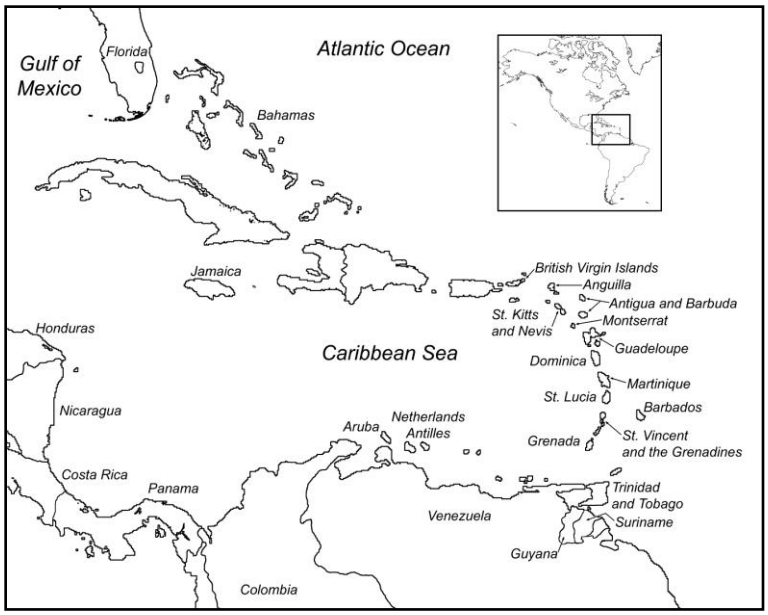
There are over 2,500 recognized *Salmonella* serotypes. In 1995, *Salmonella* Enteritidis, Typhimurium, and Typhi accounted for over three-quarters of the isolates reported in a global survey.

Question 2: Describe how serotype results can be used in public health practice.

Part II – Surveillance of *Salmonella* in the Caribbean

As early as the mid-1980s, *Salmonella* became a pathogen of public health concern in the Caribbean (Figure 2) when it caused an increasing number of cases and outbreaks of diarrhea involving local and tourist populations. The communicable disease surveillance system in place at the time, however, did not support the timely detection of these outbreaks or the investigation of risk factors associated with infection. As a result, the incidence of *Salmonella* continued to grow.

Figure 2. Countries of the Caribbean and surrounding land masses.



Question 3: To detect outbreaks of infectious diseases (e.g., salmonellosis) and investigate risk factors for infection, what characteristics should a communicable disease surveillance system have?

The communicable disease surveillance system in the Caribbean was based on notifiable disease reports from physicians and other health care providers in the community (i.e., clinician-based reporting). Surveillance of most communicable diseases included both laboratory-confirmed cases and cases diagnosed based on clinician suspicion. The laboratory did not report cases of communicable disease to the surveillance system or submit isolates for confirmation or further testing (e.g., serotyping).

To report a communicable disease in the Caribbean, the health care provider completed a disease report card (Figure 3) and mailed it to the local health department within 7 days of diagnosis of the patient.

Figure 3. Communicable Disease Case Report Card

<table>
<tr><td colspan="2">CARIBBEAN EPIDEMIOLOGY CENTRE
Clinician-based Reporting
COMMUNICABLE DISEASE CASE REPORT CARD</td></tr>
<tr><td colspan="2">Case identification
Last name, First name, Middle initial:</td></tr>
<tr><td colspan="2">Address:</td></tr>
<tr><td colspan="2">City/Country:</td></tr>
<tr><td>Disease information
Diagnosis:
Lab-confirmed: ☐ Yes ☐ No
Date of onset:</td><td>Case information
Sex: ☐ Male ☐ Female
Age:
Current status: ☐ Alive ☐ Dead</td></tr>
<tr><td>Attending physician
Name:
Address:
Telephone number:</td><td>Person reporting case (if not attending physician)
Name:
Telephone number:</td></tr>
</table>

A clerk at the local health department reviewed the report cards for completeness (requesting additional information from the health care provider, where needed), batched the reports, and mailed them to the country's Ministry of Health where they were sorted by disease. The Ministry of Health forwarded the reports to the Caribbean Epidemiology Centre (CAREC).

An epidemiologist from CAREC reviewed and summarized the reports from the individual countries. If necessary, the epidemiologist contacted the Ministry of Health if an unusual disease pattern was noted. CAREC distributed weekly, quarterly, and annual communicable disease reports for the region and each country to all Ministries of Health. In addition, CAREC reported occurrences of selected diseases (e.g., cholera, plague, yellow fever) to the Pan American

Health Organization/World Health Organization as required by International Health Regulations.

Question 4: Diagram the flow of information in the Caribbean communicable disease surveillance system.

In an evaluation of the Caribbean communicable disease surveillance system, it was determined that less than 40% of notifiable disease cases were actually reported by health care providers. The average reporting delay (i.e., from diagnosis to receipt of the report by CAREC) was 56 days.

Question 5: Evaluate the Caribbean communicable disease surveillance system with respect to the desired goals of outbreak detection and investigation of risk factors for infection. What changes would you make to the surveillance system? Why?

After extensive consultation with the Ministries of Health from the individual Caribbean countries, health care providers, professional medical organizations, and clinical laboratories, CAREC proposed a modification of communicable disease reporting in the region.

In addition to health care providers (i.e., clinician-based surveillance), clinical laboratories were enlisted to report the detection of notifiable diseases that were laboratory confirmed (i.e., laboratory-based surveillance). Clinical laboratories were also asked to forward all isolates of *Salmonella* to the national reference laboratory in Trinidad (i.e., the Public Health Laboratory). Staff at the Public Health Laboratory, who had specialized training in *Salmonella* serotyping and access to specialized reagents, were to perform serotyping and antimicrobial susceptibility testing on forwarded *Salmonella* isolates.

To further improve the timeliness of reporting, health care providers and clinical laboratories were to submit reports directly to newly designated surveillance officers in each country's Ministry of Health. Diseases that potentially could be spread through food or water or readily from person-to-person were to be reported within 24 hours of diagnosis. The remainder were to be reported within 3 days of diagnosis. Health care providers and clinical laboratories were encouraged to submit reports by telephone or FAX.

Initial acceptance and implementation of the new communicable disease reporting procedures were slow. Member countries had limited public health resources to initiate the changes and there was resistance among health care providers and clinical laboratories.

Question 6: What might be done to encourage acceptance of the surveillance system and improve reporting?

Staff from CAREC visited member countries and, with the assistance of staff from the local Ministry of Health, provided training to both health care providers and staff from clinical laboratories. Training focused on the mechanics of reporting and how surveillance data would be used to monitor disease trends, detect outbreaks, and initiate controls measures. Many of the presentations were made at professional meetings, allowing for an open discussion of the reporting procedures and surveillance in general.

CAREC staff toured the larger clinical laboratories in the various countries and identified problems associated with testing, reporting, and the forwarding of *Salmonella* isolates to the national Public Health Laboratory in Trinidad. A resource person was identified at the Public Health Laboratory to provide ongoing support to all clinical laboratories.

A close working relationship developed between the Public Health Laboratory in Trinidad and CAREC. Laboratory staff forwarded laboratory results to epidemiologists at CAREC on a weekly basis and notified them by phone if an unusual case was noted or an increase in the isolation rate of a particular disease occurred.

CAREC staff summarized communicable disease surveillance results (including serotype and antimicrobial susceptibility test results) and distributed a weekly summary to the Ministries of Health and monthly updates to health care providers and clinical laboratories. They worked closely with staff from the respective Ministries of Health if an unusual disease pattern was noted or some reporting problem became evident.

Part III – Descriptive Epidemiology of *Salmonella* in Trinidad

Due to the close proximity of both CAREC and the national Public Health Laboratory, Trinidad and Tobago moved most quickly on the implementation of the new reporting procedures. As a result, several large outbreaks of salmonellosis were detected allowing local public health practitioners to initiate investigations and implement appropriate control measures. However, salmonellosis continued to occur at a high rate in the country.

In 1998, CAREC summarized the following data for laboratory-confirmed cases of salmonellosis reported in Trinidad and Tobago.

Table 1. Laboratory isolates of *Salmonella* by serotype and year of diagnosis, Trinidad and Tobago, 1988-1997.

	Year of Diagnosis									
Serotype	88	89	90	91	92	93	94	95	96	97
Enteritidis	0	0	0	0	1	0	18	47	107	73
Typhimurium	4	6	9	17	84	45	37	13	11	5
Other	27	18	27	48	21	37	44	49	57	31
TOTAL	31	24	36	65	106	82	99	109	175	109

Question 7A: Calculate the incidence of laboratory-confirmed salmonellosis (all serotypes combined) for Trinidad and Tobago in 1997. (Assume that only one isolate was received for each patient. The population of Trinidad and Tobago was estimated to be 1,265,000 in July of 1997.)

Question 7B: The annual incidence of laboratory-confirmed *Salmonella* infections in Trinidad and Tobago is approximately 9 per 100,000 population. Assume that: 1) approximately one in every 10 people with diarrhea go to the doctor, 2) doctors request submission of a stool specimen from approximately one in every 10 patients with diarrhea that they see, and 3) approximately two in every three stool specimens are properly tested for *Salmonella* and are reported through the surveillance system.

Given these assumptions, what is the true burden of *Salmonella* in Trinidad and Tobago?

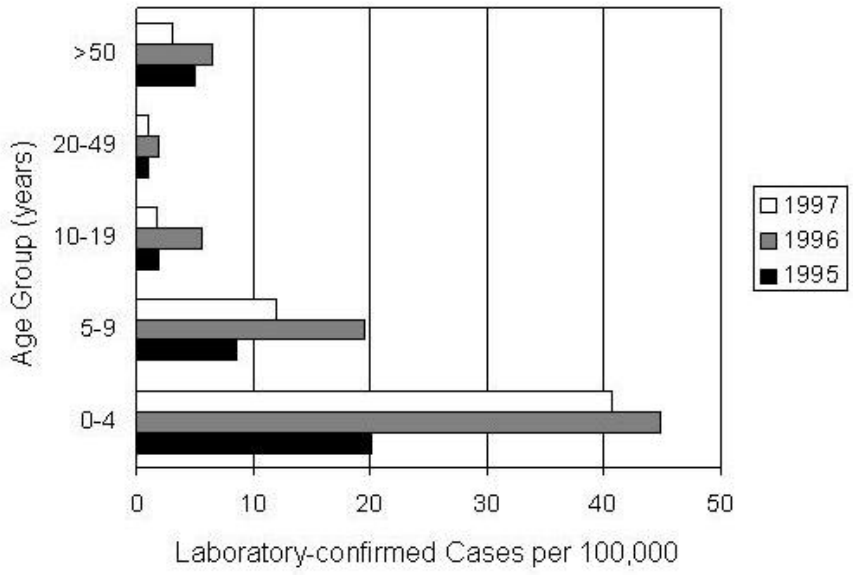
Question 8: Create a line graph of the number of *Salmonella* isolates by serotype by year of diagnosis for Trinidad and Tobago from 1988 to 1997. Interpret the graph.

Due to the increase in S. Enteritidis in Trinidad and Tobago, CAREC focused their analyses on this serotype. The following data are for S. Enteritidis only.

From 1995-97, 227 laboratory-confirmed cases of S. Enteritidis infection were reported in Trinidad and Tobago. Approximately, 76 cases were reported each year for an annual incidence of 6 per 100,000 population. In general, the geographic distribution of patients with S. Enteritidis infection reflected population distributions on the two islands. The largest numbers of cases were reported from the most populous counties of St. George and Victoria.

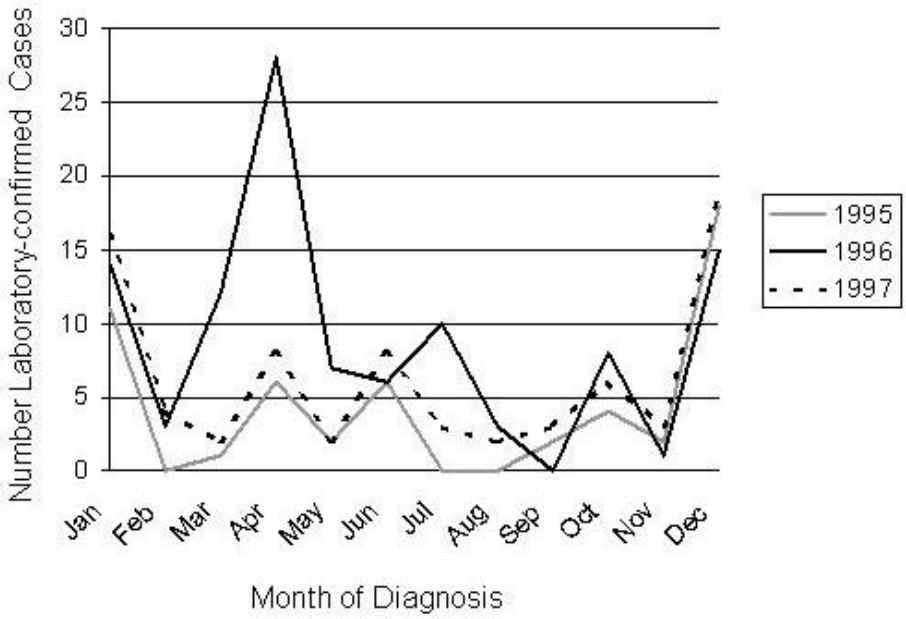
A similar proportion of S. Enteritidis infections occurred among males (48%) and females (52%). However, the distribution of cases varied by age group (Figure 4) and month of diagnosis (Figure 5).

Figure 4. Laboratory-confirmed cases of *Salmonella* Enteritidis (per 100,000 population)
by age group and year of diagnosis, Trinidad and Tobago, 1995-1997.



Question 9: Interpret the grouped bar chart of laboratory-confirmed S. Enteritidis cases by age group. What age group(s) is at highest risk for infection?

Figure 5. Laboratory-confirmed cases of *Salmonella* Enteritidis
by month and year of diagnosis, Trinidad and Tobago, 1995-1997.



Question 10: Describe the occurrence of *S.* Enteritidis infection in Trinidad and Tobago by month of diagnosis?

Part IV – Case-Control Study of *S.* Enteritidis in Trinidad and Tobago

To explore risk factors for *S.* Enteritidis infection in Trinidad and Tobago, a matched case-control study was undertaken from March 1998 - May 1999. A case-control study design was used because the cases did not arise from a well-defined group of people and were distributed across the entire country.

Cases were patients with laboratory-confirmed *S.* Enteritidis infection who were reported through the communicable disease surveillance system. Cases were enrolled prospectively, shortly after diagnosis. Controls were persons with no diarrheal illness in the previous 4 weeks who lived in the same neighborhood as cases and were similar in age. Investigators attempted to enroll two controls for each case.

Using a standardized questionnaire, investigators collected information from cases about foods and beverages consumed, recent travel, and food handling practices in

the 3 days before they became ill. Controls were asked about these exposures during the same 3-day period as the matched case. The questionnaire was administered to both cases and controls by one of the investigators in face-to-face interviews.

Forty-five patients and 92 controls were enrolled in the case-control study. The investigators analyzed the results of the case-control study.

Question 11: What is the measure of association in a case-control study? How is it interpreted?

In the Trinidad and Tobago case-control study, cases and controls were similar to each other in terms of age, sex, ethnic distribution, and place of residence. Exposure to potential sources of *Salmonella*, however, differed between cases and controls (Table 2).

Table 2. Potential sources of exposure to *Salmonella*, Trinidad and Tobago Case-Control Study, March 1998 – May 1999.

Exposure*	Matched Odds Ratio	p-value
Ate chicken	0.5	0.4
Ate shell eggs	8.8	<0.001
Ate dishes that contained raw or undercooked eggs	18.9	0.001
Ate ground beef	1.3	0.6
Ingested powdered milk	1.5	0.2
Exposed to live chickens	1.3	0.4
Bought refrigerated eggs	0.1	<0.001
Refrigerated eggs at home	0.03	<0.001

*in the 3 days before onset of illness in the associated case

Question 12: Interpret the odds ratios for the above exposures. What exposures appear to be risk factors for S. Enteritidis infection in Trinidad and Tobago?

The specific raw egg-containing foods that were implicated by the case patients' food histories included homemade eggnog, cake batter, homemade ice cream, punch a crème (i.e., a drink similar to eggnog), and stout and eggs. The implicated food items correlated with the predominance of cases in December and January as many of these foods are consumed more frequently in the holiday season.

Samples of the implicated foods were collected from patients, from the places where patients had originally purchased the foods, or both and were cultured for *Salmonella*. *S.* Enteritidis isolates from patients and food were phage-typed at the U.S. Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia.

S. Enteritidis samples from 34 patients were selected for phage typing. Of these, 30 (88%) were found to be phage type 4 and 4 (12%) were found to be phage type 1. *S.* Enteritidis was isolated from 15 (45%) of the 33 food samples implicated by the patients' food histories. Nine of the 15 food isolates were phage typed; all nine were phage type 4.

Question 13: Discuss possible interpretations of the same phage type among *Salmonella* isolated from patients with salmonellosis and suspect food samples.

Question 14: What control measures would you consider at this point?

Part V – Study of Eggs in Trinidad

To further investigate the role that eggs may play as a source of *Salmonella* infections in Trinidad, a microbiologic survey of shell eggs was undertaken. Ten egg-producing farms across the country were selected, nine of which were the largest and most popular commercial table egg farms in Trinidad. Their total production accounted for approximately 75% of the country's egg supply.

Twenty-five freshly laid eggs were collected from each farm on three different occasions for a total of 750 eggs. Each set of 25 eggs was cultured for *Salmonella* in pooled batches.

Eggshells were cultured separately from egg contents. The eggshell samples were prepared by swabbing the shell surface of each of the 25 eggs with cotton wool tips moistened with lactose pre-enrichment broth. The eggs were not washed prior to swabbing. The eggs were then sanitized using U.S. Food and Drug Administration eggshell disinfection procedures: each egg was cleaned with a stiff wire brush, hand washed under running water with antibacterial soap, and patted dry with a paper towel. The eggs were then placed in a wire basket and immersed in 70% alcohol for 30 minutes followed by distilled water for 10 minutes. The eggs were then allowed to air dry. The contents were removed aseptically, pooled together, and homogenized in a blender.

Question 15: Why were the eggshells cultured separately from the egg contents? Why were the eggs sanitized before the contents were cultured?

Salmonella was detected more often in shell cultures (4.6% of samples) than in content cultures (1.2% of samples). *S.* Typhimurium was the most prevalent serotype found on the eggshells and *S.* Enteritidis was the most prevalent serotype isolated from the egg contents (Table 3).

Table 3. *Salmonella* serotypes isolated from the 750 pooled eggshells and egg contents

from 10 egg-producing farms, Trinidad, 1998-1999.

Salmonella serotype isolated	Percent positive for serotype*	
	Pooled eggshells	Pooled egg contents
S. Typhimurium	3.06	0.4
S. Enteritidis	0.67	0.8
S. Ohio	0.27	-
S. Cerro	0.27	-

S. Infantis	0.27	-
S. Heidelberg	0.13	-
Total	4.6	1.2

*Because *Salmonella* isolates are generally present in very low numbers in eggs, it was assumed that each isolate came from one positive egg and the percentage was based on a denominator of 750.

The isolation rates of *Salmonella* on shell surfaces and in egg contents varied among the 10 egg-producing farms. At least one serotype of *Salmonella* was isolated from eggshells at all 10 of the farms. *Salmonella* was isolated from egg contents at only three of the farms.

An environmental health assessment was undertaken at each of the farms by a food safety officer from the Trinidad and Tobago Ministry of Agriculture to identify factors that could have contributed to the contamination of eggshells and contents with *Salmonella*.

Question 16: What specific activities would you undertake as part of an environmental health assessment of the egg-producing farms?

The food safety officer inspected the farms and collected information about the system of chicken rearing, quality control measures, feed and litter type, egg cleanliness, and other management practices.

At four of the farms, the environment and immediate surroundings were generally clean with dry litter surfaces and clean drinking water, poultry houses, nesting boxes, and equipment. Proper egg-handling techniques and good farm practices were also employed. The eggs collected from these farms appeared clean with little or no fecal matter on their surfaces.

In contrast, the surroundings of the other six egg-producing farms generally appeared unsanitary: litter surfaces were wet on most occasions. Egg belts, poultry houses, and nesting boxes were dirty and there were rodents and flies. These farms were also characterized by odor build-up, such as ammonia, and the eggs collected from them frequently had feces and sometimes blood on the shells. In general, these farms had higher *Salmonella* isolation rates from pooled eggshells and egg contents than the other farms.

None of the 10 farms had routine microbial monitoring of their flocks or eggs.

Question 17: What food safety practices at the egg-producing farms might help prevent or reduce the risk of salmonellosis from the consumption of eggs from these farms?

Part VI - Prevention and Control

Following release of the results from the *S.* Enteritidis case-control study, the microbiologic survey of shell eggs, and environmental health assessments of egg-producing farms, the Trinidad and Tobago Ministries of Health and of Agriculture initiated a farm-to-table approach to *Salmonella* prevention and control strategies. These strategies combined public health education of consumers, food service establishments, and food workers (on the risks associated with eating raw and undercooked eggs and using unrefrigerated eggs) and strategies for reduction of *Salmonella* infections among egg-laying flocks and breeder flocks.

Regional workshops were held in November 2002 for egg producers on production and food safety. "Good Agricultural Practices" for hatchery sanitation and egg production were developed from the proceedings. Drafts were widely distributed for review and comment. Final copies were distributed to all egg-producing farms under the coordination of the Inter-American Institute for Cooperation on Agriculture. The Ministry of Agriculture, responsible for the regulation of food safety in Trinidad and Tobago, made staff available on an ongoing basis to answer questions from producers on the "Good Agricultural Practices" and help them to explore and solve problems.

Through public and private partnerships and networking, Ministry of Agriculture officials developed a protocol to identify and remove infected flocks from the egg supply and increase quality assurance and sanitation measures at egg-producing farms. The procedures included the following steps:

- Both eggs and chickens from commercial egg-producing farms will be tested for *Salmonella* on a quarterly basis.
- Any flocks that test positive for *Salmonella* on routine exam will be re-tested.
- If a second sample is positive, traceback investigations will be undertaken to identify breeder flocks.
- Infected breeder flocks (those that produced the egg-laying chickens) will be slaughtered.
- Eggs from infected egg-laying chickens will be pasteurized instead of being sold as shell eggs.
- Non-infected flocks from farms at which infected flocks have been detected will be tested more frequently (i.e., every 4 weeks).

The Ministry of Agriculture implemented the above procedures in Trinidad and Tobago in 2003.

Question 18: In addition to the testing of eggs and flocks for *Salmonella*, how might you monitor the impact of *Salmonella* control measures in Trinidad and Tobago?

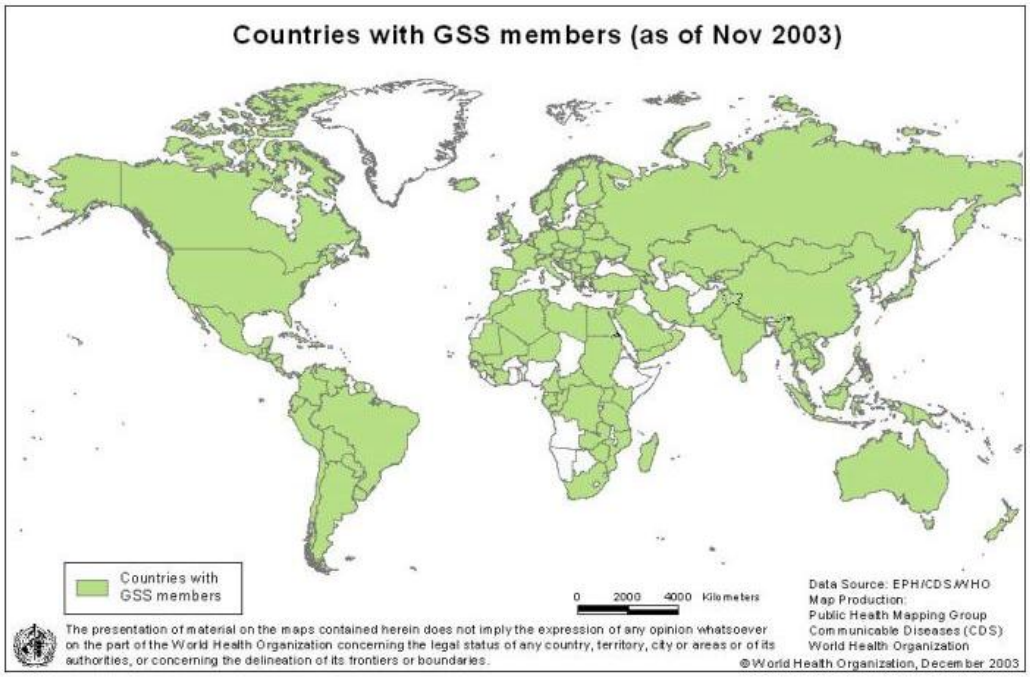
Epilogue

Serotyping of *Salmonella*, as used in the investigation of *Salmonella* Enteritidis in the Caribbean, is a common subtyping procedure used throughout the world. In a 1997 survey of World Health Organization (WHO) member states, 69 of the responding 104 countries conducted *Salmonella* serotyping as part of public health surveillance for salmonellosis. Serotyping was performed in all six WHO regions; however, surveillance was limited in time or scope for some countries. Access to serotyping reagents varied by country and some countries reported only serogroup results.

WHO Global Salm-Surv, an international, foodborne disease surveillance network, was created by WHO in partnership with the Danish Institute for Food and Veterinary Research, the Centers for Disease Control and Prevention, Institut Pasteur International Network, Health Canada, and the Animal Sciences Group (ID-Lelystad) in the Netherlands. The goal of WHO Global Salm-Surv is to reduce foodborne diseases through enhancement of laboratory-based surveillance (including serotyping and antimicrobial resistance testing) and outbreak detection and response techniques. Components of the network that help promote this goal include international training courses, an external quality assurance system, and country and region-specific projects. The network also offers a moderated list serv, web-based annual *Salmonella* summary data from member institutions, and a website, and provides services such as reference testing and identification of reliable sources of antisera for countries.

As of November 2003, WHO Global Salm-Surv had members from 138 countries including the Bahamas, Barbados, Belize, Dominican Republic, Jamaica, Saint Lucia, Suriname, and Trinidad and Tobago in the Caribbean. Participation in WHO Global Salm-Surv has provided critical information to investigate outbreaks such as the one described in this case study and has led to local interventions that have reduced the human health burden of *Salmonella* and other foodborne diseases globally.

Figure 6. WHO Global Salm-Surv Country Membership



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Indar-Harrinauth L, Daniels N, Prabhakar P, Brown C, Baccus-Taylor G, Comissiong E, Hospedales J. Emergence of *Salmonella enteritidis* phage type 4 in the Caribbean: Case-control study in Trinidad and Tobago, West Indies. Clinical Infectious Diseases 2001;32:890-6. (See Appendix for abstract.)

Indar L, Baccus-Taylor G, Commissiong E, Prabhakar P, Reid H. Salmonellosis in Trinidad: evidence for transovarian transmission of *Salmonella* in farm eggs. West Indian Med J 1998;47:50-3. (See Appendix for abstract.)

Orrett FA and Shurland SM. Susceptibility patterns and serotypes of non-typhoidal *Salmonella* in Trinidad. Saudi Med J 2001;22:852-5.

Abstracts from Original Investigations

Indar-Harrinauth L, Daniels N, Prabhakar P, Brown C, Baccus-Taylor G, Comissiong E, Hospedales J. Emergence of *Salmonella enteritidis* phage type 4 in the Caribbean: Case-control study in Trinidad and Tobago, West Indies. Clin Infect Dis 2001;32(6):890-6.

A prospective case-control study involving 46 case patients and 92 age- and neighborhood-matched control subjects was conducted in Trinidad and Tobago (T&T) between March 1998 and May 1999 to determine the etiology, sources, and risk factors for *Salmonella enteritidis* (SE) infection. SE infection in T&T was found to be associated with the consumption of shell eggs, and in particular raw or undercooked eggs. SE isolates from 30 (88%) of 34 patients and from 9 implicated egg or egg-containing food samples were phage type 4. Homemade eggnog and ice cream, cake batter, and egg-containing beverages were the main raw egg-containing foods, reflecting the cultural practices of the people of T&T. Public health education on the risks of eating raw or undercooked eggs, thorough cooking of all egg dishes, and refrigeration of shell eggs and egg dishes; studies tracing infected eggs to their sources; and testing of flocks of layer chickens for SE are needed to reduce the incidence of this infection.

Indar L, Baccus-Taylor G, Commissiong E, Prabhakar P, Reid H. Salmonellosis in Trinidad: Evidence for transovarian transmission of *Salmonella* in farm eggs. West Indian Med J 1998;47(2):50-3.

The aim of this study was to determine whether the contents of farm eggs in Trinidad are contaminated with *Salmonella* and if transovarian transmission occurs. 750 fresh eggs from 10 farms supplying 75% of the country's eggs were cultured for *Salmonella*. *Salmonella* was found on the egg shells' surfaces from all farms, and in the egg contents from three farms. Isolates were obtained from the cultures of the contents and shells of nine (1.2%) and 35 (4.66%) eggs, respectively ($p < 0.005$). Serotypes found in the contents

were *S. enteritidis* (0.8%; deduced to be contaminated by transovarian transmission) and *S. typhimurium* (0.4%); those isolated from the shells (contaminated by faecal transmission) were *S. typhimurium* (3.06%), *S. enteritidis* (0.67%), *S. ohio* (0.27%), *S. cerro* (0.27%), *S. infantis* (0.27%) and *S. heidelberg* (0.13%). This study provides the first evidence for *Salmonella* and, more importantly, *S. enteritidis*, in eggs in Trinidad. This is of major public health significance because *S. enteritidis* infected eggs appear normal and the organism is difficult to detect and control. The consumption of these eggs may increase the risk of *Salmonella* infection. Food safety practices, particularly the thorough cooking (> or = 70 degrees C) of all egg dishes and the refrigeration (< 10 degrees C) of shell eggs and egg dishes, are recommended.

Section 8

Disaster Surveillance

Introduction

Disasters can be either natural or intentional and include events such as hurricanes, tropical storms, floods, earthquakes, volcanic eruptions, fires and acts of terrorism, including bioterrorism. Widespread epidemics of serious diseases, pandemics and events of public health concern may also be viewed as disasters in themselves, and managed as such.

Many communicable diseases thrive in post disaster climates along with disrupted public utilities and health services, and the potential for a large scale outbreak becomes a very real possibility. As the risk of communicable disease spread is heightened following a disaster, there is the need for intensified and enhanced surveillance.

Pre-Disaster

Routine surveillance data in pre-disaster or inter-disaster periods are important in assessing the communicable disease risk in communities and nationally. The risk of a particular disease resurging following a disaster depends on many factors, one of which is the endemic level of that disease. Routine data should be used as a baseline for post disaster surveillance activities. This data should be readily assessable for scrutiny following a disaster.

It must be emphasized that following a disaster, interruptions in usual services – including communications, electricity and the like, should be expected and planned for. Contingencies to cater for these must be addressed as far as possible during pre-disaster periods.

Well defined and mutually understood relationships must be established between the health sector and the national coordinating agency for disaster preparedness and response. This is usually coordinated through established Emergency Operation Centres (EOCs) at parish, region and national levels.

During Disaster

It may be difficult to carry out the usual surveillance activities, but monitoring, advice and action must be undertaken as much as is feasible (e.g. monitoring of shelters, provision of supplies, food etc.)

Assessment of Damage and Subsequent Disease Potential

Damage assessment should not wait until detail reports on specific locales are received, a rapid assessment should be initiated as early as possible. As far as possible, information should be displayed on wall maps and updated as new information becomes available.

At a local level, a rapid assessment of the extent of damage should place special emphasis on:

- Communications
- Roads including state of bridges
- Telephone links
- Health facilities
- Areas flooded
- Water supply systems
- Sewerage systems
- Solid waste disposal systems

Epidemiologic factors which influence the potential risk of communicable disease transmission after a disaster include:

- Changes in pre-existing levels of disease
- Ecological changes resulting from the disaster
- Population displacement (persons in shelters etc.)
- Changes in population density
- Disruption of public utilities
- Interruption of basic public health services

Most prominent are the influences on the modes of transmission of communicable diseases. For example:

- Crowding in evacuation centers (shelters) can increase transmission of diseases caused by respiratory and person to person spread
- Tropical depressions and hurricanes can create floods, increasing contact with contaminated water and increasing the risk, for example, of a leptospirosis outbreak or skin infection
- Flooding can damage or overwhelm water treatment plants, pumping stations and distribution mains resulting in disrupted or contaminated supplies, increasing the risk of gastrointestinal illnesses.
- Stagnant water, following floods, provides fertile breeding grounds for several vectors e.g. mosquitoes contributing to a dengue or malaria outbreak.

Identification of Surveillance Needs and Resources

Disease surveillance essentially involves the gathering of information that is critical for rationally planning, implementing and evaluating public health action. Coordinated efforts that respond to real priorities are essential.

Surveillance during post disaster periods should be based on existing systems with minimum essential modification. A surveillance coordinator should be assigned and this individual should report directly to the coordinator with overall responsibility for health related activities.

Routine surveillance in non-disaster areas should not lapse as outbreaks in regions not affected by the disaster may still be occurring. In addition, persons from the disaster areas may move to other areas while incubating an infection.

While special needs may be peculiar to certain types of disasters, both in terms of surveillance activities and public health action, there are common basic areas which must be addressed:

- The existence of a health sector plan for disaster preparedness is assumed. This should be reviewed and updated annually and should address any

deficiencies identified in the event that it had been activated in the interim, either during simulation exercises or in an actual disaster situation.

- The designation of a coordinator for surveillance activities with established lines of communication and command.
- Provisions to allow ready access to baseline and other data including the use of reference maps.
- Clear guidelines of what to report and how. This should include the handling of reports received from non-traditional sources.
- Guidelines and resources for the appropriate analysis of the collected surveillance data.
- Mechanisms for feeding field information to the command centre with provisions to cater for breakdown in normal communication systems. Appropriate feedback provisions.
- Backup laboratory services, the use of which should be rationalized.
- Suitable field equipment for monitoring and recording essential surveillance data, as well as for the collection and transport of clinical and environmental specimens.
- Inputs from Epidemiologists at both the planning and field operations stages.
- Suitable mechanism for disseminating information and advice to the public.

Post Disaster

During the post disaster period, the diseases that are likely to increase include the following: dengue, malaria, leptospirosis, cholera, foodborne illness, typhoid fever, and scabies. During this period, reporting is a key element of surveillance. Syndromic surveillance supported by laboratory testing is very essential to detecting and preventing any outbreak.

Daily information is required on the number of persons residing in shelters or evacuation centre or persons seeking attention at a health facility. The use of case definitions must be standardized therefore the post disaster form should be used for reporting key elements of surveillance. The **NSU will announce via the most appropriate communication channel when to revert to normal surveillance.**

The prevention and control measures of the most likely diseases should be implemented at the same time. (refer to CAREC Public Health Surveillance Manual for action for further information).

Plan of Action for Surveillance Response

Considerations that need to be addressed in the establishment of post-disaster surveillance:

1. **Establishing a Post-disaster surveillance centre**

The location of the centre will depend upon:

- Extent of the disaster, local or nationwide.
- Pre-disaster organization of the health services e.g. administered through regional, parish, or county administrations.

- Communication facilities with special emphasis on telephone or radio links with national coordinating agency and field reporting units. Computer links could be especially helpful, where these exist and are not interrupted by the disaster itself. It is important to maintain rapid two-way flow of information between peripheral and the central level, at which critical and urgent decisions will have to be made from time to time.

2. Reporting system

Reporting is a key element of surveillance, and emphasis should be placed on the sensitivity of the system to be able to detect minor changes in disease occurrence so that analysis and appropriate action can be taken immediately. This usually necessitates limiting the number of diseases under surveillance, becoming more flexible in regard to diagnostic criteria in laboratory work, and relying on the reporting of symptom complexes (syndromic reporting). Daily syndromic reporting is required for persons residing in an evacuation centre or seeking attention at a health facility.

- Use of case definitions and symptom complexes must be standardized throughout the surveillance period. (See examples of post-disaster surveillance forms in Appendix FF).
- Timeliness of reporting is important. Since the situation is changing daily, daily reporting is necessary. Collection of reporting forms should be organized on a daily basis.
- Completeness of data may not be necessary or feasible in disaster situations. What is required is data that can be interpreted as an overall indicator on which appropriate and effective public health interventions can be based. The importance of negative reporting should be stressed.
- It is also important that information, reports and "rumours" arising from non-organized channels should not be ignored. Action should be taken to verify the source and reliability of the information to confirm veracity and institute necessary measures where indicated.
- Monitoring activities should extend beyond disease occurrence to include other conditions which have public health implications e.g. information on the status of water supplies. Where disrupted treatment systems have been restored testing for free and residual levels of chlorine should be done, and if access to laboratory facilities is available bacteriological testing should be carried out as well.

3. Feedback

Data from investigations should be analyzed and the findings should be published in an official daily or weekly report. It should also contain tables and charts from the daily reports.

Section 9

Surveillance of Chronic Non-Communicable Diseases

Introduction

Sixty percent of deaths globally are due to Chronic Non-communicable diseases. Currently, 80% of deaths from chronic disease occur in low- and middle-income countries, where people develop these diseases at younger ages, suffer longer, and die sooner. The Caribbean has the highest prevalence of Chronic Non-communicable diseases (CNCDs) in the region of the Americas.

Since the 1970's, there has been an epidemiological transition in disease patterns in Jamaica. Chronic diseases, including cardiovascular diseases, diabetes, and cancer now account for 56% of deaths annually. Direct costs from violence related injuries for the Jamaican health sector is 2.2 billion each year. This is approximately 40% of the recurrent hospital budget of the Ministry of Health[3].

The prevalence and risk factors for CNCD, such as, diabetes *(7.2% in 2000 to 7.9% in 2008),* hypertension (*20% in 2000 to 25% in 2008)* and obesity (*19.7% in 2000 to 25.3% in 2008)* continue to spiral out of control, causing preventable loss of life, premature death, lost productivity and increase in cost of health care.

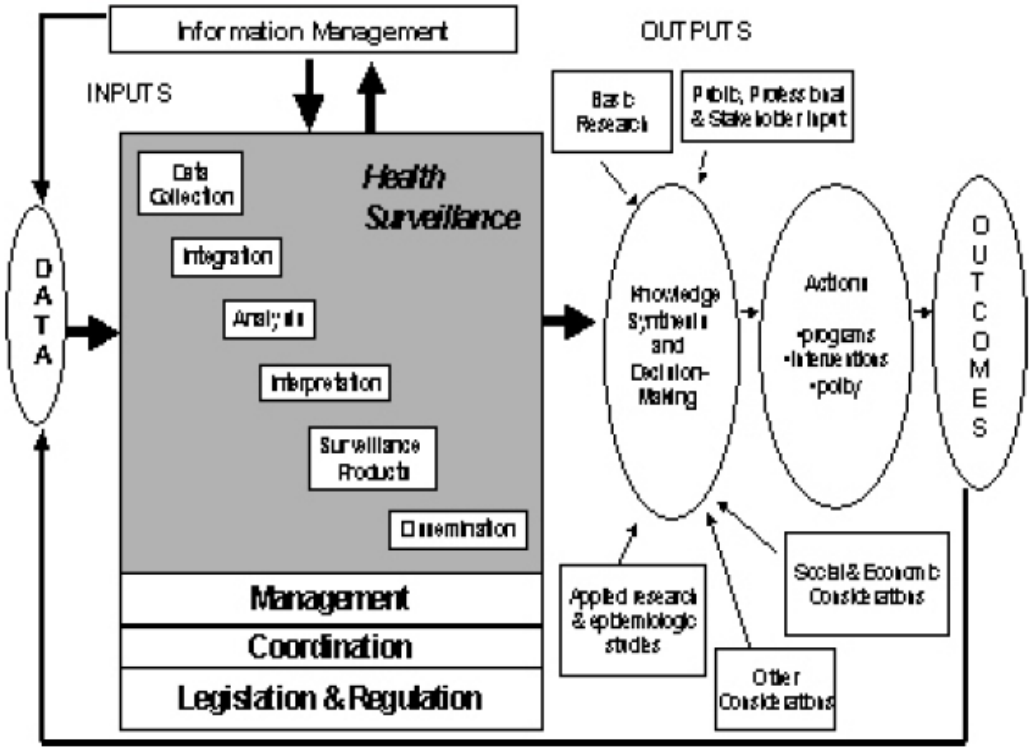
Chronic Non-communicable Disease surveillance

Chronic Diseases are those health conditions that are incurable, caused by a complex interaction of factors, with a prolonged clinical course. These diseases can be prevented and controlled however, in order to achieve this it will be necessary to monitor and track the risk factors which increase the probability of developing the chronic diseases, as well as indicators of the processes and outcomes of these diseases. In other words a chronic disease Surveillance system is necessary in the fight against CNCDs.

Why develop a surveillance system for chronic non-communicable diseases?
Although chronic diseases are among the most common and costly health problems, they are also among the most preventable. Adopting healthy behaviors (e.g., eating nutritious foods, being physically active, and avoiding tobacco use) can prevent or control the effects of these diseases. In addition, quality of life is enhanced when chronic diseases are detected and treated early. Regular screening can reduce morbidity and mortality from cancers of the breast, cervix, colon, and rectum. Clinical preventive services can prevent the debilitating complications of diabetes and cardiovascular disease.

The **purpose** of the Chronic Non-Communicable Disease Surveillance system is to monitor the health situation (mortality, morbidity data, prevalence and incidence of Risk Factor) socioeconomic determinants and data on programme and policy performance, with a view to analyzing them from different perspectives and help in the selection of priorities, allocation of resources and strengthening comprehensive protocols, policies and programmes.

Figure 9.1 A High-Level Health Surveillance Model



Source: Chronic Disease Surveillance in Primary Care in Canada. "An opportunity whose time has come." Presentation by: Richard Birtwhisite MD MSc FCFP - New Foundland Chapter CFPC Annual Scientific Assembly.

There are several data sources and systems in Jamaica that collect information on chronic diseases. *Please see table 1 below.*

Table 9-1: Data sources and systems for Chronic Diseases and their risk factors in Jamaica

Data source	Type of data collected	Data collected on Chronic diseases
Hospital Monthly Statistical Report (HMSR) database	Reports on workload information within the hospital system.	Workload by age groups for Asthma, and Lower Respiratory Tract Infection Injuries – workload and type of injury
Medical Records Case Abstract (MRCA) database	Stores patient demographics and information on diagnostic procedures, and discharge diagnoses	Individual conditions for chronic diseases as specified on the ICD 10 code.
Patient Administration system (PAS) database	Stores patient demographics and information on admission, diagnostic procedures, and discharge.	Individual conditions for chronic diseases as specified on the ICD 10 code.
Monthly Clinical Summary Report (MCSR) database	Stores aggregate information on services including antenatal, postnatal, child health, Family Planning etc.	Workload asthma, hypertension, diabetes, mental health disorder, pap smears, breast exams, prostate exam Caseload- diabetes and hypertension

Data source	Type of data collected	Data collected on Chronic diseases
Community Mental Health database	Workload (differentiated by six diagnosis Post-traumatic Stress disorder of Childhood/adolescent, Substance abuse, Organic Mental Disorder, Mood Disorder, Pyschizophrenic/Pychicotic disorder) and caseload for mental health patients and source of referrals	Six Mental health conditions.
National Health Fund database	Store information on patient demographics, 14 chronic disease conditions and their treatment (Breast Cancer, Prostate Cancer, Hypertension, Ischaemic Heart Disease, Rheumatic Fever/Heart Disease, High Cholesterol, Vascular Disease, Diabetes, Epilepsy, Major Depression, Psychosis, Glaucoma, Asthma, Arthritis and Benign Prostatic Hyperplasia)	14 chronic disease conditions and their treatment
Registrar General Department	Stores data on individual demographics and vital statistics	Mortality data
Statistical Institute of Jamaica (STATIN)	Reports on Vital statistics, demographics, economic and commercial marketing statistics.	Consumption patterns Trends in Aging of population Mortality Data
Jamaica Constabulary Force	Reports Individual demographics, violence related injuries and motor vehicle accidents.	Mortality data
Jamaica Injury Surveillance system	The JISS is a hospital based information system that gathers injuries data from nine Govt. hospitals across Jamaica. They are Cornwall Regional, Annotto Bay, Spanish Town, St. Ann's Bay, May Pen, Mandeville, Sav-La-Mar, Kingston Public and Bustamante Children's. There are four categories of injuries that the system monitors. These are Accident/Unintentional Injuries, Violence Related Injuries (VRIs), Suicide Attempts (SAs) and Motor Vehicle Accidents (MVAs). The data is entered into the PAS database under special projects.	Accident/Unintentional Injuries, Violence Related Injuries (VRIs), Suicide Attempts (SAs) and Motor Vehicle Accidents (MVAs)
Cancer Registry	There are two registries in Jamaica, the University of the West Indies (UWI) Department of Pathology and the Western Regional Health Authority. The UWI Department of Pathology collects data for Kingston and St. Andrew and the Western Regional Health Authority collects data for that region.	Cancer incidence
Pap Smear Register	Stores data on patient demographics, screening, referrals, quality of smear, and pap smear results	Caseload pap smear Pap smear results referrals
Chronic Disease Register	Patient demographics, disease parameters for Diabetes and Hypertension.	Quality of care diabetes and hypertension
Surveys ➢ Jamaica Health and Lifestyle Survey ➢ Youth Resiliency Survey ➢ Global Tobacco Survey	Collects data on Chronic diseases and risk factors	Collects data on Chronic diseases and risk factors
Sentinel Surveillance	Information is collected weekly from sites along with data on communicable diseases.	Intentional and Unintentional injuries over 5 and under 5 years of age

Currently, there are 24 hospitals and 344 health centres across the 4 health administrative regions of the island. Data from the hospital and health centre service delivery levels are aggregated on paper-based forms and sent directly to the Office of Planning and Evaluation. The Ministry of Health databases, with the exception of the MRCA, monthly summaries reports are on paper-based forms. The MRCA, however, tracks actual patient information based on the Taxation Registration Number (TRN), which, again, has its own limitations as a unique patient identifier.

There is a global momentum to scale up the response to the leading national and regional public health burden in morbidity, premature mortality and disability generated by chronic non communicable diseases (CNCD) and their risk factors (RF). It has therefore become increasingly important to countries and to the Sub-region to be able to report accurate, timely and comparable data to different national and international entities in order to secure development or expansion of health programmes, strengthen the health care system, and use the information for strengthening the whole government approach for sectoral decisions and partnership building.

The indicators listed for chronic non-communicable diseases and their risk factors in *table 2* are the minimum dataset that built on the existing dataset that was developed through collaborative work of experts from PAHO Washington DC (WDC) programs and PAHO country offices, WHO-HQ, and CAREC.
The selection of indicators took into account national, regional and parish requirements for chronic disease surveillance. It is envisioned that the indicators will be reviewed periodically as changes occur in the availability of data and public health priorities for chronic non-communicable disease.

Future trends for CNCD surveillance

- Establish select diseases as notifiable e.g. renal failure, diabetes, stroke and cancers.
- Sentinel surveillance of select diseases e.g. stroke, osteoarthritis
- Use surveillance methods employed for communicable diseases i.e. syndromic surveillance
- National Health Information system to include chronic diseases
- Utilise polling methods for behaviour risk surveillance

It is envisioned that the information gathered will be **"information for action" as we unite to halt the chronic non-communicable disease epidemic."**

References:

1. WHO: Chronic Disease a Vital Investment. www.who.org
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7. Health Canada, Office of National Health Surveillance. Partnering for quality, timely surveillance leading to action for better health. Proposal to Develop a Network for Health Surveillance in Canada. Ottawa, May 1999

Table 9-2 NATIONAL CHRONIC DISEASE INDICATORS

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
MORTALITY					
Number of deaths < 70 yrs old due to IHD (ICD 10 120-125)			RGD	A	MOH
Number of deaths <70 years due to cerebrovascular disease (stroke) (ICD 10 160-169)			RGD	A	MOH
Number of deaths < 70 years due to malignant neoplasm (total) (ICD 10 C00-C97)			RGD	A	MOH
Number deaths <70 years due to cervical cancer (ICD 10 C53)			RGD	A	MOH
Number of deaths <70 years due to lung cancer (ICD 10 C33, C34)			RGD	A	MOH
Number of deaths <70 years duet to female breast cancer (ICD 10 C50)			RGD	A	MOH
Number of deaths <70 years due to cancer of the digestive system (ICD 10 C15-C26, C48))			RGD	A	MOH
Number of deaths < 70 due to prostate cancer			RGD	A	MOH
Number of deaths <70 due to colon and rectum cancer			RGD	A	MOH
Number of deaths < 70 due to stomach cancer			RGD	A	MOH
Number of deaths < 70 due to oesophegeal cancer			RGD	A	MOH
Number of deaths < 70 due to cancer of the oral cavity and pharynx			RGD	A	MOH
Number of deaths < 70 due to underlying cause being diabetes			RGD	A	MOH

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
(ICD 10 E10-E14)					
Number of deaths < 70 due to lower respiratory diseases (ICD 10 J40-j47))			RGD	A	MOH
Number of deaths < 70 due to external causes (ICD 10 V01-V89)			RGD	A	MOH
Number of deaths < 70 due to Land Transport Accidents(ICD 10 V01-V89)			RGD	A	MOH
Number of deaths < 70 due to Assault (ICD 10 X85-X09)			RGD	A	MOH
PREVALENCE/INCIDENCE OF SELECTED NCDs					
Number of new cases < 70 years due to malignant neoplasm (total) (ICD 10 C00-C97)			Cancer Registry	A	WHRA, UWI Pathology laboratory
Number new cases <70 years due to cervical cancer (ICD 10 C53)			Cancer Registry	A	WHRA UWI Pathology laboratory
Number new cases <70 years due to lung cancer (ICD 10 C33, C34)			Cancer Registry	A	WHRA UWI Pathology laboratory
Number new cases <70 years duet to female breast cancer (ICD 10 C50)			Cancer Registry	A	WHRA UWI Pathology laboratory
Number new cases <70 years due to cancer of the digestive system (ICD 10 C15-C26, C48))			Cancer Registry	A	WHRA UWI Pathology laboratory
Number new cases < 70 due to prostate cancer			Cancer Registry	A	WHRA UWI Pathology laboratory
Number new cases <70 due to colon and rectum cancer			Cancer Registry	A	WHRA UWI Pathology laboratory
Number new cases < 70 due to stomach cancer			Cancer Registry	A	WHRA UWI Pathology laboratory
Number new cases < 70 due to oesophegeal cancer			Cancer Registry	A	WHRA UWI Pathology laboratory
Number new cases < 70 due to cancer of the oral cavity and pharynx			Cancer Registry	A	WHRA UWI Pathology laboratory
Prevalence of Diabetes mellitus ICD 10, E10-14	Diabetics registered in the population	**Numerator:** number of respondents who have	Survey Chronic Disease Register	Q, A	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
	, expressed as a percentage of the corresponding mid-year population	elevated fasting plasma glucose greater than or equal to 7mmol/l (126 mg/dl) or 2-h plasma glucose greater than or equal to 11.1mmol/l (200mg/dl) from self-report or measured in a health centre **Denominator:** total number of respondents of the survey or number of persons that had had a blood glucose test (fasting or 2-hrpp)			
Incidence of Diabetes mellitus ICD 10, E10-14	Population who report having being diagnosed with Diabetes during the last year expressed as percentage of total respondents of the survey or diabetes incidence as detected for the first time through the health care system.	**Numerator:** number of respondents who have elevated fasting plasma glucose greater than or equal to 7mmol/l (126 mg/dl) or 2-h plasma glucose greater than or equal to 11.1mmol/l (200mg/dl). From self-reported or measured in a health care centre during the last year. **Denominator:** total number of respondents of the survey or total population of diabetics in a health care centre during the last year.	Survey Chronic Disease Register	Q, A	MOH Region Parish
Prevalence of Hypertension	Population who report having ever being diagnosed with hypertensi	**Numerator** number of respondents from the survey who have blood pressure > 140/90 from	Survey Chronic Disease Register	Q, A	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
	on by health professional expressed as percentage of total respondents of the survey.	self-reported or measured in a health care center **Denominator** total number of respondents of the survey			
Number of persons on renal dialysis by site and diagnosis			Renal register	Q, A	Renal dialysis site.
Incidence of treated end-stage renal disease attributed to Hypertension	Persons who having ever being diagnosed with treatable end-stage renal disease due to hypertension by a health professional expressed as percentage of total persons with treatable end-stage renal disease	**Numerator** number of Persons diagnosed with treatable end-stage renal disease **Denominator** total number of persons with treatable end-stage renal disease	Survey Renal Register	A	MOH Region Parish
Incidence of Hypertension	Population who report having being diagnosed with hypertension by a health professional during the last year expressed as percentage of population surveyed.	**Numerator** Number of respondents who reported having being diagnosed with Hypertension by a health professional during the last year **Denominator** total number of respondents in the survey or with blood pressure over	Survey Chronic Disease Register	Q, A	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
		140/90 measured in a health care centre during the last year/total number of person 25-64 whose blood pressure was measured during the last year.			
Prevalence of overweight among Adults and adolescents (self reported height and weight) Or measured height and weight Cut off: BMI 25.0-29.99	Population who has a body mass index (BMI between 25. and 29.9 kg/m2 calculated from self reported weight and height or measured height and weight expressed as percentage of population surveyed.	**Numerator** Number of **respondents** who have a body mass index (BMI) between 25.0 kg/m2 and 29.9 calculated from self-reported or measured weight and height. **Denominator:** Respondents for whom BMI can be calculated from their self-reported or measured weight and height (excluding unknowns or refusals to provide weight or height)	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Prevalence of Obesity self reported height and weight Or measured height and weight	Population who has a body mass index (BMI over 30.0 kg/m2 calculated from self reported weight and height or measured height and weight expressed as	**Numerator** Number of **respondents** who have a body mass index (BMI) 30.0 kg/m2 and over calculated from self-reported or measured weight and height. Number of adolescents whose weight falls in 97th	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
	percentage of population surveyed.	percentile **Denominator:** Respondents for whom BMI can be calculated from their self-reported weight and height (excluding unknowns or refusals to provide weight or height).			
RISK FACTORS FOR CHRONIC DISEASES					
Prevalence of current daily smokers of tobacco among adults	Population who report to be current daily smokers expressed as a percentage of population surveyed.	**Numerator** Number of Respondents who report being daily smokers **Denominator** Total Number of respondents of the survey	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Prevalence of current smokers of tobacco	Population reporting to be current smokers expressed as a percentage of surveyed population.	**Numerator** Number of Respondents who report being currently smokers **Denominator** Total Number of Respondents of the survey		National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Prevalence of tobacco consumption among the youth	Young population who report smoking one or more times during the last 30 days expressed as a percentage of surveyed population.	**Numerator** Number of young respondents (13-15 years old) who report smoking 1 day or more during the last 30 days **Denominator** Total number of Respondents of the survey who are 13-15 years old	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Average age started smoking (years)	Average age at which surveyed	**Numerator:** sum of all ages reported as starting	Survey	National 3-5 yrs Indicator should be	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
	individuals start smoking tobacco	smoking tobacco **Denominator:** total_Number of Respondents (adults and adolescents) who smoke		considered when conducting interventions.	
Exposure to second hand smoke	Population who report being exposed to second hand smoke expressed as percentage of surveyed population	**Numerator** Number of respondents that report exposure to second hand smoke **Denominator** total number of respondents in the survey	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Binge drinking among Men	Male population who report having ≥ 5 (5 or more drinks on one or more occasion during the last month expressed as percentage of all the male population surveyed	**Numerator** Number of Male Respondents who report having ≥5 drinks on more than 1 occasion during the last month **Denominator** total number of Male Respondents who report having a specific number, including no drinks on one occasion during the previous month (excluding unknowns and refusals)	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Binge drinking among Women	Women who report having ≥4 drinks (4 or more) on more than 1 occasion during the last month expressed as percentage of all	**Numerator** Number of Female Respondents who report having ≥4 drinks on more than 1 occasion during the last month **Denominator** total number of female Respondents	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
	women who participated in the study	who report having a specific number, including no drinks on one occasion during the previous month (excluding unknowns and refusals)			
Prevalence of Alcohol consumption among the youth	Young population (13-15 years old) who had at least one drink containing alcohol on or more days during the last 30 days	**Numerator** Number of young Respondents (13-15 years old) who report having had at least one drink containing alcohol on one or more days during the last 30 days **Denominator** total number of respondents of the survey	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Nutrition: Mean No of servings of fruits per day	Average of the number of serving of fruit consumed by the population.	**Numerator** Sum of all the numbers of servings consumed by male and female and all the respondents **Denominator** total number of respondents of the survey	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Mean No of servings of vegetables per day	Average of the number of servings of vegetables consumed by the population.	**Numerator** Sum of all the number of servings consumed by all the respondents **Denominator** total number of respondents of the survey	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Percentage of Population who eats 5 or more servings of F&V a day	Population who report eating 5 or more servings of fruits and vegetables	**Numerator** Number of people who eats more than 5 servings of fruit and vegetables	Survey	National 3-5 yrs Indicator should be considered when conducting	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
	a day expressed as a percentage of all persons surveyed	**Denominator** total number of respondents of the survey		interventions.	
Physical inactivity Population with low levels of activity	Population with low levels of physical activity expressed as percentage of all population surveyed.	**Numerator** Number of people whose physical activity is < 600 MET minutes **Denominator** total number of respondents of the survey	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Population with moderate levels of activity	Population with moderate levels of physical activity expressed as percentage of all population surveyed	**Numerator** Number of people whose physical activity is assessed as moderate over 600 MET minutes but less than 1500 MET minutes **Denominator** total number of respondents of the survey	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Population with high levels of physical activity	Population with high levels of physical activity expressed as percentage of all the population surveyed.	**Numerator** Number of people whose physical activity is assessed as(≥ 1500 MET minutes) **Denominator** total number of respondents of the survey	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Physical Inactivity among the youth	Young persons (13-15 years old) who report not having any type of physical activity for at least 60 minutes daily during the last 7 days	**Numerator** Number of young population (13-15 years old) who report not having any type of physical activity for at least 60 minutes per day, every day during the last 7 days	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
		Denominator total number of respondents of the survey			
Mean level of systolic blood pressure and standard deviation (SD) in the population	Average of the systolic blood pressure levels in the surveyed population	**Numerator** Sum of all the measurements of systolic blood pressure **Denominator** Total number of respondents who had their blood pressure measured	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Mean level of diastolic blood pressure and standard deviation (SD) in the population	Average of the diastolic blood pressure measured in the surveyed population	**Numerator:** Sum of all the measurements of diastolic blood pressure **Denominator** total number of respondents who had their blood pressure measured in the study	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Mean level of blood glucose and standard deviation (SD) in the population	Average of the levels of blood glucose measured in the surveyed	**Numerator** Sum of all the levels of blood glucose in the study population **Denominator** Total number of respondents who had their blood glucose checked	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Mean level of BMI and standard deviation (SD) in the population	Measure of central tendency for BMI that divides the distribution of surveyed population in two equal parts	**Numerator** Sum of all the levels of BMI in the population **Denominator** Total number of respondents whose BMI was calculated in the study	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Mean (and SD) of Waist Circumference in the population	Waist circumference average in	**Numerator:** Sum of all the waist circumferences	Survey	National 3-5 yrs Indicator should be	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
	the surveyed population. Waist circumference is an approximate index of intra-abdominal fat mass and total body fat.	in the studied population **Denominator** Total number of respondents who had their waist circumference measured.		considered when conducting interventions.	
HEALTH SYSTEM PERFORMANCE INDICATORS					
Health insurance coverage	Percentage of population who report having any kind of health insurance	**Numerator:** Number of people who have any kind of health insurance. **Denominator** Midyear resident population	Health Insurance companies	A	MOH Region Parish
Population with Chronic Diseases covered by NHF	Percentage of people with Chronic Diseases that are covered by National Health Fund	**Numerator:** Number of people with Chronic Diseases **Denominator** Total number of respondents who have a chronic disease	National Health Fund	A	MOH NHF
Pap smear among women in last year	Female population who report having ever had a pap smear within the last 3 years expressed as percentage of all female population screened.	**Numerator:** Number of Female respondents who reported having ever had a pap test within the last 3 years. **Denominator:** Total number of female respondents in the survey	Survey Pap smear register	3-5 yrs Q M, Q	7 MOH Region Parish
Mammogram use among women 45-64 years	Female population between 45-64 years who report having ever had a mammogram expressed	**Numerator:** Number of Female respondents 45-64 years old who report having ever had a mammogram **Denominator:** Total number of female	Survey	National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
	as percentage of all female population surveyed.	respondents 45-64 years old			
Blood pressure control among adults	Population who report having their blood pressure checked within the previous year expressed as percentage of population surveyed	**Numerator** Number of respondents who report having had his/her blood Pressure checked during the last year **Denominator** total number of respondents of the survey		National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Blood glucose check up among adults	Population who report having their blood glucose checked within the previous year expressed as percentage of all population surveyed.	**Numerator** Number of Respondents who report having had his/her blood glucose checked during the last year **Denominator** total number of Respondents of the survey		National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Cholesterol check up among adults	Population who report having their cholesterol checked within the previous year expressed as percentage of population surveyed	**Numerator** Number of respondents who report having had a blood cholesterol examination during the last year **Denominator** total number of respondents of the survey		National 3-5 yrs Indicator should be considered when conducting interventions.	MOH Region Parish
Eye examination among adults with diabetes	Population of diabetes who report having received at least one clinical eye examination within	**Numerator** Number of respondents who report being diabetics and have had a clinical eye examination within the	Survey Chronic Disease Register	Q, A	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
	the previous year expressed as percentage of diabetics in the population surveyed	previous year **Denominator** total number of respondents who report being diabetics			
Foot examination among adults with diabetes	Population of diabetes who report having received at least one clinical foot examination within the previous year expressed as percentage of population surveyed who are diabetics.	**Numerator** Number of respondents with diabetes who report to have had a clinical foot examination within the previous year **Denominator** total number of respondents who have diabetes	Survey Chronic Disease Register	Q, A	MOH Region Parish
Hospital discharge with diagnosis myocardial infarction in a given year ICD 10 I 46 I50	Hospitalized cases with a principal diagnosis expressed as percentage of all hospitalization in the given year.	**Numerator** Number of cases discharged from the hospital with a diagnosis of Myocardial infarction ICD 10 I 46 I 50 in a given year **Denominator** total number of all cases hospitalized during a given year	Patient Administrative System	Q, A	MOH Region Parish
Average length of stay in hospital because of MI	Mean of hospital day bed occupancy in a given year with cases of Myocardial Infarction (MI)	**Numerator:** Sum of all hospital days due to MI in a given year **Denominator** total number of cases who have been	Patient Administrative System	Q, A	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
		hospitalized due to MI in a given year			
Hospital discharge with diagnosis stroke in a given year ICD 10 I60-69	Hospitalized cases with a diagnoses of stroke expressed as percentage of all hospitalization in the given year	**Numerator** Number of hospital cases discharged from the hospital with a diagnosis of stroke ICD 10 I60-69 in a given year **Denominator** total number of cases hospitalized in a given year	Patient Administrative System	Q, A	MOH Region Parish
Average length of stay in hospital because of stroke	Mean of hospital day bed occupancy in a given year with cases of Stroke	**Numerator:** Sum of all the bed day in use due to Stroke in a given year **Denominator** total number of people who have been hospitalized due to Stroke in a given year	Patient Administrative System	Q, A	MOH Region Parish
Hospital discharge with diagnosis COPD in a given year ICD 10 J40-47	Hospital cases with a principal diagnosis of COPD expressed as part of overall hospitalization in the given year	**Numerator** Number of hospital cases discharged from the hospital with a diagnosis of stroke ICD 10 J40-47 in a given year **Denominator** total number of people hospitalized in a given year	Patient Administrative System	Q, A	MOH Region Parish
Hospital discharge with diagnosis diabetes in a given year	Hospitalized cases with a principal or contributing diagnosis of diabetes during a given year	**Numerator** Number of hospital cases discharged from the hospital with a diagnosis of Diabetes (ICD) 10 E10-14 in a given year **Denominator** total number of	Patient Administrative System	Q, A	MOH Region Parish

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
		people hospitalized in a given year			
Average length of stay in hospital because of diabetes		**Numerator:** Sum of all hospital days due to Diabetes in a given year **Denominator** total number of people who have been hospitalized due to Diabetes in a given year	Patient Administrative System	Q, A	MOH Region Parish
Amputations among adults with diabetes	Number of amputations within the previous year expressed as percentage of all diabetics	**Numerator** Number of amputations with underlying cause of diabetes within the previous year **Denominator** total number of population diagnosed with diabetes	Patient Administrative System	Q, A	MOH Region Parish
Percentage of hypertensive with a recent blood pressure < 140/90mmhg		**Numerator:** The number of hypertensive patients in register with blood pressure reading less than 130/80 at last reading within the past 12 months **Denominator:** Number hypertensive patients in the register with a documented blood pressure in the last 12 months. Multiply by 100 to get percentage.	Audit Chronic Disease Register	Q, A	MOH Region Parish
Percentage of diabetics with a documented foot examination			Audit Chronic Disease Register	Q, A	MOH Region Parish
Percentage of diabetic		**Numerator:**	Audit	Q, A	MOH

Indicator	Definition	Method of calculation	Data source	Frequency of reporting	Person (s) Responsible
patients with HbA1c<7.0%		Number of patients with recent HbA1c < 7.0% **Denominator:** Number of patients in the population	Chronic Disease register		Region Parish
Percentage of diabetic patients with blood pressure < 130/80 mm Hg		**Numerator:** The number of diabetic patients in register with blood pressure reading less than 130/80 at last reading within the past 12 months **Denominator:** Number diabetic patients in the register with a documented blood pressure in the last 12 months. Multiply by 100 to get percentage	Audit Chronic Disease register	Q, A	MOH Region Parish
Geographic accessibility of PHC service	Population who report having a PHC unit reachable in 60 minutes expressed as percentage of all the population surveyed.	**Numerator** Number of people who reports having a PHC unit reachable in 60 minutes (by foot or by car) **Denominator** Midyear resident population	Survey	3-5 years	MOH
PROGRAMMATIC INDICATORS					
Number of health professionals trained in the management of hypertension, diabetes			Training/ workshop records	Q, A	MOH Region Parish
Number of patients with diabetes trained in self-management			Training/ workshop records	Q, A	MOH Region Parish
Number of companies with corporate wellness programmes			Survey	A	MOH Region Parish
Number of schools with physical education for all grades			Survey	A	MOH Region Parish

Section 10

Hotel Surveillance

Hotel Surveillance is an integral part of the prevention and control of communicable disease outbreaks. Early notification and quick response to outbreaks is vital to securing Jamaica's main industry. For this process to be realized, it warrants the participation of key stakeholders, namely; MOH; RHAs; Parish Health Departments; Hotel Management; Hotel
Nurses; and International Organizations (WHO; PAHO; CAREC; CDC; etc.).

Collectively all the stakeholders must ensure the early detection and reporting of all CDs. The process should begin with the reception clerks noting as much information about the location of the guests' permanent residence and be observant of any possible symptoms. Regardless of apparent state of health, on arrival guests should be made aware of the location of nurse's station, and encouraged to present there or contact if they feel ill at any time during their stay.

Hotels are required by law to report gastroenteritis (GE), acute respiratory illnesses and accidents to the Health Department. This is done on a standardized report form which captures cases reporting with the symptoms: diarrhoea by itself or with vomiting, fever, abdominal cramps or blood in stool; ARIs, bruises, burns/scalds, cuts, fractures, sprains/strains. Reporting is done weekly by nurses from properties with 100 rooms or more by fax. Smaller tourist establishments are required to have health and safety committees in place, which are to report on a case-by-case basis.

Reports received are to be entered into databases and analyzed at the parish, regional and national level.

An outbreak of any condition (in either guests or staff) is to be reported within **24 hours of identification** to the parish health department; who will in turn notify the RHA and the Surveillance Unit. At the onset of the outbreak, the hotel nurse will also start appropriate sample collection. In the event that any quarantinable disease is identified, quarantine procedures will be implemented within entities.

Since the hotel nurse represents one of the first lines of contacts for ill staff or guests, she is responsible for the notification to the Health Department and hotel management simultaneously for the initiation of a prompt and appropriate response to prevent further spread in the suspicion of a communicable disease.

Therefore, in the event that the outbreak is noted prior to the routine time for reporting, the nurse will notify the Health Department verbally and does not wait on the routine reporting time as the situation may have escalated by that time due to late response.

Upon receipt of the notification, the Health Department will mobilize the outbreak response team, which will, in collaboration with the hotel team, launch an investigation into the incident. All the necessary preventive and control actions should be employed to prevent spread to the susceptible population. The lab should also be notified as their services may be necessary to isolate pathogen/s.

All protocols observed; the outbreak investigation steps are applied in the order befitting the situation to ensure that all the necessary details are acquired. It is also necessary to inform the RHA and MOH of the existing situation as they may have to make timely interventions to ensure compliance. While the chief focus is on GG at the properties, care must be taken to focus on all CDs, especially for guests arriving from endemic areas. In addition, endemic levels should be established for ARIs with the advent of Avian Influenza Pandemic.

Section 11

Port Health Surveillance

The ports of entry are the first contact with visitors who may be travelling from countries with diseases that are not endemic to Jamaica. In keeping with the objectives of the International Health Regulations and Quarantine Act to ensure that there is maximum security against the entry and spread of disease, Port Health surveillance must facilitate the prompt recognition of infectious or potentially infectious persons, (especially for those diseases of international and local concern) and implementation of appropriate interventions, such as quarantine, when necessary. In order to facilitate these processes, cooperation, participation and high levels of communication are needed from key stakeholders such as airport authorities, airline management staff, public health personnel and immigration officers.

On arrival, all passengers should be encouraged to be proactive in seeking medical attention if they begin to feel ill while in Jamaica (even if it is just a fever) and to advise the physician of their recent travel history. In addition, health alert cards should be distributed to passengers arriving from known endemic areas, and contact information concerning the traveller's destination should be obtained so that travellers may be contacted if necessary. Where possible, interviews with passengers who indicate that they are feeling ill or are displaying suspicious symptoms should be conducted.

Review of Immigration cards for the previous day should be done and line listings prepared of passengers who visited endemic countries, noting the place of stay\ address in Jamaica, arrival date, length of stay and endemic country\ countries visited within the last six (6) weeks. This information should be copied as soon as possible to the relevant Health Departments in all the parishes where the passengers\ guests are staying; and the Nurses in the Hotels (where applicable) where guests are booked.

Cruise ships are also required by law to report notifiable diseases and the maritime declaration of health is examined prior to the disembarkment of passengers.

(See endemic list of malaria and yellow fever countries attached as appendix U)

Section 12

International Health regulations

A central and historic responsibility for the World Health Organization has been the management of international regime for the control of the international spread of disease. Under Articles 21(a) and (22), the WHO constitution confers upon the Health Assembly the authority to adopt regulations designed to prevent the international spread of disease.

The international Health regulation (IHR) were first adopted by the World Health Assembly in 1969 and initially covered six "quarantinable diseases" which were, in turn , amended in 1973 and 1981 primarily to reduce the number of covered diseases from six to three (yellow fever, plague and cholera), and to mark the global eradication of smallpox.

In consideration of the increases in international travel and trade, emergence and re-emergence of new international disease threats and against the background of the international spread of Severe Acute Respiratory Syndrome the Health Assembly established an Intergovernmental Working Group (IGWG) in 2003 open to all Member States to review and recommend a draft revision of the Regulations to the Assembly pursuant to WHO Constitution Article 21. The International Health Regulations (2005) were adopted at the Fifty-eight World Health Assembly by consensus on 23 May 2005. The new Regulations entered into force on June 15, 2007 for all Member States who do not reject or make reservations to them within a limited period.

The purpose and scope of the new Regulations are to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public risks, and which avoid unnecessary interference with international traffic and trade. The IHR (2005) contain range of new and unprecedented innovations which include:

- A scope for many obligations which is not limited to any specific disease
- State Party obligations to develop certain minimum core public health capacities
- Obligations for State Party to notify WHO of all event which constitute a public health emergency of international concern
- Provisions authorizing the organization to take into consideration unofficial reports of disease events
- Procedures for declaration by the Director General of a "public health emergency of international concern"
- Human right protection for travelers
- Establishment of IHR National Focal Points

International Health Regulation in Jamaica

In accordance with the IHR (2005), the IHR Focal Point for Jamaica shall be the Chief Medical Officer or The National Epidemiologist or his/her designate. The National Surveillance Unit will be responsible for collating any data or information that is required to be communicated to the WHO IHR Contact Point.

The implementation of IHR does not require the establishment of any additional parallel surveillance systems but to strengthen existing ones after an assessment of the system has been conducted. In October 2008, the MOH with the assistance of PAHO/CAREC conducted an evaluation of the communicable disease surveillance system. The findings of the evaluation have been very useful in guiding the MOH in the strengthening process of the surveillance system (The contact information of the IHR focal point in Jamaica can be found under list of contacts in chapter 8.)

IHR (2005) ANNEX 1

A. CORE CAPACITY REQUIREMENTS FOR SURVEILLANCE AND RESPONSE

1. States Parties shall utilize existing national structures and resources to meet their core capacity
requirements under these Regulations, including with regard to:
(a) their surveillance, reporting, notification, verification, response and collaboration activities; and
(b) their activities concerning designated airports, ports and ground crossings.

2. Each State Party shall assess, within two years following the entry into force of these
Regulations for that State Party, the ability of existing national structures and resources to meet the
minimum requirements described in this Annex. As a result of such assessment, States Parties shall
develop and implement plans of action to ensure that these core capacities are present and functioning
throughout their territories as set out in paragraph 1 of Article 5 and paragraph 1 of Article 13.

3. States Parties and WHO shall support assessments, planning and implementation processes
under this Annex.

4. At the local community level and/or primary public health response level

The capacities:
(a) to detect events involving disease or death above expected levels for the particular time
and place in all areas within the territory of the State Party; and
(b) to report all available essential information immediately to the appropriate level of healthcare
response. At the community level, reporting shall be to local community health-care

institutions or the appropriate health personnel. At the primary public health response level,
reporting shall be to the intermediate or national response level, depending on organizational
structures. For the purposes of this Annex, essential information includes the following: clinical
descriptions, laboratory results, sources and type of risk, numbers of human cases and deaths,
conditions affecting the spread of the disease and the health measures employed; and
(c) to implement preliminary control measures immediately.

5. At the intermediate public health response levels

The capacities:

(a) to confirm the status of reported events and to support or implement additional control
measures; and
(b) to assess reported events immediately and, if found urgent, to report all essential information to the national level. For the purposes of this Annex, the criteria for urgent events
include serious public health impact and/or unusual or unexpected nature with high potential for spread.

6. At the national level

Assessment and notification. The capacities:
(a) to assess all reports of urgent events within 48 hours; and
(b) to notify WHO immediately through the National IHR Focal Point when the assessment
indicates the event is notifiable pursuant to paragraph 1 of Article 6 and Annex 2 and to inform
WHO as required pursuant to Article 7 and paragraph 2 of Article 9.

Public health response. The capacities:

(a) to determine rapidly the control measures required to prevent domestic and international
spread;
(b) to provide support through specialized staff, laboratory analysis of samples (domestically
or through collaborating centres) and logistical assistance (e.g. equipment, supplies and
transport);
(c) to provide on-site assistance as required to supplement local investigations;
(d) to provide a direct operational link with senior health and other officials to approve
rapidly and implement containment and control measures;
(e) to provide direct liaison with other relevant government ministries;

(f) to provide, by the most efficient means of communication available, links with hospitals,
clinics, airports, ports, ground crossings, laboratories and other key operational areas for the
dissemination of information and recommendations received from WHO regarding events in the State Party's own territory and in the territories of other States Parties;
(g) to establish, operate and maintain a national public health emergency response plan,
including the creation of multidisciplinary/multisectoral teams to respond to events that may
constitute a public health emergency of international concern; and
(h) to provide the foregoing on a 24-hour basis.

B. CORE CAPACITY REQUIREMENTS FOR DESIGNATED AIRPORTS, PORTS AND GROUND CROSSINGS

1. At all times
The capacities:

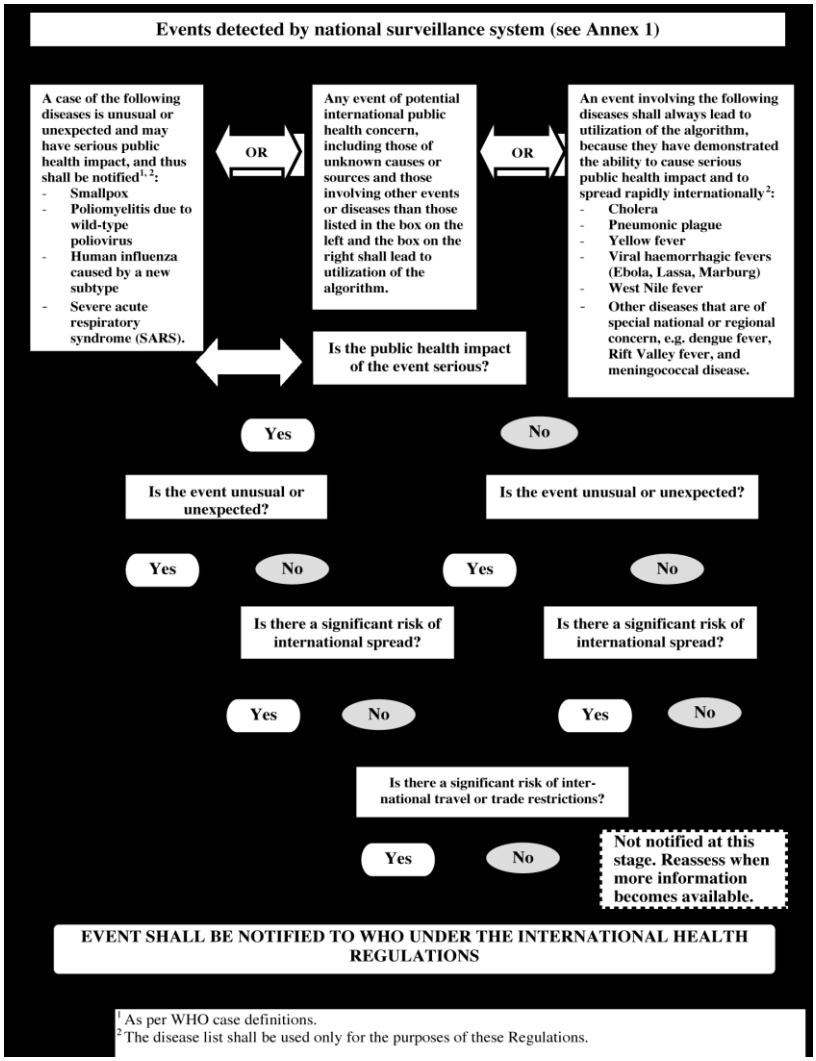
(a) to provide access to (i) an appropriate medical service including diagnostic facilities
located so as to allow the prompt assessment and care of ill travellers, and (ii) adequate staff,
equipment and premises;
(b) to provide access to equipment and personnel for the transport of ill travellers to an
appropriate medical facility;
(c) to provide trained personnel for the inspection of conveyances;
(d) to ensure a safe environment for travellers using point of entry facilities, including potable water supplies, eating establishments, flight catering facilities, public washrooms,
appropriate solid and liquid waste disposal services and other potential risk areas, by conducting
inspection programmes, as appropriate; and
(e) to provide as far as practicable a programme and trained personnel for the control of
vectors and reservoirs in and near points of entry.

2. For responding to events that may constitute a public health emergency of international concern

The capacities:
(a) to provide appropriate public health emergency response by establishing and maintaining
a public health emergency contingency plan, including the nomination of a coordinator and
contact points for relevant point of entry, public health and other agencies and services;
(b) to provide assessment of and care for affected travellers or animals by establishing arrangements with local medical and veterinary facilities for their isolation, treatment and other support services that may be required;

(c) to provide appropriate space, separate from other travellers, to interview suspect or affected persons;
(d) to provide for the assessment and, if required, quarantine of suspect travellers, preferably
in facilities away from the point of entry;
(e) to apply recommended measures to disinsect, derat, disinfect, decontaminate or otherwise
treat baggage, cargo, containers, conveyances, goods or postal parcels including, when
appropriate, at locations specially designated and equipped for this purpose;
(f) to apply entry or exit controls for arriving and departing travellers; and
(g) to provide access to specially designated equipment, and to trained personnel with
appropriate personal protection, for the transfer of travellers who may carry infection or contamination.

IHR (2005) Annex II
Decision instrument for the assessment and notification of events that may constitute a public health emergency of international concern



EXAMPLES FOR THE APPLICATION OF THE DECISION INSTRUMENT FOR THE ASSESSMENT AND NOTIFICATION OF EVENTS THAT MAY CONSTITUTE A PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN

The examples appearing in this Annex are not binding and are for indicative guidance
purposes to assist in the interpretation of the decision instrument criteria.

DOES THE EVENT MEET AT LEAST TWO OF THE FOLLOWING CRITERIA?

Is the public health impact of the event serious?	**I. Is the public health impact of the event serious?**
	1. *Is the number of cases and/or number of deaths for this type of event large for the given place, time or population?*
	2. *Has the event the potential to have a high public health impact?* THE FOLLOWING ARE EXAMPLES OF CIRCUMSTANCES THAT CONTRIBUTE TO HIGH PUBLIC HEALTH IMPACT: • Event caused by a pathogen with high potential to cause epidemic (infectiousness of the agent, high case fatality, multiple transmission routes or healthy carrier). • Indication of treatment failure (new or emerging antibiotic resistance, vaccine failure, antidote resistance or failure). • Event represents a significant public health risk even if no or very few human cases have yet been identified. • Cases reported among health staff. • The population at risk is especially vulnerable (refugees, low level of immunization, children, elderly, low immunity, undernourished, etc.). • Concomitant factors that may hinder or delay the public health response (natural catastrophes, armed conflicts, unfavourable weather conditions, multiple foci in the State Party). • Event in an area with high population density. • Spread of toxic, infectious or otherwise hazardous materials that may be occurring naturally or otherwise that has contaminated or has the potential to contaminate a population and/or a large geographical area.
	3. *Is external assistance needed to detect, investigate, respond and control the current event, or prevent new cases?* THE FOLLOWING ARE EXAMPLES OF WHEN ASSISTANCE MAY BE REQUIRED: • Inadequate human, financial, material or technical resources – in particular: - insufficient laboratory or epidemiological capacity to investigate the event (equipment, personnel, financial resources); - insufficient antidotes, drugs and/or vaccine and/or protective equipment, decontamination equipment, or supportive equipment to cover estimated needs; - existing surveillance system is inadequate to detect new cases in a timely manner.
	IS THE PUBLIC HEALTH IMPACT OF THE EVENT SERIOUS?

	Answer "yes" if you have answered "yes" to questions 1, 2 or 3 above.
Is the event unusual or unexpected?	**II. Is the event unusual or unexpected?**
	4. *Is the event unusual?* THE FOLLOWING ARE EXAMPLES OF UNUSUAL EVENTS: • The event is caused by an unknown agent or the source, vehicle, route of transmission is unusual or unknown. • Evolution of cases more severe than expected (including morbidity or case-fatality) or with unusual symptoms. • Occurrence of the event itself unusual for the area, season or population.
	5. Is the event unexpected from a public health perspective? THE FOLLOWING ARE EXAMPLES OF UNEXPECTED EVENTS: • Event caused by a disease/agent that had already been eliminated or eradicated from the State Party or not previously reported.
	IS THE EVENT UNUSUAL OR UNEXPECTED? **Answer "yes" if you have answered "yes" to questions 4 or 5 above.**

Is there a significant risk of international spread?	**III. Is there a significant risk of international spread?**
	6. *Is there evidence of an epidemiological link to similar events in other States?*
	7. *Is there any factor that should alert us to the potential for cross border movement of the agent, vehicle or host?* THE FOLLOWING ARE EXAMPLES OF CIRCUMSTANCES THAT MAY PREDISPOSE TO INTERNATIONAL SPREAD: • Where there is evidence of local spread, an index case (or other linked cases) with a history within the previous month of: – international travel (or time equivalent to the incubation period if the pathogen is known); – participation in an international gathering (pilgrimage, sports event, conference, etc.); – close contact with an international traveller or a highly mobile population. • Event caused by an environmental contamination that has the potential to spread across international borders. • Event in an area of intense international traffic with limited capacity for sanitary control or environmental detection or decontamination.
	IS THERE A SIGNIFICANT RISK OF INTERNATIONAL SPREAD? **Answer "yes" if you have answered "yes" to questions 6 or 7 above.**

States Parties that answer "yes" to the question whether the event meets any two of the four criteria (I-IV) above, shall notify WHO under Article 6 of the International Health Regulations.
(Excerpt from IHR (2005) WHO publication)

National Surveillance Manual – **INTERNATIONAL HEALTH REGULATIONS**		
Date Revised	Distribution to all Regional Health Authorities, Parish Health Departments and Health centres and hospitals	Section 12
Approved by: Director, Health Promotion and Protection		

Section 13

Severe Acute Respiratory Infection (SARI)

In 2005, at the 58th World Health Assembly, the World Health Organization (WHO) formally adopted the revised *International Health regulations (IHR 2005)* as a key global instrument against the international spread of disease. The Assembly also adopted a resolution entitled *Strengthening Pandemic Influenza Preparedness and Response*, which calls for WHO and its Members States to fortify and coordinate national strategies to prepare for an Influenza pandemic.

PAHO, in close liaison with CDC, developed a generic protocol for Influenza surveillance to provide support for WHO Member States to improve Influenza surveillance. The protocol proposes an enhanced nationwide notifiable disease surveillance system, and the implementation of a sentinel surveillance system for Influenza-like illnesses (ILI) and Severe Acute Respiratory Illness (SARI).

Because the National Surveillance Unit already collects surveillance data on patients with fever and respiratory symptoms (acute respiratory illness – ARI) as part of their routine syndromic surveillance systems, the main activity will be focused on patients with **Severe Acute Respiratory Illnesses (SARI)** who are hospitalized in the designated sites.

The objectives of the SARI surveillance system are to:

1. Determine, on a weekly basis and by age category, the proportion of hospitalizations attributable to SARI and the proportion of confirmed positive cases of Influenza and other respiratory viruses among SARI cases.
2. Provide epidemiologic and clinical characteristics of confirmed Influenza cases among hospitalized patients with SARI.
3. Describe the frequency, temporal trends, and geographic distribution of laboratory-diagnosed influenza and other respiratory viruses in specimens obtained from patients with SARI.
4. Determine the proportion of SARI-associated deaths among all hospitalizations and among all hospitalized deaths.
5. Isolate and antigenically characterize Influenza viruses for the formulation of vaccine composition and to identify new Influenza subtypes.
6. Rapidly identify strains that cannot be subtyped or that are of Avian Influenza subtypes and immediately send isolates to a WHO Collaborating Center for further testing.

The definition for SARI in persons greater than 5 years is adapted from the WHO protocol on rapid response.

SARI Case Definition for Persons ≥5 years old:

- Sudden onset of fever over 38°C, **AND**
- Cough or sore throat, **AND**
- Shortness of breath or difficulty breathing, **AND**
- Requiring hospital admission.

The SARI definition for children <5 years old uses the above case definition but also includes pneumonia definitions from the program for Integrated Management of Childhood Illness.

SARI Case Definition for Children <5 years old

- Meets the case definition **as above**

OR

- Any child < 5 years old clinically suspected of having **pneumonia** or severe/very severe pneumonia, and requiring hospital **admission**.

Integrated Management of Childhood Illnesses (IMCI) on Pneumonia:
A child with cough or difficulty breathing who has fast breathing and no general danger signs, no chest indrawing and no stridor when calm is classified as having PNEUMONIA

IMCI on Severe Pneumonia or Very Severe Disease:
A child with cough or difficulty breathing and with any of the following signs – any general danger sign, chest indrawing or stridor in a calm child – is classified as having severe pneumonia or very severe disease.

General Signs of Danger:

- Child unable to drink or be breastfed
- Child is lethargic or unconscious
- Child vomits everything
- Convulsions

Difficulty Breathing

- If the child is **2 months - 12 months** fast breathing is **50** breaths per minute or more
- If the child is **12 months - 5 years** fast breathing is **40** breaths per minute or more

A **confirmed case of Influenza** is defined as any suspected case of ARI or SARI with laboratory test results positive for Influenza virus. The laboratory tests used to ascertain confirmed cases include the following:

- Positive viral culture;
- Positive polymerase chain reaction (PCR);
- Positive immunofluorescence antibody (IFA) test; and
- Four-fold rise in the specific antibody titre in paired serum samples.

All samples should be taken by a doctor or trained health care personnel, in accordance with the recommended standardized procedure. For SARI cases, **a nasopharyngeal swab** (or aspirate if available) is recommended; but a combination of nasal and throat swabs is also acceptable. Nasopharyngeal or throat swabs are to be collected from **all** SARI cases within 72 hours of the date of onset of illness. This is optimal for virus isolation, but the virus can be isolated for up to five days after the date of onset of illness. These specimens should be kept refrigerated and sent immediately (preferably within 4 hours) to UHWI Virology Department along with the usual Laboratory Investigation Form. The laboratory testing should be performed on arrival of specimens.

A **SARI Case Investigation Form** should also be completed for each hospitalized patient who meets the case definition for SARI. It is critical that results on individual patients are rapidly **fed back to the responsible physician** in order to strengthen the surveillance system and enhance motivation of the clinician.

(**For further information please refer to Regional Protocol on Influenza Surveillance in the Caribbean)**

Section 14

Glossary of epidemiological terms

Attack rate

An attack rate is defined as the number of new cases of disease during a specified time period, divided by the total population at risk during the same time period. This is usually multiplied by a factor of ten to make it a whole number. An attack rate is actually an incidence rate (that is rate of occurrence of new cases), but it is referred to as an attack rate during outbreaks.

$$\text{Attack rate} = \frac{\text{Number of new cases of a disease during a limited time period}}{\text{Total population at risk during the specified time period}} \times 10^{k}$$

Attack rates can be calculated for cohort studies as the total population at risk is known, but NOT for case control studies since this denominator is unknown.

Carrier - A person or animal that harbors a specific infectious agent in the absence of discernible clinical disease and serves as a potential source of infection. The carrier state may occur in an individual with an infection that is inapparent throughout its course (known as healthy or asymptomatic carrier) or during the incubation period, convalescence, and postconvalescence of an individual with a clinically recognizable disease (known as incubatory carrier or convalescent carrier). The carrier state may be of short or long duration (temporary or transient carrier or chronic carrier).

Case-control study

A case control study is an observational study in which participants are selected on the basis of whether they have the disease under study (cases), or do not have the disease (controls). This is the type of study that is usually conducted for larger outbreaks for which it is either impossible or impractical to interview all the cases.

Case definition

A case definition is a standard set of criteria to be used for deciding whether someone should be classified as a case of the disease under investigation. The case definition must

- include information relating to person, place and time
- include signs and symptoms
- be clear as to whether suspected, probable or confirmed cases of disease will be utilized
- be clear as to whether a case is to be confirmed clinically, by laboratory, or by epidemiologic linkage

If the team wants to be sure to capture all cases, the case definition should be fairly loose, with minimal criteria for inclusion. Many investigations often start with a fairly loose case definition and this definition becomes more precise as the investigation proceeds.

Case investigation form

A case investigation form is one used to collect information on a case under investigation. It should always contain basic demographic information about the case such as name, age gender and contact information such as address and phone number. Contact information is essential in case you need to ask some cases further questions later in the investigation.

Information such as occupation and place of employment would be important if there was some suspicion that the exposure or disease was related to one of these factors.

A case identification (ID) number is useful if a computer is being used for analysis. The case ID number on the form and on the record in the computer should be the same, so that if an error was discovered on the record during analysis, the form could easily be referred to for verification.

Date of onset of illness is essential for determining incubation periods and identifying aetiology. Time of onset of illness can also be collected if it would be useful (e.g. in food borne disease outbreaks) and if it is likely to be reliable.

Signs and symptoms are also essential for identifying aetiology. They should be relevant to the disease under investigation.

If patient specimens had been obtained, information on these, such as date of collection and results should also be included on the form.

In a food borne disease outbreak, food history is always essential to identify the source of the outbreak. If the exposure occurred at a specific event or function, a list of the foods served should be used. If the time of exposure is not known, then a food history for a specified time should be used.

Additional information such as travel history, housing conditions, etc can be important depending on the source of infection.

Finally, there should always be a place for additional comments or remarks and for the interviewer completing the report to sign and date it.

Cluster - aggregation of relatively uncommon events or diseases in space and/or time in amounts that are believed or perceived to be greater than could be expected by chance. Putative disease clusters are often perceived to exist on the basis of anecdotal evidence, and much effort may be expended by epidemiologists and biostatisticians in demonstrating whether a true cluster exists. With modern molecular laboratory techniques, clusters of infections with “identical” organisms can be found.

Cohort study

A cohort study is an observational study in which participants are selected on the basis of whether they had an exposure under study or not. The cohort is the total group of persons with a possible risk of the exposure that is being investigated in the

study. Cohort studies are usually conducted for small, well defined outbreaks, when it is relatively easy to reach all the persons involved.

Confidence intervals (CI) - the computed interval with a given probability, e.g., 95%, that the true value of a variable such as a mean, proportion, or rate is contained within the interval. This is a measure of statistical significance; if a confidence interval includes the value 1.0, the study findings are said to be not statistically significant at the given level of certainty.

Confounding -
1. A situation in which the effects of two processes are not separated. The distortion of the apparent effect of an exposure risk brought about by the association with other factors that can influence the outcome.
2. A relationship between the effects of two or more causal factors as observed in a set of data such that it is not logically possible to separate the contribution that any single causal factor has made to an effect.
3. A situation in which a measure of the effect of an exposure on risk is distorted because of the association of exposure with other factor(s) that influence the outcome under study.

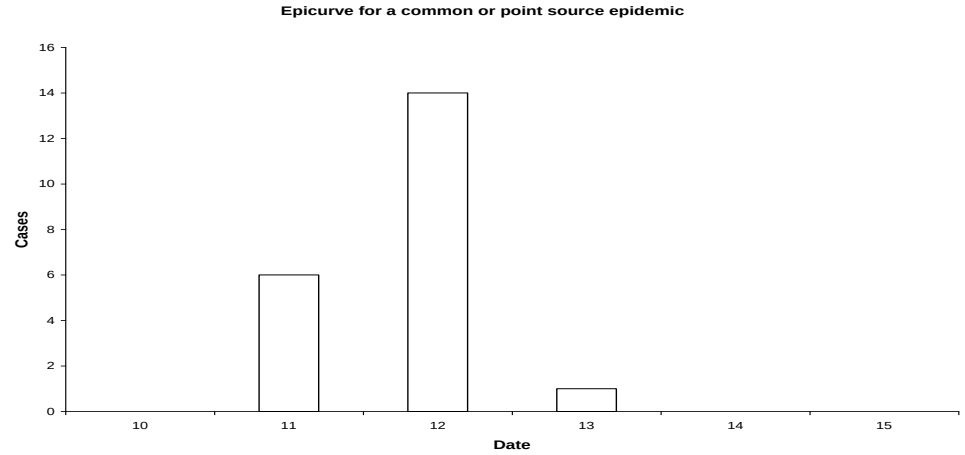
Confounding is minimized by stratification e.g. In the study of cancers, age can be a confounding factor. This effect is minimized by stratification."

Endemic
The endemic level of a disease is the level at which it usually occurs.

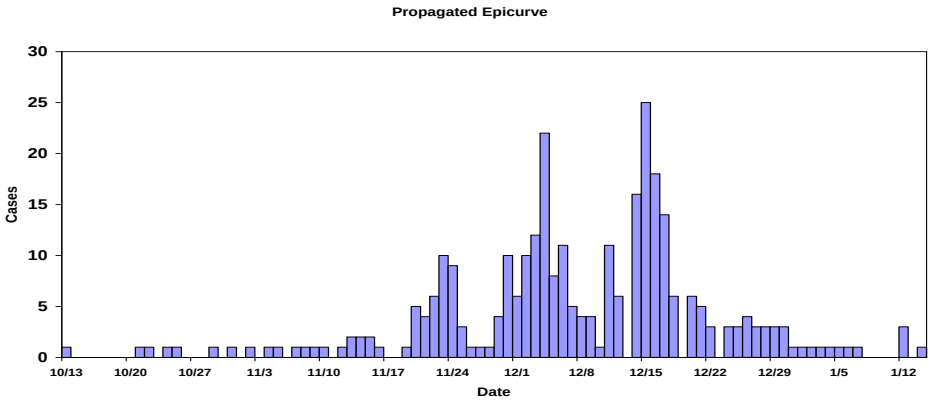
Epidemic
An epidemic is defined as the occurrence of disease clearly in excess of what is normally expected. Another word for an epidemic is an outbreak.

Epi-curve
An epidemic curve or epi-curve as it is more commonly called is a graph of the occurrence of cases over time. This may be a line graph or histogram. The number of cases is shown on the vertical (Y) axis and time is shown on the horizontal (X) axis. There are two types of epicurves:

- The epicurve for a point or common source epidemic (example given below): This curve usually has a buildup of cases to the peak of the epidemic and then tails off. If there is a long exposure to the source it is called a "continuous common source" epidemic and the shape will be a plateau rather than a peak. Sometimes there are outlier cases, which may or may not be related to the epidemic. A case occurring well before the other cases in an outbreak could be a child who was fed early, or a cook who had an early taste of a contaminated meal. A case occurring well after an outbreak could be someone who unknowingly ate leftovers from a contaminated meal and often this person has more severe illness than the other patients in the outbreak.



The propagated epicurve (example given below). In this situation, there is person to person spread. This epicurve usually consists of a series of peaks, continuing over time, one incubation period apart.



Flexibility

The flexibility of a surveillance system is the ability of the system to be modified without losing its sensitivity. This also means the ability of the system to adapt to changes made to case definitions and reporting and transmission of information.

Hypothesis

A hypothesis is a supposition based on known information to be used for further investigation. It should be as precise as possible and used to guide the investigation. It should incorporate all known clinical, laboratory, and epidemiological facts, as well as known facts about the disease and environmental information if available. The hypothesis could include the source of infection, mode of transmission and risk factors for the disease.

Line listing

A line listing is a list of information on persons in a study. It contains one line of information per person. (see appendix K)

Measure of association - a quantity that expresses the strength of association between variables. Commonly used measures of association are differences between

means, proportions or rates, the rate ratio, the odds ratio, and correlation and regression coefficients.

Odds ratio

An odds ratio is the ratio of two odds (odds compares the chance of an event happening to it not happening). Odds ratio is defined as the odds of exposure among the cases divided by the odds of exposure among the controls.

Odds ratio = $\frac{a}{b} \Big/ \frac{c}{d} = \frac{a \times d}{b \times c}$ (Please refer to the section on two by two tables below)

If an exposure has an odds ratio of greater than 1, the exposure may be a risk factor for the illness under investigation.

If an exposure has an odds ratio of less than 1 the exposure may be a protective factor.

If the odds ratio is equal to 1 then the exposure has no effect on the outcome, it can be neither a risk factor nor a protective factor.

P-value

P-value is a probability value. It is the probability that a certain finding or association between an exposure and a disease is not real and that it occurred due to chance alone.

A p-value of less than or equal to 0.05 or 5% means that there is less than a 5% probability that the association found was due to chance. The association is then said to be statistically significant.

A p-value of greater than 0.05 or 5%, means that there is a greater than 5% probability that the association occurred by chance. The association is therefore not considered to be statistically significant.

A statistically significant finding in a study does not mean that chance could not have accounted for the association, only that it was unlikely to have done so. Likewise, a finding that is not statistically significant does not mean that the association occurred by chance, only that it cannot be excluded as a likely explanation.

Predictive value

In screening and diagnostic tests, the probability that the person with a positive test is a true positive (i.e., does have the disease) is referred to as the "predictive value of a positive test." The predictive value of a negative test is the probability that a person with a negative test does not have the disease. The predictive value of a screening test is determined by the sensitivity and specificity of the test and by the prevalence of the condition for which the test is used.

Power

Power is the ability of a study to demonstrate an association between an exposure and an outcome if one exists. Power is influenced by the sample size, study design, frequency of the condition being studied and the magnitude of the effect.

Rate difference
A rate difference is the difference between 2 rates, one subtracted from the other.

Relative Risk (RR)
1. The ratio of the risk of disease or death among those exposed to the risk among the
unexposed; this usage is synonymous with risk ratio.

2. Alternatively, the ratio of the cumulative incidence rate in the exposed to the cumulative
incidence rate in the unexposed, i.e., the cumulative incidence ratio.

3. The term relative risk has also been used synonymously with odds ratio and, in some

Rate difference for exposure 'x'
= Attack rate for those exposed to 'x' - Attack rate for those not exposed to 'x'.

Simplicity
The simplicity of a surveillance system refers to how easy the users of the system are able to use the system effectively without a significant change to their work process. This can be evident by the proportion of users using the system correctly.

Serotype (or serovar) – a subdivision of a species or subspecies distinguishable from other strains therein on the basis of antigenic character.

Sensitivity
The sensitivity of a surveillance system is a measure of the proportion of the cases identified and notified by the system as they should be. It is measured as follows:

Sensitivity of surveillance system =

Number of cases of the syndrome or disease identified and notified to the next level during the week period being audited

Divided by
Total number of cases of the syndrome or disease identified in the medical records during the 4-week period being audited

Multiplied by 100

Sporadic case – occurring irregularly, haphazardly from time to time, and generally infrequently, e.g., cases of certain infectious diseases; also, a case NOT associated with a known outbreak.

Statistically significant association – statistical methods allow an estimate to be made of the probability of the observed or greater degree of association between independent and dependent variables under the null hypothesis. From this estimate,

in a sample of given size, the statistical "significance" of a result can be stated. Usually the level of statistical significance is stated by the p-value.

Strength of association – the magnitude of the measure of association (see above); for example, the size or value of the odds ratio is a measure of the strength of association between an exposure and an illness or other outcome—the larger the odds ratio, the stronger the association.

Timeliness
Timeliness is generally a measure of whether surveillance reports were submitted to the next level in time for appropriate response actions to be initiated. Timeliness of the surveillance system must be determined based upon the standard reporting times agreed upon in each country.

Two by two table
A two by two table is a table with 2 rows and 2 columns. It is a simple a way of presenting data, with the exposure (Yes or No) in rows and the outcome, usually the disease under investigation (Yes or No) in columns.

Outcome

Exposure	Yes	No	Total
Yes	a	b	a + b
No	c	d	c + d
Total	a + c	b + d	N

Vector - in infectious disease epidemiology, an insect or any living carrier that transports an infectious agent from an infected individual or its wastes to a susceptible individual or its food or immediate surrounding. The organism may or may not pass through a developmental cycle within the vector.

Vehicle (of infection transmission) - the mode of transmission of an infectious agent from its reservoir to a susceptible host. This can be (e.g.) person to person, food, or vector-borne.

Section 15

References of interest

Books and Manuals of Interest

CAREC. Public Health Surveillance Manual, a Caribbean Communicable Disease Surveillance Manual for Action. Trinidad: CAREC 1999

Chin, J (Ed). Control of Communicable Diseases Manual, 17th Edition. Washington: American Public Health Association, 2000.

Last, J (Ed). A Dictionary of Epidemiology. Oxford University Press USA, 2000

John Last (Ed) Public Health and Preventive Medicine 13th Edition

Red Book 2000. Report of the Committee on Infectious Diseases 25th Edition: American Academy of Pediatrics.

International Health regulations (2005) World health Organization, 2006. Geneva

Websites of Interest

Antimicrobial resistance information bank	http://oms2.b3e.jussieu.fr/arinfobank
Buruli ulcer	http://www.who.int/gtb-buruli
CAREC	http://www.carec.org
Cholera	http://www.who.int/csr/disease/cholera
Centers for Disease Control	http://www.cdc.gov
Deliberate use of biological and chemical agents	http://www.who.int/csr/delibepidemics/
Dengue (DengueNet)	http://oms2.b3e.jussieu.fr/DengueNet
Eradication/elimination programmes	http://www.who.int/infectious-disease-news/
Filariasis	http://www.filariasis.org
Geographical information systems (GIS)	http://www.who.int/csr/mapping/
Global atlas of infectious diseases	http://globalatlas.who.int
Health topics	http://www.who.int
Infectious diseases	http://www.who.int/health-topics/idindex.htm
Influenza network (FluNet)	http://oms.b3e.jussieu.fr/flunet/
Integrated management of childhood illnesses	http://www.who.int/chd/
International travel and health	http://www.who.int/ith/
Intestinal parasites	http://www.who.int/wormcontrol/
Leprosy	http://www.who.int/lep/
Malaria	http://www.rbm.who.int
Newsletter *(Action against infection)*	http://www.who.int/infectious-disease-news/
Outbreaks	http://www.who.int/csr/don

PAHO	http://www.paho.org
Poliomyelitis	http://www.who.int/gpv/
Rabies network (RABNET)	http://oms.b3e.jussieu.fr/rabnet
Report on infectious diseases	http://www.who.int/infectious-disease-report/
Salmonella surveillance network	http://www.who.int/salmsurv
Smallpox	http://www.who.int/csr/disease/smallpox/
Surveillance and response	http://www.who.int/csr/
Tropical disease research	http://www.who.int/tdr/
Tuberculosis	http://www.stoptb.org or http://www.who.int/gtb
Vaccines	http://www.who.int/gpv/
Weekly epidemiological record	http://www.who.int/wer/
WHO	http://www.who.int
WHO infectious disease websites (updated links available from this site)	http://www.who.int/infectious-disease-news/IRCcatalogue/index.html
WHO Office in Lyon	http://www.who.int/csr/labepidemiology
WHO pesticide evaluation scheme (WHOPES)	http://www.who.int/ctd/whopes/
WHO Mediterranean Centre, Tunis	http://wmc.who.int

Section 16

List of Appendices

Appendix A CONTACT INFORMATION

MoH CONTACT LIST

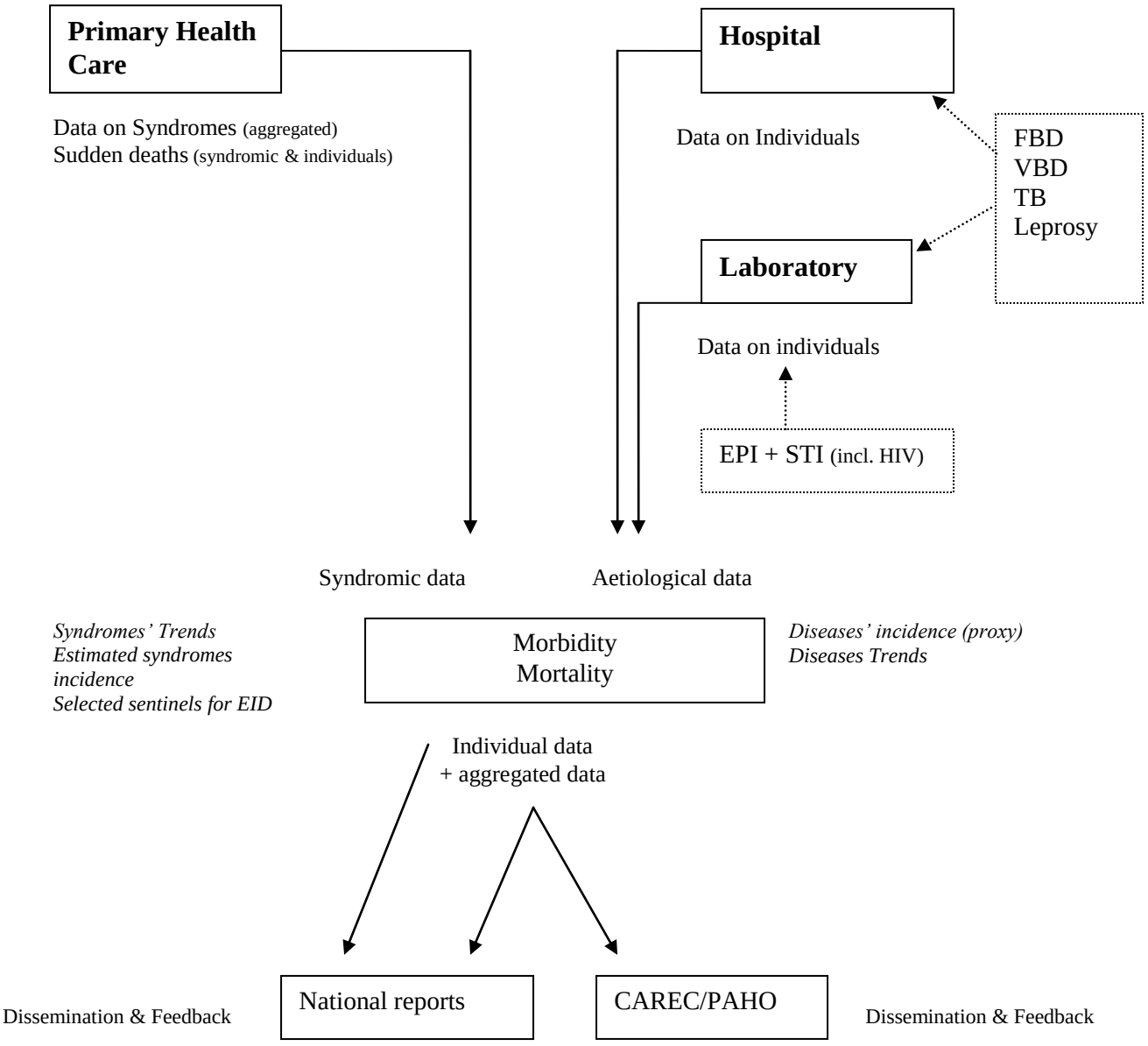
Position	Telephone and Fax	Postal Address
Minister of Health	Phone: 967-0306 Fax: 922-8862	Ministry of Health 2 – 4 King Street Oceana Complex
Permanent Secretary	Phone: 967-1078 Fax: 9671303	Ministry of Health 2 – 4 King Street Oceana Complex
Chief Medical Officer	Phone: 967-1628 Fax: 967-1324	Ministry of Health 2 – 4 King Street Oceana Complex.
Director of Health Promotion and Protection	Phone: 967-3570 Fax: 922-5381	Ministry of Health 2 – 4 King Street Oceana Complex.
Director of Disease Prevention and Control	Phone: 924-9668 Fax: 922-5381 / 967-1280	Ministry of Health 2 – 4 King Street Oceana Complex.
Director, Health Information Unit	Phone: 922-5162 Fax: 967-0169	Ministry of Health 2 – 4 King Street Oceana Complex.
Laboratory Director, NPHL	Phone: 967-5783 Fax: 967-0169	21 Slipe Pen Road Kingston
Director of Environmental Health Unit	Phone: 967-5783 Fax: 9671280	Ministry of Health 2 – 4 King Street Oceana Complex
Director of Veterinary Public Health	Phone: 9671466 Fax: 922-1269	Ministry of Health 2 – 4 King Street Oceana Complex.
Director of Emergency and Disaster Management and Special Services (EDMSS)	Phone: 948-0153 Fax: 967-0997 Email: MoHmergency@yahoo.com	Ministry of Health 2 – 4 King Street Oceana Complex.
Director of Family Health Services	Phone: 967-7575 Fax: 922-1269	Ministry of Health 2 – 4 King Street Oceana Complex
Director of Health Services Planning and Integration Services	Phone: 967-1466 Fax: 922-1269	Ministry of Health 2 – 4 King Street Oceana Complex.
SMO of National HIV /STI Programme	Phone: 922-2448 Fax: 967-1643	Ministry of Health 2 – 4 King Street Oceana Complex.
Tuberculosis Coordinator	Phone: 924-9668	Ministry of Health

Position	Telephone and Fax	Postal Address
	Fax: 967-1280	2 – 4 King Street Oceana Complex.
Medical Officer of Health, Surveillance Unit	Phone: 924-9668 Fax: 967-1280	Ministry of Health 2 – 4 King Street Oceana Complex.
Chief Nursing Officer	Phone: 967-4766 Fax: 967-1331	Ministry of Health 2 – 4 King Street Oceana Complex.
Director of Health Promotion and Education	Phone: 922-0024 Fax: 922-0024	Ministry of Health 2 – 4 King Street Oceana Complex.
Public Relations Officer	Phone: 967-1561 Fax: 967-1561	Ministry of Health 2 – 4 King Street Oceana Complex.
CAREC : Epidemiology Division	Phone: 868 622 2152 (M-F, 8-4.30) Phone: 868 687 2927…. (after hours) Fax: 868 622 1008/2792 Email: carec-epidemiology@carec.paho.org	16-18 Jamaica Blvd Federation Park Port of Spain Trinidad and Tobago
CAREC: Laboratory Division	Phone: 868 622 4261/4262 Fax: 868 622 2792	16-18 Jamaica Blvd Federation Park Port of Spain Trinidad and Tobago

PARISH HEALTH DEPARTMENTS/ REGIONAL HEALTH AUTHORITIES CONTACT LIST

Parish Health Dept No	Telephone and Fax	Postal Address
KSA	Phone: 926-1550-2 Fax: 920-8103	5 Marescaux Rd., Kingston 5
St. Catherine	Phone: 984-2282 or 984-3318 or 907-5284-5 Fax: 984-2623 or 907-5280	Burke Rd, Spanish Town
St. Thomas	Phone: 982-1619 or 703-6181-2 Fax: 703-6183	52 Lyssons Rd., Morant Bay
SERHA	**Phone: 754-3439; Fax: 926-4109**	**The Towers, 15 Dominica Dr Kingston 5**
Portland	Phone: 993-2557 Fax: 993-9426	Port Antonio
St. Mary	Phone: 994-2358 or 994-9979 or 994-9605 Fax: 795-2747	Main Street, Port Maria
St. Ann	Phone: 972-5728 or 972-2215 Fax: 972-1337	Owen Sound Drive, St. Ann's Bay
NERHA	**Phone: 795-3107; Fax: 974-8819;**	**Shop 34-37, Ocean Village Plaza, Ocho Rios**
Trelawny	Phone: 954-3689 Fax: 954-3563	97 Cornwall Street, Falmouth
St. James	Phone: 979-7820 Fax: 979-7802	Payne Street, Montego Bay
Hanover	Phone: 956-9637 or 956-2604 Fax: 956-9688	Fort Charlotte Drive, Lucea
Westmoreland	Phone: 955-2308 Fax: 955-2929	Savanna-la-Mar
WRHA	**Phone: 518-4023 or 518-4077 or 518-4058-9 Fax: 952-4074**	**c/o Cornwall Regional Hospital PO Box 900, Montego Bay, St. James**
St. Elizabeth	Phone: 965-2266 Fax: 965-2701	High Street, Black River
Manchester	Phone: 962-2288 or 962-7033 or 962-2171 Fax: 962-2171	South Race Course Rd., Mandeville
Clarendon	Phone: 986-4548 or 986-7869 Fax: 986-9713	Muirhead Avenue, May Pen
SRHA	**Phone: 625-0612-3 Fax: 962-8233**	**3 Brumalia Road Mandeville**

Appendix B:
SOURCES AND TYPES OF DATA FOR REVISED COMMUNICABLE DISEASE SURVEILLANCE [1]



_____ Existing data flow

.....Potential for integration into surveillance system

[1] Y. Souares, R. Salas, P. Ricketts

Appendix C: CAREC COMMUNIABLE DISEASES REPORT (FOUR WEEK PERIODS)

CAREC COMMUNICABLE DISEASES REPORT (FOUR WEEK PERIODS)

Country:_____ Reporting Year:_____ Reporting Period (circle one only)

1-4	5-8	9-12	13-16	17-20	21-24	
25-28	29-32	33-36	37-40	41-44	45-48	49-52/53

CONFIRMED* CASES ONLY	AGE GROUP																	
	< 1		1-4		5-14		15-24		25-44		45-64		65+		Unknown Age or Gender	Total for Rep. Period	Cumulative Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F			Curr. Yr	Last Yr.
Campylobacter																		
Chicken Pox (Varicella)																		
Cholera																		
Ciguatera Poisoning																		
Congenital Rubella Syndrome																		
Dengue Fever																		
Dengue Haemorrhagic Fever/Shock Syndrome																		
Diptheria																		
***E. coli* (pathogenic)**																		
Influenza																		
Leprosy (Hansen's Disease)																		
Leptospirosis																		
Malaria																		
Measles																		
Meningitis due to *HaemophilusInfluenzae*																		
Meningoccocal Infection due to *Neisseria meningitidis*																		
Mumps																		
Pertussis																		
Plague (Enter probable overleaf)																		
Pneumonia due to *Haemophilus influenzae*																		
Pneumonia due to *Steptococcus pneumoniae*																		
Poliomyelitis, Acute																		
Rabies (in humans)																		
Rotavirus																		
Rubella (German Measles)																		
Salmonellosis																		
Shigellosis																		
Severe Acute Respiratory Syndrome (SARS)																		
Tetanus neonatorum																		
Tetanus (excluding neonatal)																		
Tuberculosis (Pulmonary)																		
Tuberculosis (Extra-pulmonary)																		
Typhoid and Paratyphoid Fevers																		
Viral Encephalitis/Meningitis																		
Viral Hepatitis A																		
Viral Hepatitis B																		
Yellow Fever (Urban or Sylvatic)																		
Other Diseases																		

* Confirmed by laboratory, epidemiological link or clinically if it applies. Blank=zero cases i=imported

Appendix D: WEEKLY PARISH SURVEILLANCE REPORT FORM

WEEKLY PARISH SURVEILLANCE REPORT FORM

To: Surveillance Unit, M.O.H

From:_____

Fax#: 967-1280

Fax#:_____

For week number _____ (ending ____/____/_____)

Sentinel Surveillance Data		**Diseases**	**Sites**						
	pts seen		1	2	3	4	5	6
Site 1_____	_____	1. Fever with Rash ……..	_____	_____	_____	_____	_____	_____
Site 2_____	_____	2. Fever ……..	_____	_____	_____	_____	_____	_____
Site 3_____	_____	< 5yrs. Old ……..	_____	_____	_____	_____	_____	_____
Site 4_____	_____	≥ 5yrs. Old ……	_____	_____	_____	_____	_____	_____
Site 5_____	_____	3. Gastroenteritis ……	_____	_____	_____	_____	_____	_____
Site 6_____	_____	< 5yrs. Old ……	_____	_____	_____	_____	_____	_____
		≥ 5yrs. Old ……	_____	_____	_____	_____	_____	_____
		4. Accidents ……	_____	_____	_____	_____	_____	_____
		< 5yrs. Old ……	_____	_____	_____	_____	_____	_____
		≥ 5yrs. Old ……	_____	_____	_____	_____	_____	_____
		5. Violence ……	_____	_____	_____	_____	_____	_____
		< 5yrs. Old ……	_____	_____	_____	_____	_____	_____
		≥ 5yrs. Old ……	_____	_____	_____	_____	_____	_____
		6. Fever and Respiratory Symp. ……..	_____	_____	_____	_____	_____	_____
		< 5yrs. Old ……	_____	_____	_____	_____	_____	_____
		≥ 5yrs. Old (up to 59 yrs.)……	_____	_____	_____	_____	_____	_____
		≥ 60yrs. Old ……..	_____	_____	_____	_____	_____	_____
		7. Fever and Haemorrhagic Symp…….	_____	_____	_____	_____	_____	_____
		8. Fever with Jaundice (Hosp only)……..	_____	_____	_____	_____	_____	_____
		9. Fever and Neurological Symp. (Hosp. Only)	_____	_____	_____	_____	_____	_____
		Other:_____ ……..	_____	_____	_____	_____	_____	_____
		_____.....	_____	_____	_____	_____	_____	_____
		_____.....	_____	_____	_____	_____	_____	_____
		_____.....	_____	_____	_____	_____	_____	_____
		_____.....	_____	_____	_____	_____	_____	_____
		_____.....	_____	_____	_____	_____	_____	_____

Hospital Active Surveillance Data	**Diseases**	1	2	3	4	5	6	7	8	9	10
1. _____	1. Accidental Poisoning	___	___	___	___	___	___	___	___	___	___
	2. AFP/Polio	___	___	___	___	___	___	___	___	___	___
2. _____	3. Congenital Rubella	___	___	___	___	___	___	___	___	___	___
	4. Congential Syphilis	___	___	___	___	___	___	___	___	___	___
3. _____	5. Diphtheria	___	___	___	___	___	___	___	___	___	___
	6. Encephalitis	___	___	___	___	___	___	___	___	___	___
4. _____	7. Hansen's Disease (Leprosy)	___	___	___	___	___	___	___	___	___	___
	6. Hepatitis B	___	___	___	___	___	___	___	___	___	___
5. _____	7. HIV/AIDS	___	___	___	___	___	___	___	___	___	___
	8. Malaria	___	___	___	___	___	___	___	___	___	___
6. _____	9. Maternal Death	___	___	___	___	___	___	___	___	___	___
	10. Measles	___	___	___	___	___	___	___	___	___	___
7. _____	11. Meningitis	___	___	___	___	___	___	___	___	___	___
	12. Ophthalmia Neonatorum	___	___	___	___	___	___	___	___	___	___
8. _____	13. Pertussis-like Syndrome	___	___	___	___	___	___	___	___	___	___
	14. Rheumatic Fever	___	___	___	___	___	___	___	___	___	___
9. _____	15. Tetanus	___	___	___	___	___	___	___	___	___	___
	16. Tuberculosis	___	___	___	___	___	___	___	___	___	___
10._____	17. Typhoid Fever	___	___	___	___	___	___	___	___	___	___
	18. Admitted Lower Respiratory Tract Infection (Data Only)	___	___	___	___	___	___	___	___	___	___
	19. Respiratory - Related Death (Data Only)	___	___	___	___	___	___	___	___	___	___
	20. _____	___	___	___	___	___	___	___	___	___	___
	21. _____	___	___	___	___	___	___	___	___	___	___
	22. _____	___	___	___	___	___	___	___	___	___	___

Community Surveillance			
	1. Maternal Death	_____	_____
	2. Respiratory - Related Death	_____	_____

Person Completing form:_____(Print) MO(H) Signature:_____ Date: _____

Comments: _____

Appendix E: EXAMPLE OF A NATIONAL WEEKLY SURVEILLANCE REPORT

WEEKLY SURVEILLANCE BULLETIN JAMAICA

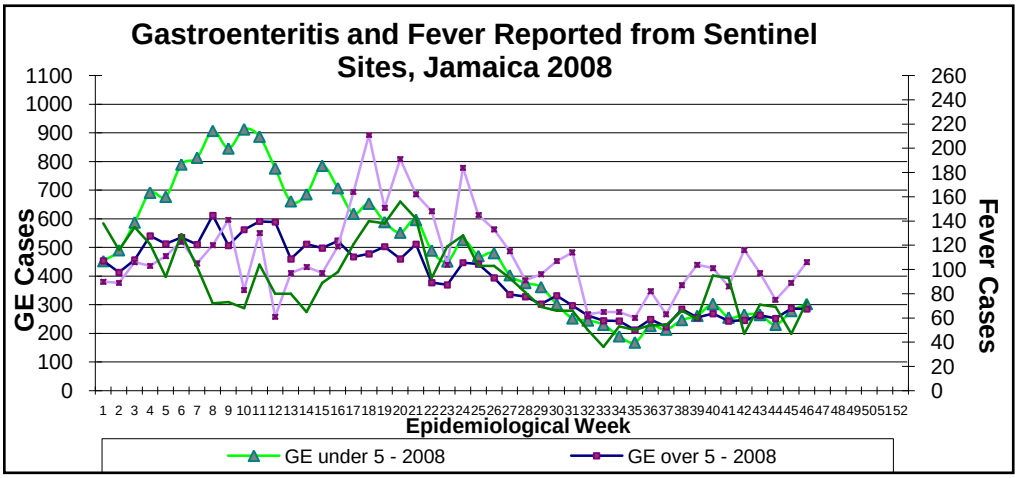
SURVEILLANCE UNIT, MINISTRY OF HEALTH WEEK ENDING 15/11/2008 (WEEK #46)

SENTINEL STATION ACTIVITIES:

Sixty-three (100%) sentinel sites submitted early reports for the forty-sixth epidemiological week of 2008. **Since the beginning of 2008 Moneague Health Centre and Mobay Hope Hospital have been added as new sentinel sites.**

Gastroenteritis and Fever reported from sentinel sites

		Current year		Previous year	
		Week 46 2008	YTD 2008	Week 46 2007	YTD 2007
Gastroenteritis:	**<5 years**	303	22386	617	16000
	≥5 years	285	18091	450	14274
	TOTAL	**588**	**40477**	**1067**	**30274**
Fever	**<5 years**	106	5087	214	4213
	≥5 years	73	4099	271	5215
	Unknown Age	0	43	16	61
	TOTAL	**179**	**9229**	**469**	**9489**



Appendix F:

SYNDROMIC DIAGNOSIS FLOWCHART

FEVER AND HAEMORRHAGIC SYMPTOMS

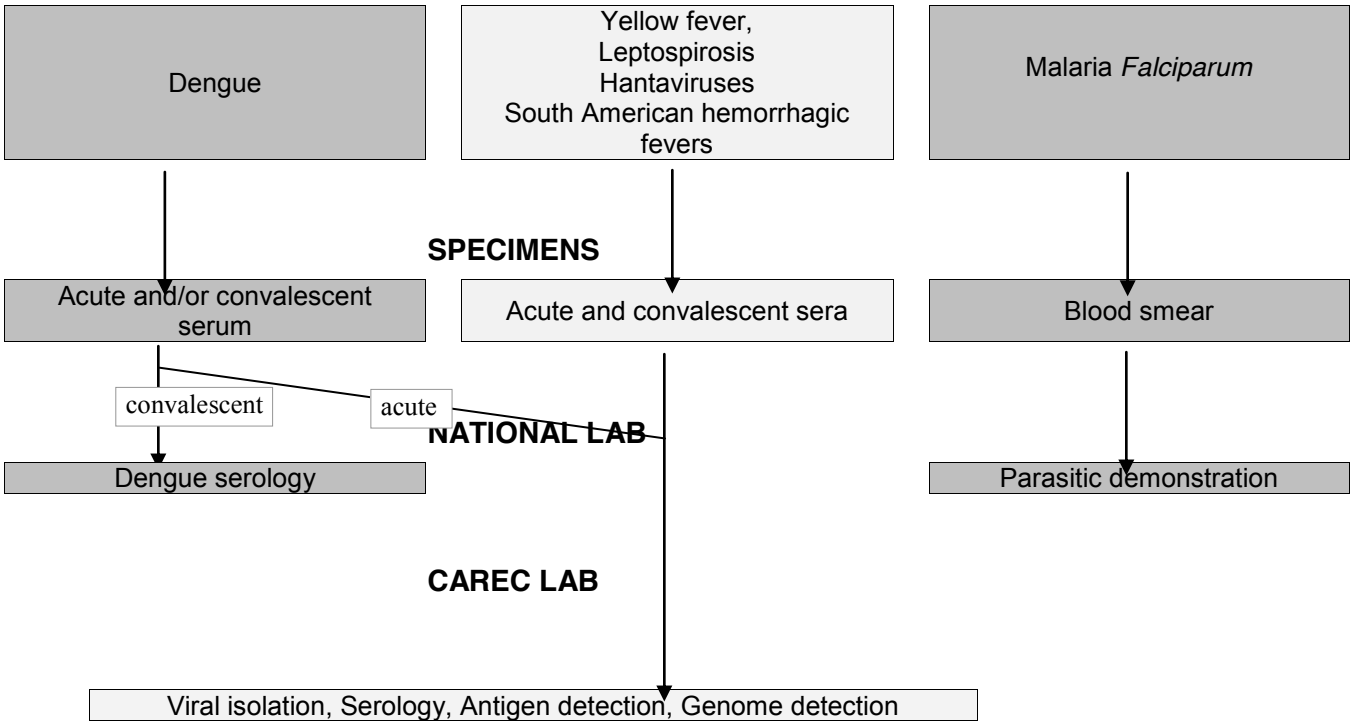
CASE DEFINITON

Recent history of fever with at least one haemorrhagic (bleeding) manifestation, with or without jaundice

Examples of haemorrhagic manifestations
- Purpura
- Epistaxis
- Hemoptysis
- Melena

EPIDEMIOLOGICAL DATA
- Previously healthy person
- Recent travel
- Prior medication
- Contact with insects and rodents
- Contact with similar cases
- No history of coagulation disorder

POSSIBLE DISEASES/PATHOGENS



NOTE: Acute Serum: ≤5 days from onset of symptoms, Convalescent serum > 5 days from onset of symptoms

SYNDROMIC DIAGNOSIS FLOWCHART

FEVER AND NEUROLOGICAL SYMPTOMS

CASE DEFINITON

Recent history of fever with or without headache and vomiting with at least one of the following signs

- Meningeal irritation
- Convulsions
- Altered consciousness
- Altered sensory manifestations
- Paralysis (apart from AFP)

EPIDEMIOLOGICAL DATA

- Previously healthy person
- Risk factor for HIV
- Prior medication
- Recent travel
- Contact with insects & rodents
- Contact with similar cases

POSSIBLE DISEASES/PATHOGENS

Meningitis/Meningoencephalitis		
Viral	**Bacterial**	**Parasitic**
Enterovirus WNV Adenovirus HSV , VZV Mumps	Meningococcal Pneumococcal Hib Leptospirosis	Malaria Trypanosomiasis

Encephalitis
Rabies
WNV
SLE
Equine Encephalitis
HSV

SPECIMENS

CSF, Blood culture, blood smears, throat swab, urine, acute and convalescent serum

CSF, acute and convalescent serum, post mortem specimens

NATIONAL LAB

Gram stain, bacterial culture

CAREC LAB

Antigen detection. Viral culture. Serology. Genome amplification.

NOTES: Acute Serum: ≤5 days from onset of symptoms, Convalescent serum > 5 days from onset of symptoms
If patient presents with AFP, follow the EPI programme protocol.

SYNDROMIC DIAGNOSIS FLOWCHART

FEVER AND RESPIRATORY SYMPTOMS

CASE DEFINITON

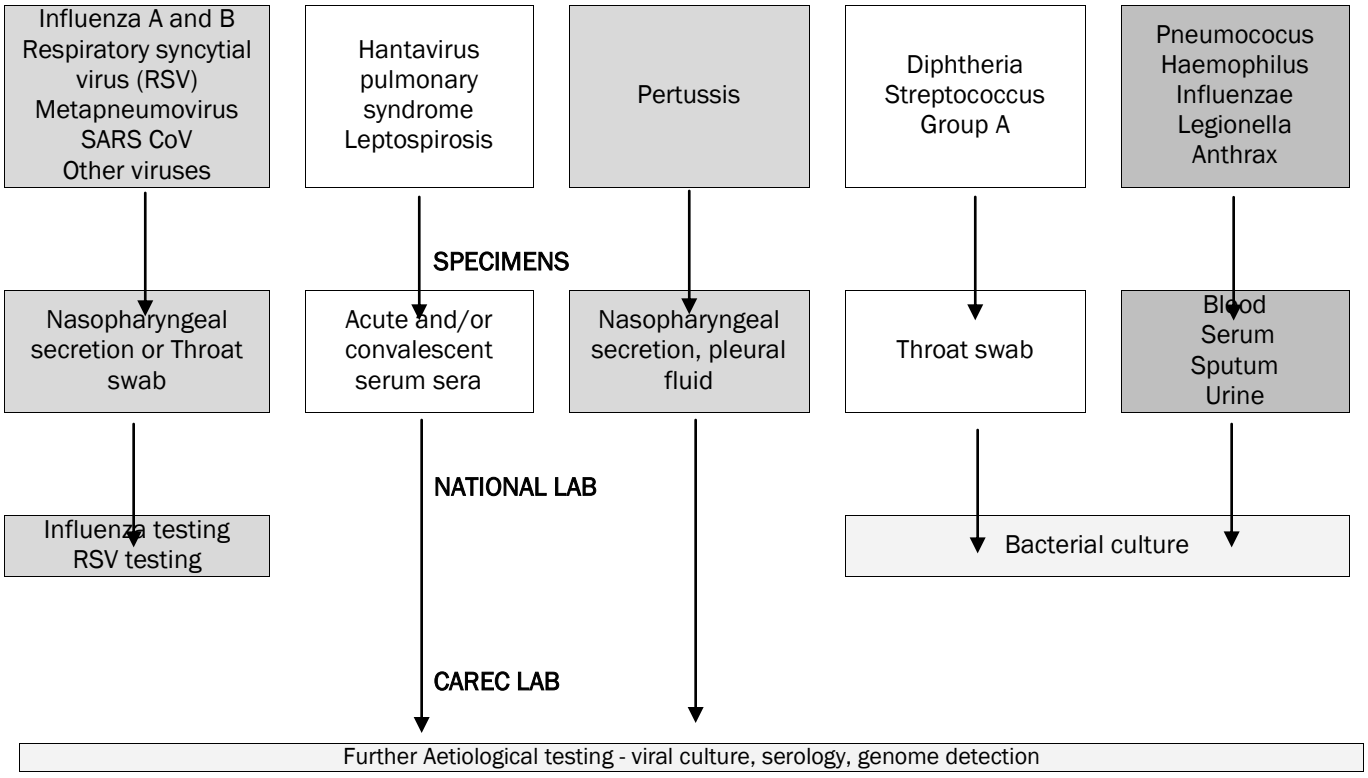
Recent history of fever with one of the following symptoms, with or without respiratory distress

- Cough
- Sore throat

EPIDEMIOLOGICAL DATA

- Previously healthy
- Risk factor for HIV
- Prior medication
- Recent travel
- Contact with animals
- Contact with similar cases

POSSIBLE DISEASES/PATHOGENS



NOTE: Acute Serum: ≤5 days from onset of symptoms, Convalescent serum > 5 days from onset of symptoms

SYNDROMIC DIAGNOSIS FLOWCHART

GASTROENTERITIS / ACUTE DIARRHEAL SYNDROME

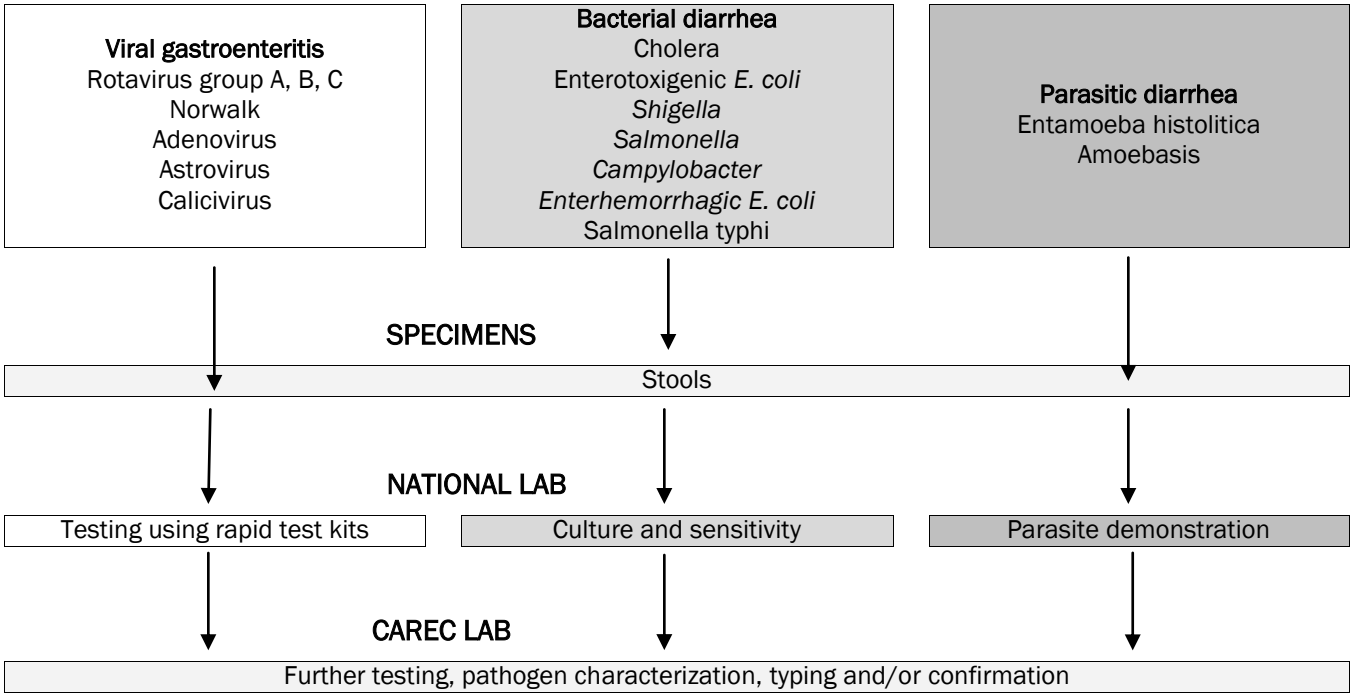
CASE DEFINITON

Acute onset of diarrhoea, with or without fever, and presenting with 3 or more loose stools or watery stools in the past 24 hours, with or without dehydration, vomiting and/or visible blood

EPIDEMIOLOGICAL DATA

- Previously healthy person
- Risk factor for HIV
- Recent travel
- Food history
- Contact with similar cases

POSSIBLE DISEASES/PATHOGENS



NOTE: Acute Serum: ≤5 days from onset of symptoms, Convalescent serum > 5 days from onset of symptoms

SYNDROMIC DIAGNOSIS FLOWCHART

UNDIFFERENTIATED FEVER

CASE DEFINITON

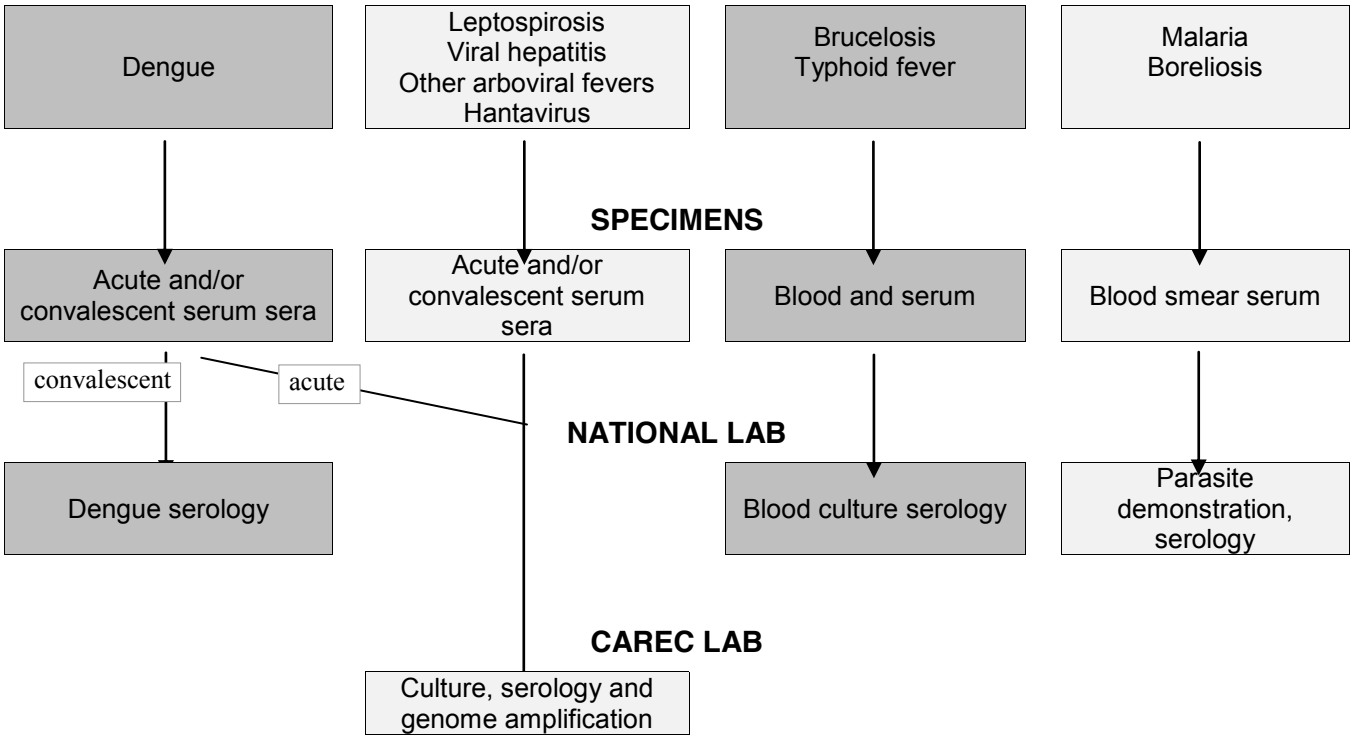
Recent history of fever with two or more of the following symptoms

- Headache
- Retro-orbital pain
- Arthralgia,
- Myalgia,
- Nausea,
- Vomiting
- Jaundice

EPIDEMIOLOGICAL DATA

- Previously healthy person
- Recent travel
- Prior medication
- Contact with insects and rodents
- Contact with similar cases.

POSSIBLE DISEASES/PATHOGENS



Measles and Rubella must be tested for if rash is present in children, as per the EPI Programme protocol

NOTE: Acute Serum: ≤5 days from onset of symptoms, Convalescent serum > 5 days from onset of symptoms

Appendix G:

CAREC WEEKLY REPORT

SYNDROMIC SURVEILLANCE OF COMMUNICABLE DISEASES

COUNTRY _____

Week # _____ *(epidemiological)* Total number of reporting sites_____

Week ending ____/____/____ Number of sites reporting this week_____

Syndromes	No. of cases
Fever and haemorrhagic symptoms	
Fever and neurological symptoms	
Fever and respiratory symptoms (ARI) < 5 yrs	
Fever and respiratory symptoms (ARI) ≥ 5 yrs	
Gastroenteritis < 5 yrs	
Gastroenteritis ≥ 5 yrs	
Undifferentiated Fever < 5 yrs	
Undifferentiated Fever ≥ 5 yrs	

Were any outbreaks/cluster/unusual events observed this week? ☐ YES ☐ NO

Reminder: In addition to reporting outbreaks/clusters/unusual events on this form, they must also be reported immediately to CAREC

Reminder: Fever and rash & Acute Flaccid Paralysis will continue to be reported through the Expanded Programme on Immunization weekly notification and reporting system

Send form to: CARIBBEAN EPIDEMIOLOGY CENTRE (CAREC),

P.O. Box 164, Port of Spain, Trinidad

Telephone: 1-868-622-4261, Facsimile: 1-868-622-1008

Email: carec-epidemiology@carec.paho.org

Received **____/____/____ (At CAREC)**

Appendix H: OUTBREAKS

Caribbean Outbreak Response Toolkit (CORT)

CORT is a series of tools that will support CAREC Member Countries when investigating communicable disease outbreaks. The tools currently available are:

Outbreak Investigation - information to guide you through the investigation and management of an infectious disease outbreak

Foodborne Disease Outbreaks - tools specific for investigation of foodborne disease outbreaks

Case Investigation Forms - downloadable forms to assist you in the investigation of cases during an outbreak

Specimen collection guide - information to assist in the collection of appropriate clinical specimens

Laboratory Investigation Form - a downloadable for use when collecting specimens for testing in the national and/or regional reference laboratory

Outbreak Reporting Form - a downloadable or printable form to assist you in summarizing and reporting the results of an outbreak investigation

Introduction to Epidemiology - links to websites with information on epidemiology

Introduction to Biostatistics - links to websites with information on basic statistics for epidemiologists and public health practitioners

Free Public Health Software - links to free software downloads to assist in the collection and analysis of epidemiological data

These tools are available on the following website:

www.carec.net/outbreak

The CORT website also links to key websites providing regular updates on outbreak activity in the region and around the world.

If you would like to provide feedback on the tools, including suggestions for additional ones, please contact CAREC Epidemiology:

Telephone
868-622-3277, 868-622-2152
FAX
868-622-1008, 868-622-2792
Email
carec-epidemiology@carec.paho.org

_____ Specify Institution affected

OUTBREAK REPORTING FORM

A. Reporting Details

1. Agency submitting report: .....
2. Region: .....
3. Parish: .....
4. Name of person submitting report: .....
5. Contact telephone number: .....
6. Date this form was completed
7. Is this ☐ a first report or ☐ an updated/amended report?

B. Type of Outbreak

8.
☐ Food-borne ☐ Respiratory
☐ Water-borne ☐ Sexually transmitted infection
☐ Vector-borne ☐ Unknown at this stage
☐ EPI disease ☐ Other, please specify below

9. Was a vehicle/vector/source identified? ☐ Yes ☐ No
10. If yes, please specify:

C. Descriptive Epidemiology (person, place)

11. Number of cases: ..... Suspected or Probable
..... Confirmed
..... Total
12. List number of cases (suspect, probable and confirmed) by age group and gender:

13. Was the whole country affected? ☐ Yes ☐ No
14. If no, describe the areas affected: .....
.....
15. Exposure setting (check all that apply):
☐ General community
☐ Health institution (e.g. hospital, nursing home)
☐ Other institution (e.g. prison, boarding home)
☐ Hotel or resort complex
☐ Restaurant
☐ School or child care facility
☐ Other, please specify type _____
☐ Don't know

D. Clinical Details

16. Common Symptoms/Syndromes (check all that apply)

☐ Nausea	☐ Vomiting
☐ Diarrhea	☐ Abdominal cramps
☐ Fever	☐ Rash
☐ Respiratory symptoms	☐ Hemorrhagic symptoms
☐ Genital ulcer	☐ Genital discharge
☐ Neurological symptoms	☐ Headache

☐ Other, specify: chills, weakness, dehydration, blood in stool
.....

17. Number of cases hospitalized: .....
(including cases that died)

18. Number of cases that died: .....
(*including cases hospitalized*)

19. Incubation period (circle appropriate units)
Average .....
Range: ..... hours / days - ..... hours / days

20. Duration of illness (circle appropriate units)
Average: ..... hours / day
Range: ..... hours / day - ..... hours / day

E. Case Summary (time)

21. Please record number of cases per unit time (attach epi curve). Record time interval as:
- Month (i.e. Jan 04, Feb 04, Mar 04), or
- Epidemiological week (i.e. 23, 24, 25), or
- Day (record as exact date, i.e. 23/06/04)

Time Interval	Number Suspect/ Probable Cases	Number of Confirmed Cases

F. Aetiology

22. Was a primary causative pathogen identified in the outbreak? ☐ Yes ☐ No
23. If yes, please specify the name and subtype (if known) of the pathogen Shigella flexneri

G. Clinical Specimens (*e.g. stool, blood, urine, nasal aspirate, etc)

24. Type of Specimen	Number Tested	Number Positive	Etiologic Agent	Subtype 1	Subtype 2	Antimicrobial Resistance Profile

H. Food or Environmental Specimens (*e.g. ground beef, raw chicken, water, surface swab, etc)

25. Type of Specimen	Number Tested	Number Positive	Etiologic Agent	Subtype 1	Subtype 2	Antimicrobial Resistance Profile

I. Results of an epidemiological study

26. What type of epidemiological study was conducted?
☐ Cohort study ☐ Other, please specify .....
☐ Case Control Study ☐ No epidemiological study was conducted
27. If a cohort study was conducted, what was the overall attack rate? ..... %
(note, attack rate = [number ill/total persons at risk] x 100)
28. If a cohort or case control study was conducted, please complete the following table

Risk Factor	Odds Ratio or Relative Risk	95% Confidence Intervals	p-value

Additional Outbreak Details/Notes

Please provide a brief summary of the outbreak, including information on the following if applicable and available:

Background/ Source of Notification
Initial Response Measures Taken
Case Definitions
Epidemiological Assessment
Results/ Findings of Investigation
Recommendations
Integrated Team Response/Further Actions Taken
Economic Impact
Hypothesis

Points to Remember in Case Investigation

- Do a quick reading to update yourself of the disease, paying special attention to the case definition, identification, infectious agent, reservoir, mode of transmission, incubation period, susceptibility and résistance and methods of control (control of communicable disease manual 17th Edition is very useful).

- Check through your library to see if you already have case investigation form for the disease (there is no need to reinvent the wheel) if one is not available you may have to develop one.

- Schedule an interview with the index case /household members (remember to take necessary universal precaution while conducting an investigation).

- Remember to take necessary and adequate samples as indicated by the case.

- Always make an extra effort to determine the source of the disease.

- You will be asked questions, so always go with some Health Education Materials on that disease or related disease.

- Provide Health Education to your audience.

- Always show appreciation - you may have to come back again.

Appendix I: ANSWERS TO OUTBREAK INVESTIGATION CASE STUDY
Salmonella in the Caribbean

A Classroom Case Study

Original investigators: Lisa Indar-Harrinauth,[1, 2] Nicholas Daniels,[3] Parimi Prabbakar,[1] Clive Brown,[1] Gail Baccus-Taylor,[2] Edward Commissiong,[2] H. Reid,[4] and James Hospedales[1]

[1]Caribbean Epidemiology Centre, Pan American Health Organization/World Health Organization
[2]Food Technology Unit, Department of Chemical Engineering, University of the West Indies
[3]Foodborne and Diarrheal Diseases Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention
[4]Trinidad Public Health Laboratory, Trinidad

Case study and instructor's guide created by: Jeanette K. Stehr-Green, MD

Reviewed by: Frederick J. Angulo, DVM, PhD, Stephanie M. DeLong, MPH, Lisa Indar-Harrinauth, PhD, MSc, James Hospedales, MBBS, MSc, MFPHM, Robert Tauxe, MD, MPH, James Flint, MPH, Roderick C. Jones, MPH, Eleni Galanis, MD, MPH

NOTE: This case study is based on real-life investigations undertaken in Trinidad and Tobago in 1998-1999 and published in Clinical Infectious Diseases and the West Indian Medical Journal. (See Appendix for abstracts.) Some aspects of these investigations (and the circumstances leading up to them) have been altered to assist in meeting the desired teaching objectives and some details have been fabricated to provide continuity to the storyline.

Target audience: public health practitioners with knowledge of basic epidemiologic concepts, especially non-epidemiologists (e.g., laboratorians, environmental health specialists, sanitarians, public health nurses, veterinarians, MPH students)

Level of case study: basic

Teaching materials required: graph paper, calculator

Time required: 3-4 hours

Language: English

Training materials funded by: the Centers for Disease Control and Prevention (National Center for Infectious Diseases, Food Safety Initiative, Public Health Practice Program Office, and Epidemiology Program Office/Division of International Health)

August 2004

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
Atlanta, Georgia 30333

Learning objectives:

After completing this case study, the student should be able to:
describe the signs and symptoms, means of diagnosis, and control of salmonellosis
describe how *Salmonella* serotyping can be used in public health practice
given a disease, describe the desired characteristics of a surveillance system for that disease
discuss how the inclusion of the laboratory in the surveillance of a disease impacts the characteristics of the surveillance system and the usefulness of the data
calculate the incidence of a disease if given the number of cases and population size
characterize a health problem by time, place, and person (e.g., perform the descriptive epidemiology)
create and interpret a graph
interpret the measure of association for a case-control study

Part I – Background on *Salmonella*

Question 1: How is salmonellosis diagnosed? How does the method of diagnosis impact our understanding of the occurrence of salmonellosis in the community (e.g., burden of disease, trends over time, high-risk populations)?

Many diseases can cause fever, diarrhea, and abdominal cramps. As a result, ***salmonellosis cannot be diagnosed based on symptoms alone****. Because Salmonella most often reside in the gastrointestinal tract, salmonellosis is usually diagnosed by isolating the organism from the stool of the patient, although it can sometimes be isolated from blood and other bodily fluids. Stools specimens should be collected during the period of active diarrhea (preferably as soon after onset of symptoms as possible).*

The need to confirm the diagnosis in the laboratory impacts our understanding of the occurrence of salmonellosis. To be laboratory confirmed: 1) the patient has to seek medical care, 2) a specimen has to be collected (while the patient is still shedding the organism), and 3) appropriate laboratory tests/cultures must be performed. Since only a fraction of patients with salmonellosis follow this course, laboratory-confirmed cases of Salmonella will **underestimate** the number of Salmonella infections in the community. Furthermore, because patients from whom specimens are collected are likely to be sicker and have better access to health care (e.g., have higher incomes, be employed and have access to health insurance, be located in an urban setting) than patients from whom specimens are not collected, their characteristics **may not be representative** of all patients with the infection.

Question 2: Describe how serotype results can be used in public health practice.

Because outbreaks of Salmonella are typically caused by contamination of food and water with a single serotype, routine serotyping of isolates can provide critical information to investigate and control outbreaks. Serotyping can help determine:

- *if* ***cases of the same disease are related*** *(i.e., are likely to represent an outbreak)*
- *if a* ***vehicle*** *(e.g., a food item) that is contaminated with bacteria is* ***related to a particular outbreak***

Serotyping, however, is an ***adjunct to epidemiologic investigation*** *and not a replacement for it. Similar serotypes should not be considered proof of a common exposure, merely that the isolates share a common ancestry. An epidemiologic investigation is necessary to demonstrate that there is a common source of infection.*

Part II – Surveillance of *Salmonella* in the Caribbean

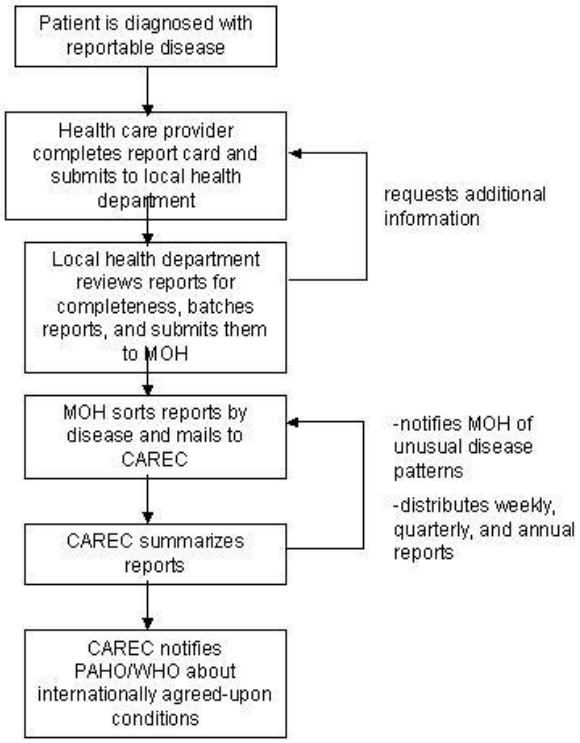
Question 3: To detect outbreaks of infectious diseases (e.g., salmonellosis) and investigate risk factors for infection, what characteristics should a communicable disease surveillance system have?

A surveillance system should be developed to meet the intended purpose of the system. To detect outbreaks in the community and investigate risk factors for infection so that control measures can be implemented, a surveillance system needs to have the following characteristics:

- *It should be able to detect a large proportion of infections that occur in the community (i.e., have a* ***high sensitivity****).*
- *Reported cases, however, should have a high probability of being true cases (****high positive predictive value****) and should include serotype results to enhance the detection of potential linkages between cases.*
- *Finally, the system should be* ***timely****, with a minimal delay between onset of symptoms in the patient and receipt of the case report. This will allow public health officials to initiate investigations as quickly as possible and implement control measures to limit morbidity and mortality.*

NOTE TO INSTRUCTORS: Students should keep the above characteristics in mind as they learn about the Caribbean communicable disease surveillance system.

Question 4: Diagram the flow of information in the Caribbean communicable disease surveillance system.



Question 5: Evaluate the Caribbean communicable disease surveillance system with respect to the desired goals of outbreak detection and investigation of risk factors for infection. What changes would you make to the surveillance system? Why?

NOTE TO INSTRUCTORS: You may wish to use a white board or flip chart to create a list of strengths and weaknesses. To increase participation, have each student provide only one strength or weakness and move on to the next student.

Strengths:

- *Clinicians are a well-established and traditional source of reporting. As a result, the responsibility for reporting is generally accepted among most health care providers.*
- *Because clinicians are typically the first point of contact between the patient and the health care system, the system has the potential for increased sensitivity and timeliness.*
- *Because clinicians have more information on the patient (e.g., patient characteristics, risk factors), the system can provide a more accurate description of the population at risk. Clinicians also have better access to patients if additional information is needed or special investigations are undertaken.*
- *The Communicable Disease Case Report Card is short but includes the necessary information (e.g., patient identifying information, demographic information, clinical information, name of the health care provider). This brevity enhances the acceptability of the system and increases the likelihood that health care providers will report.*

Weaknesses:

- *Reporting of communicable diseases to the system is incomplete (40%) and lacks sensitivity.*
- *Lack of laboratory confirmation means that reported cases have a low positive predictive value.*
- *Lack of subtyping inhibits the system's ability to detect outbreaks.*
- *Clinician-based reporting involves a large number of individuals. This makes it more difficult to change reporting procedures (e.g., add new diseases, collect additional information).*
- *Mailing of reports from health care providers, the multiple parties involved with processing of reports (i.e., local health department, Ministries of Health, CAREC), and the batching and holding of reports at various points along the way decreases the timeliness of reporting.*

Desirable changes:

- ***Require laboratory confirmation*** *of diseases for which laboratory tests/cultures are necessary for a definitive diagnosis (e.g., shigellosis, salmonellosis, hepatitis A). Laboratory confirmation will increase the positive predictive value of the system.*
- ***Require clinical laboratories to report*** *the detection of notifiable diseases directly to the reporting authority. Because most laboratories are computerized, labs may be able to submit reports through automated computer-based systems that will likely increase the completeness and timeliness of reporting.*
- ***Require clinical laboratories to submit isolates*** *for selected diseases (e.g., Salmonella) to the national laboratory* ***for subtyping****. Through subtyping, the public health officials may be able to identify potential linkages between cases (and, therefore, possible outbreaks) and compare human, animal, and food subtype results.*
- ***Streamline the flow of information*** *and speed the transmission of reports to the final recipient (e.g., send reports on a daily basis where possible instead of batching or holding them).*

- ***Improve the communication network*** *between health care providers, clinical laboratories, and public health officials with respect to reporting and use of surveillance information.*

Question 6: What might be done to encourage acceptance of the surveillance system and improve reporting?

Efforts to improve the acceptance of the surveillance system are largely three-fold:

1) ***Make the reporting system as simple and straightforward as possible****. Minimize the burden of reporting by limiting the amount of information collected, using forms that are easy to complete, allowing for the submission of reports by phone/fax, and creating computer programs that can automatically generate reports when certain conditions are met. Where possible, provide support to health care providers and clinical laboratories in the form of finances, staff, and/or equipment that will facilitate reporting to the health department.*

2) ***Educate health care providers and clinical laboratories about reporting.*** *This includes not only education about the reporting process itself (e.g., what to report to whom and how), but also the rationale for the reporting. Health care providers and clinical laboratories need to understand why reporting is important and how the information will be used. They will become much more compliant with reporting if they understand the impact of the disease on the community (e.g., incidence, morbidity, mortality, socioeconomic impact) and the public health actions that will be taken based on the reports (e.g., contact investigations, treatment and/or prophylaxis of contacts, implementation of vaccination programs, investigations to determine the source, and implementation of control measures appropriate to that source).*

3) ***Provide feedback to health care providers and clinical laboratories that report cases.*** *Acknowledging the receipt of reports and providing routine information about cases back to health care providers and clinical laboratories (in the form of a weekly or monthly report that summarizes case counts with special articles about specific disease trends or investigations) is an ideal way to show them that the information is being used.*

Part III – Descriptive Epidemiology of *Salmonella* in Trinidad

Question 7A: Calculate the incidence of laboratory-confirmed salmonellosis (all serotypes combined) for Trinidad and Tobago in 1997. (Assume that only one isolate was received for each patient. The population of Trinidad and Tobago was estimated to be 1,265,000 in July of 1997.)

The incidence is a measure of ***the frequency with which an event*** *(e.g., a new case of a disease or isolation of a pathogen)* ***occurs in a population over a period of time****. The numerator is the number of events occurring during a given time period. The denominator is the population at risk.*

incidence = number of events /population at risk

incidence (lab-confirmed salmonellosis) = 109 isolates per 1,265,000 people per year
= 0.0000862 isolates per person per year
= 8.6 isolates per 100,000 persons per year

NOTE TO INSTRUCTORS:

- *Incidence (instead of raw numbers) is used to compare the occurrence of disease in different populations because it is a rate and accounts for differences in population sizes.*

- *In a rate, a time period must be specified. In this analysis, the time period is 1997.*
- The event should be clearly defined. For this analysis, the event is the isolation of Salmonella from blood or stool of a resident of Trinidad or Tobago. It excludes isolates obtained from visitors.
- *The denominator should only include persons at risk of acquiring the illness. Although there is a vaccination for Salmonella Typhi, it does not impact the occurrence of other serotypes. Previous infections with Salmonella will not protect from subsequent infections. Therefore, for this analysis, it would be reasonable to use the entire Trinidad and Tobago population for the denominator.*
- *Some students have difficulty with decimal places when calculating incidence. They need to realize that if they divide the number of events by the population estimate, the resulting number equals the number of events per person in the population. Because it is difficult to think of incidence in these terms (i.e., the number will be very small), the student should calculate how many events would be expected among a larger group of people (typically 100,000) by multiplying by that larger number.*

Question 7B: The annual incidence of laboratory-confirmed *Salmonella* infections in Trinidad and Tobago is approximately 9 per 100,000 population. Assume that: 1) approximately one in every 10 people with diarrhea go to the doctor, 2) doctors request submission of a stool specimen from approximately one in every 10 patients with diarrhea that they see, and 3) approximately two in every three stool specimens are properly tested for *Salmonella* and are reported through the surveillance system.

Given these assumptions, what is the true burden of *Salmonella* in Trinidad and Tobago?
To answer this question, it is useful to look at the "Burden of Foodborne Disease Pyramid" and create multipliers for key sections on the pyramid. We can multiply the incidence of laboratory-confirmed salmonellosis by these multipliers to estimate the overall incidence of Salmonella per year in Trinidad and Tobago (i.e., the" true" estimate of burden).

Burden of Foodborne Diseases Pyramid

**Burden of Illness Pyramid courtesy of FoodNet*
(http://www.cdc.gov/foodnet, April 22, 2004)

Based on the information provided above, you can create the following multipliers:

- *1 in 10 people with diarrhea go to the doctor (labeled "Person seeks care" in pyramid) = 1/10 or 0.10 →* ***the multiplier will be the inverse of 0.10 (or 10)***
- *Of those consulting a doctor, 1 in 10 are requested to submit a stool specimen (labeled "Specimen obtained" in pyramid) = 1/10 or 0.10 →* ***the multiplier will be the inverse of 0 .10 (or 10)***

- *Two out of every three stool specimens are properly tested for Salmonella and are reported through the surveillance system (labeled "Lab tests for organism" and "Reported to Health Department" in pyramid) = 2/3 or 0.667→* ***the multiplier will be the inverse of 0.67 (or 1.5)***

  To estimate the true number of Salmonella cases in Trinidad and Tobago:
  Step 1: *Multiply the multipliers together. This is 10 x 10 x 1.5 = 150. This is your* ***final multiplier****.*
  Step 2: *Multiply the incidence of laboratory-confirmed cases by the final multiplier to obtain the estimate of the true incidence of Salmonella cases in Trinidad and Tobago. This is 9 laboratory-confirmed Salmonella cases per 100,000 population times 150 which equals an* ***estimated 1,350 cases of Salmonella per 100,000 population each year in Trinidad and Tobago*** *(or 17,078 Salmonella infections).*

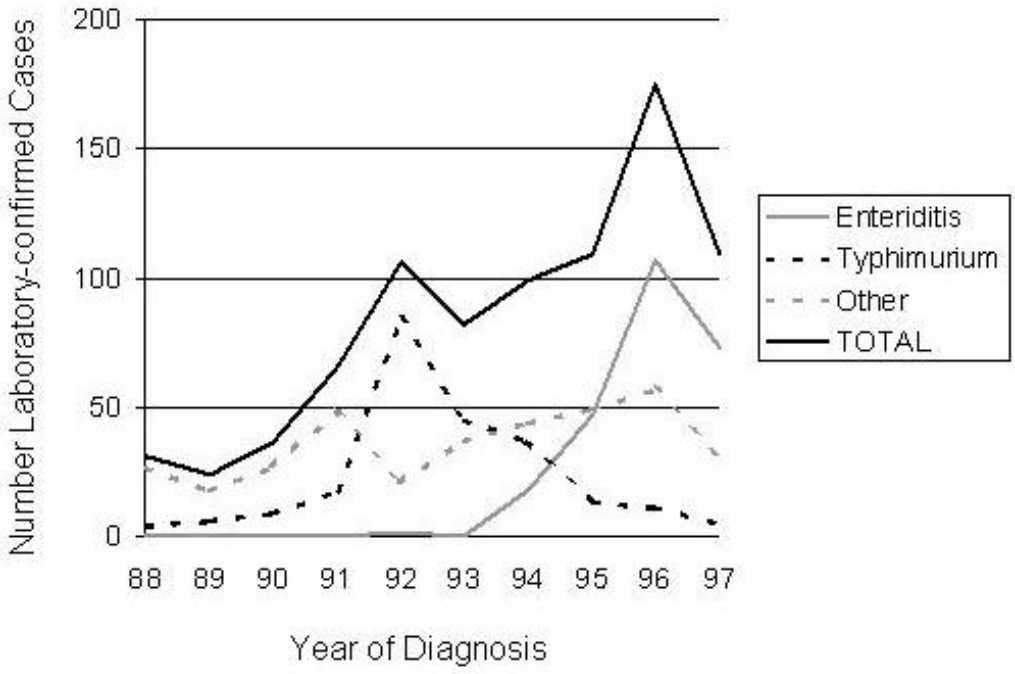
  Compare:

  Laboratory-confirmed Salmonella isolates in 1997: ***109 isolates or 9/100,000 population***
  Estimated Salmonella infections in 1997: ***17, 078 infections or 1,350/100,000 population***

Question 8: Create a line graph of the number of *Salmonella* isolates by serotype by year of diagnosis for Trinidad and Tobago from 1988 to 1997. Interpret the graph.

NOTE TO INSTRUCTORS: Divide class into groups of 2-4 students each. Have each group create the line graph for total isolates or one serotype. After 5-10 minutes, reassemble the class. Have one member from each group present their line graph to the rest of the class.

Salmonella isolates by serotype and year of diagnosis, Trinidad and Tobago, 1988-1997.



Instructors should spend time on the appropriate construction of the line graph as well as its interpretation. A graph should be able to "stand alone". Viewers should be able to quickly discern the information conveyed by the graph and not need additional explanations from another source.

In critiquing a graph, one should ask the following questions:

- *Does the graph have a title?*
- *Does the title describe the content, including subject, person, time, and place?*
- *Is each axis labeled clearly and concisely?*
- *Are the specific units of measurement included as part of the label?*
- *Are the scale divisions on the axes clearly indicated?*
- *Are the scales for each axis appropriate for the data?*
- *Does the y-axis start at zero?*
- *Are the plots drawn clearly?*
- *If more than one series of data or components are shown, are they clearly distinguishable on the graph?*
- *Is each series of data or components labeled on the graph, or in a legend or key?*
- *Are all codes, abbreviations, or symbols explained?*

Interpretation of graph:
Overall, the isolation of Salmonella increased dramatically from 1988 to 1997 in Trinidad and Tobago. (This increase may be due, in part, to implementation of new surveillance methods described in Part II).

The distribution of isolates by serotype also changed during this time period. In the early 1990s, S. Typhimurium was the most prevalent Salmonella serotype in Trinidad and Tobago. The isolation of S. Enteritidis, however, increased from 1 (<1%) of 106 Salmonella isolates in 1992 to 73 (67%) of 109 isolates in 1997. As a result, S. Enteritidis surpassed S. Typhimurium to become the most frequent Salmonella serotype causing diarrheal illness on the two islands. (The shift in serotype distribution cannot be attributed to the implementation of new surveillance strategies.)

NOTE TO INSTRUCTORS: At this point, the class should pause and reflect. Would these trends have been detected through the original communicable disease surveillance system? How useful would the overall isolation rates of Salmonella have been as opposed to the serotypes?

Question 9: Interpret the grouped bar chart of laboratory-confirmed S. Enteritidis cases by age group. What age group(s) is at highest risk for infection?

From 1995 to 1997, children 0-4 years of age had the highest rates of infection (with rates of 20-45 per 100,000), followed by children 5-9 years of age (with rates of 9-20 per 100,000).

Question 10: Describe the occurrence of *S.* Enteritidis infection in Trinidad and Tobago by month of diagnosis?

S. Enteritidis infections increased each year in December and January. The cases that occurred during these two months accounted for approximately 40% of the cases for each year. In addition, there was a large increase in cases of S. Enteritidis in March and April of 1996.

A characteristic distribution of cases (i.e., repeated pattern) that changes through the year, such as in this example, is called ***seasonality****. Seasonality may suggest hypotheses about the mode of transmission, behavioral factors that increase risk, or other contributors to the disease or condition. For example, it is possible that the increase in S. Enteritidis infections in Trinidad and Tobago in December and January is somehow related to the Christmas-New Year holiday season.*

NOTE TO INSTRUCTORS: Be ready to speculate on the increase in cases in March and April of 1996. How might students explore the nature of that increase? (e.g., geographic distribution, age and sex distribution)

Part IV – Case-Control Study of *S. enteritidis* in Trinidad and Tobago

Question 11: What is the measure of association in a case-control study? How is it interpreted?

The ***odds ratio*** *is the measure of association for a case-control study (matched or unmatched). It is the ratio of two odds: the odds of exposure to a factor among cases and the odds of exposure to the factor among controls. An odds ratio tells us how many times higher the odds of exposure is among cases compared to controls.*

Odds ratios are always between 0 and infinity. An odds ratio of:

- ***Less than 1.0*** *means that the* ***odds of exposure among cases is lower*** *than the odds of exposure among controls. The exposure may be protective against the health problem.*
- ***One (or close to 1.0)*** *means that the* ***odds of exposure among cases is the same*** *as the odds of exposure among controls. The exposure is not associated with the health problem.*
- ***Greater than 1.0*** *means that the* ***odds of exposure among cases is greater*** *than the odds of exposure among controls. The exposure may be a risk factor for the health problem*

Tests of statistical significance (e.g., chi-square, Fisher exact test) must be used to determine the probability that an observed odds ratio could have occurred due to chance alone. This probability is called the ***p-value****. A very small p-value means that you would be unlikely to observe a particular outcome due to chance alone, if there were no association between the exposure and the disease. If the p-value is less than some predetermined cut-off (usually 0.05 or a 5 in 100 chance), the association is then said to be statistically significant.*

Question 12: Interpret the odds ratios for the above exposures. What exposures appear to be risk factors for S. Enteritidis infection in Trinidad and Tobago?

The following interpretations can be gleaned from Table 2:

- The odds of eating shell eggs was almost 9 times higher among cases than controls. (The probability that this finding was due to chance alone was less than one-in-a-thousand.)
- The odds of eating dishes that contained raw or undercooked eggs was almost 20 times higher among case than controls. (The probability that this finding was due to chance alone was one-in-a-thousand.)
- The odds of purchasing refrigerated eggs was one-tenth as common among cases as controls. (The probability that this finding was due to chance alone was less than one-in-a-thousand.)
- The odds of refrigerating eggs after purchase was less than one-tenth as common among cases as controls. (The probability that this finding was due to chance was less than one-in-a-thousand.)
- *The odds of eating chicken, beef, or powdered milk, or having been exposed to live chickens was similar among cases and controls.*

The findings of the case-control study suggest that consumption of shell eggs, particularly raw or undercooked eggs or foods containing them, was a ***significant risk factor*** *for sporadic S. Enteritidis infection in Trinidad and Tobago. Purchase of refrigerated eggs or storage of eggs in the refrigerator at home was a* ***protective factor****.*

Question 13: Discuss possible interpretations of the same phage type among *Salmonella* isolated from patients with salmonellosis and suspect food samples.

Bacteriophages *(i.e., phages) are groups of viruses that infect bacteria. Each bacterial strain will exhibit resistance to some phages and be susceptible to others. The profile of resistance and susceptibility to a standardized battery of phages is called the* ***phage type****.*

Phage typing can be used to distinguish between bacteria within a particular serotype. Identification of a common phage type among patients infected with the same serotype or between patients and a potential vehicle of infection (e.g., food item) can help establish epidemiological linkages.

In this investigation, the identification of phage type 4 among most of the patients and all of the food items suggests that the implicated foods were likely to be the source of the patients' infections. We cannot, however, rule out that the implicated food item may have actually been contaminated by the patient himself/herself or that the implicated food item was cross-contaminated by another food item that was the source of infection for the patient.

Of note: phage type 4 is more virulent than other S. Enteritidis phage types and is remarkable for its ability, once introduced into poultry, to cause marked increases in human illness. Phage type 4 has been dominant in Europe since the 1980s and emerged in the United States in the mid-90s. The high prevalence of phage type 4 in Trinidad and Tobago suggests that S. Enteritidis might have been introduced through imported breeder flocks, chicks for layer flocks, or hatching eggs.

Question 14: What control measures would you consider at this point?

At this point, control measures will be directed primarily at consumers, food service establishments, and foodhandlers. Control measures include recommendations to:

- *Buy refrigerated eggs.*
- *Keep eggs refrigerated after purchase and until the time of use.*
- *Discard cracked or dirty eggs.*
- *Wash hands and cooking utensils with soap and water after contact with raw eggs.*
- *Eat eggs promptly after cooking. Do not keep eggs warm for more than 2 hours.*
- *Refrigerate unused or leftover egg-containing foods.*
- *Avoid eating raw eggs (as in homemade ice cream, eggnog, or stout).*
- *Avoid restaurant dishes made with raw or undercooked, unpasteurized eggs. Restaurants should use pasteurized eggs in any recipe (such as Hollandaise sauce or Caesar salad dressing) that calls for use of raw eggs.*

Part V – Study of Eggs in Trinidad

Question 15: Why were the eggshells cultured separately from the egg contents? Why were the eggs sanitized before the contents were cultured?

Shell eggs can become contaminated with Salmonella in two ways:

1) ***external fecal contamination of shell**s – Salmonella (from the intestinal tract of the laying hen or in the environment from another source) contaminates the shell of the egg after it has been laid. This external contamination can penetrate into the egg through cracks in the shell. Stringent procedures for disinfecting the exterior of the eggshell and rejecting cracked eggs have decreased this route of transmission of Salmonella.*
2) ***transovarian transmission** – An ovarian infection in the laying hen contaminates the contents of the egg during its formation (i.e., before the eggshell is formed), resulting in an egg that is intact, unbroken, and normal looking but colonized with Salmonella. Disinfection of the eggshell surface and rejection of cracked eggs **do not prevent** this route of Salmonella contamination. Only prevention of infection in laying hens can prevent transovarian transmission.*

For this study of shell eggs from egg-producing farms in Trinidad, eggshells were tested separately from the egg contents to determine the relative contribution of these two sources of contamination. Because egg contents can become contaminated from the eggshell when the egg is cracked, the eggshells were disinfected before removing the contents.

Question 16: What specific activities would you undertake as part of an environmental health assessment of the egg-producing farms?

An environmental health assessment should focus on critical points where:

- ***laying chickens could become infected with Salmonella** (e.g., brood chickens that produce laying hens, rodent infestations, nesting boxes, poultry houses, feed, water, litter)*
- ***egg shells could become contaminated with Salmonella** between the time they are laid until they are shipped to market (e.g., rodent infestations, nesting boxes, handling by humans, conveyor belts, containers in which eggs are stored)*
- ***growth of Salmonella already present on or in eggs could occur** (e.g., how quickly eggs are collected after laying, whether eggshells are cleaned/disinfected before storage, what temperatures eggs are held at and for how long)*

The food safety officer should examine the general sanitation of the poultry houses and farms including presence of rodents and source of water, feed, and litter for the chickens. The officer should talk with farm managers and employees about standard operating procedures, observe egg-handling activities, and draw a flow diagram for egg production. The officer should measure temperatures to which the eggs are exposed (and how long they are likely to be held at those temperatures) and collect environmental specimens. The food safety officer should clarify the system of chicken rearing including the nursery the laying hens came from and where that source got its fertile eggs. The food safety officer should then search for antecedents for the conditions that could lead to infection of laying chickens, egg contamination, and growth of Salmonella on eggs.

Question 17: What food safety practices at the egg-producing farms might help prevent or reduce the risk of salmonellosis from the consumption of eggs from these farms?

- *monitor breeder flocks that produce egg-laying chickens and destroy infected flocks*
- *monitor egg-laying flocks for infection and remove infected flocks from the egg supply*
- *when infected breeder flocks or egg-laying flocks are identified, undertake traceback and trace forward investigations to find out where the chickens were obtained and which other farms may have used the same source (and, therefore, also are likely to have the problem)*
- *obtain new laying flocks only from breeder flocks that are known to be free of S. Enteritidis*
- *use Salmonella free feed for egg-laying and breeder flocks*
- *increase sanitation measures at egg-producing farms including drinking water, poultry houses, nesting boxes, and equipment*
- *control rodents on egg-producing farms*
- *refrigerate eggs from the producer to the consumer*
- *use a Hazard Analysis Critical Control Point (HACCP) system on egg-producing farms to identify potential problematic areas in the production of eggs*

Part VI - Prevention and Control

Question 18: In addition to the testing of eggs and flocks for *Salmonella*, how might you monitor the impact of *Salmonella* control measures in Trinidad and Tobago?

In addition to testing eggs and flocks for Salmonella, public health officials should:

- *monitor the incidence of human salmonellosis by serotype, characterizing cases by time, place, and person*
- *investigate clusters of cases to identify risk factors/sources of infection*
- *undertake periodic environmental health assessments of egg-producing farms*

References

Herikstad H, Motarjemi Y, Tauxe RV. *Salmonella* surveillance: a global survey of public health serotyping. Epidemiol. Infect 2002;129:1-8.

Indar-Harrinauth L, Daniels N, Prabhakar P, Brown C, Baccus-Taylor G, Comissiong E, Hospedales J. Emergence of *Salmonella enteritidis* phage type 4 in the Caribbean: Case-control study in Trinidad and Tobago, West Indies. Clinical Infectious Diseases 2001;32:890-6. (See Appendix for abstract.)

Indar L, Baccus-Taylor G, Commissiong E, Prabhakar P, Reid H. Salmonellosis in Trinidad: evidence for transovarian transmission of *Salmonella* in farm eggs. West Indian Med J 1998;47:50-3. (See Appendix for abstract.)

Orrett FA and Shurland SM. Susceptibility patterns and serotypes of non-typhoidal *Salmonella* in Trinidad. Saudi Med J 2001;22:852-5.

Abstracts from Original Investigations

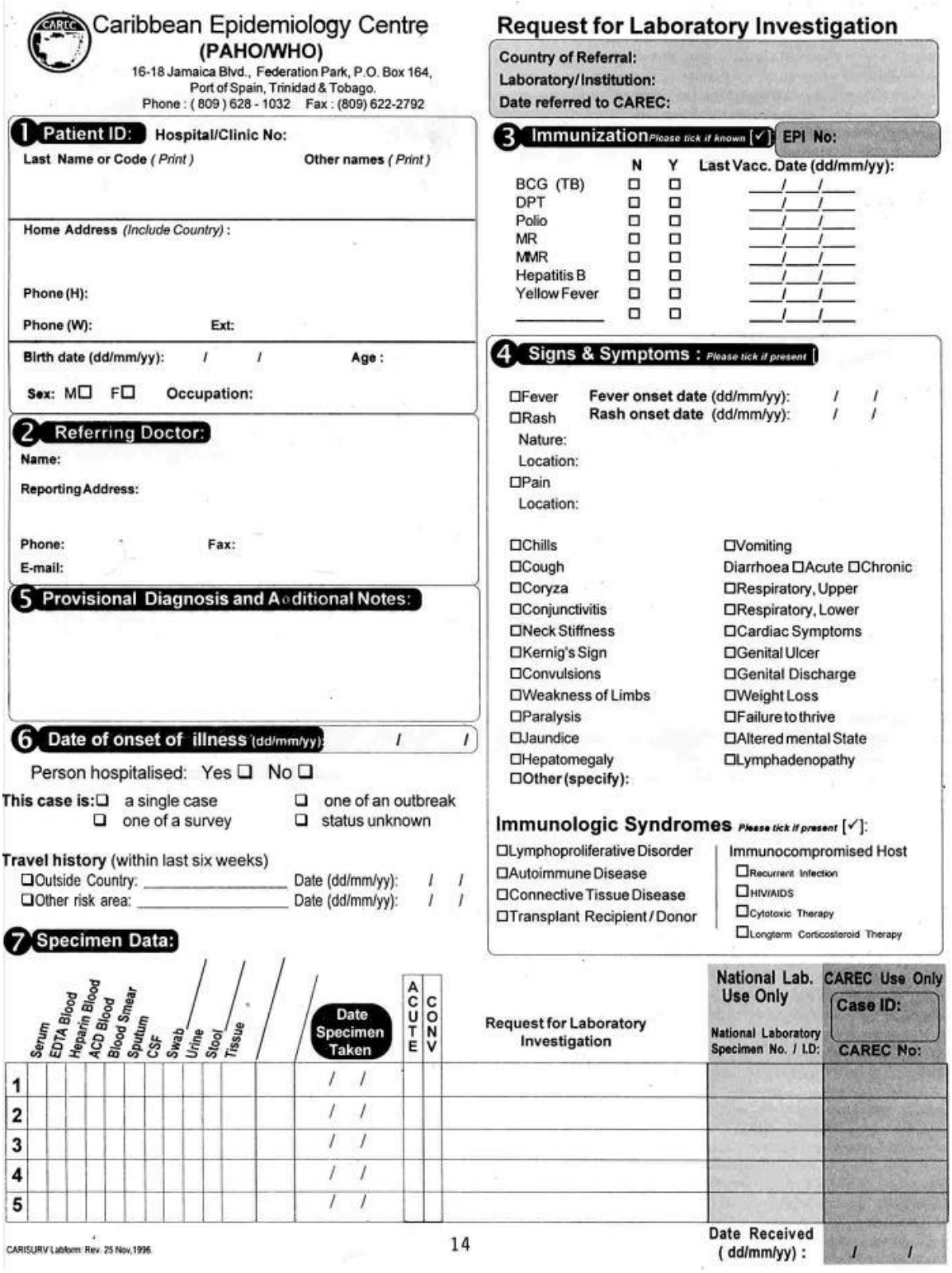
Indar-Harrinauth L, Daniels N, Prabhakar P, Brown C, Baccus-Taylor G, Comissiong E, Hospedales J. Emergence of *Salmonella enteritidis* phage type 4 in the Caribbean: Case-control study in Trinidad and Tobago, West Indies. Clin Infect Dis 2001;32(6):890-6.

A prospective case-control study involving 46 case patients and 92 age- and neighborhood-matched control subjects was conducted in Trinidad and Tobago (T&T) between March 1998 and May 1999 to determine the etiology, sources, and risk factors for *Salmonella enteritidis* (SE) infection. SE infection in T&T was found to be associated with the consumption of shell eggs, and in particular raw or undercooked eggs. SE isolates from 30 (88%) of 34 patients and from 9 implicated egg or egg-containing food samples were phage type 4. Homemade eggnog and ice cream, cake batter, and egg-containing beverages were the main raw egg-containing foods, reflecting the cultural practices of the people of T&T. Public health education on the risks of eating raw or undercooked eggs, thorough cooking of all egg dishes, and refrigeration of shell eggs and egg dishes; studies tracing infected eggs to their sources; and testing of flocks of layer chickens for SE are needed to reduce the incidence of this infection.

Indar L, Baccus-Taylor G, Commissiong E, Prabhakar P, Reid H. Salmonellosis in Trinidad: Evidence for transovarian transmission of *Salmonella* in farm eggs. West Indian Med J 1998;47(2):50-3.

The aim of this study was to determine whether the contents of farm eggs in Trinidad are contaminated with *Salmonella* and if transovarian transmission occurs. 750 fresh eggs from 10 farms supplying 75% of the country's eggs were cultured for *Salmonella*. *Salmonella* was found on the egg shells' surfaces from all farms, and in the egg contents from three farms. Isolates were obtained from the cultures of the contents and shells of nine (1.2%) and 35 (4.66%) eggs, respectively ($p < 0.005$). Serotypes found in the contents were *S. enteritidis* (0.8%; deduced to be contaminated by transovarian transmission) and *S. typhimurium* (0.4%); those isolated from the shells (contaminated by faecal transmission) were *S. typhimurium* (3.06%), *S. enteritidis* (0.67%), *S. ohio* (0.27%), *S. cerro* (0.27%), *S. infantis* (0.27%) and *S. heidelberg* (0.13%). This study provides the first evidence for *Salmonella* and, more importantly, *S. enteritidis*, in eggs in Trinidad. This is of major public health significance because *S. enteritidis* infected eggs appear normal and the organism is difficult to detect and control. The consumption of these eggs may increase the risk of *Salmonella* infection. Food safety practices, particularly the thorough cooking (> or = 70 degrees C) of all egg dishes and the refrigeration (< 10 degrees C) of shell eggs and egg dishes, are recommended.

Appendix J: CAREC LABORATORY INVESTIGATION FORM



Caribbean Epidemiology Centre
(PAHO/WHO)
16-18 Jamaica Blvd., Federation Park, P.O. Box 164,
Port of Spain, Trinidad & Tobago.
Phone : (809) 628 - 1032 Fax : (809) 622-2792

Request for Laboratory Investigation

Country of Referral:
Laboratory/Institution:
Date referred to CAREC:

1 Patient ID: Hospital/Clinic No:
Last Name or Code (Print) Other names (Print)

Home Address (Include Country) :
Phone (H):
Phone (W): Ext:

Birth date (dd/mm/yy): / / Age :
Sex: M☐ F☐ Occupation:

2 Referring Doctor:
Name:
Reporting Address:
Phone: Fax:
E-mail:

3 Immunization Please tick if known [✓] EPI No:

	N	Y	Last Vacc. Date (dd/mm/yy):
BCG (TB)	☐	☐	___/___/___
DPT	☐	☐	___/___/___
Polio	☐	☐	___/___/___
MR	☐	☐	___/___/___
MMR	☐	☐	___/___/___
Hepatitis B	☐	☐	___/___/___
Yellow Fever	☐	☐	___/___/___
_____	☐	☐	___/___/___

4 Signs & Symptoms : Please tick if present [✓]

☐Fever Fever onset date (dd/mm/yy): / /
☐Rash Rash onset date (dd/mm/yy): / /
Nature:
Location:
☐Pain
Location:

☐Chills
☐Cough
☐Coryza
☐Conjunctivitis
☐Neck Stiffness
☐Kernig's Sign
☐Convulsions
☐Weakness of Limbs
☐Paralysis
☐Jaundice
☐Hepatomegaly
☐Other (specify):

☐Vomiting
Diarrhoea ☐Acute ☐Chronic
☐Respiratory, Upper
☐Respiratory, Lower
☐Cardiac Symptoms
☐Genital Ulcer
☐Genital Discharge
☐Weight Loss
☐Failure to thrive
☐Altered mental State
☐Lymphadenopathy

Immunologic Syndromes Please tick if present [✓]:

☐Lymphoproliferative Disorder
☐Autoimmune Disease
☐Connective Tissue Disease
☐Transplant Recipient / Donor

Immunocompromised Host
☐Recurrent Infection
☐HIV/AIDS
☐Cytotoxic Therapy
☐Longterm Corticosteroid Therapy

5 Provisional Diagnosis and Additional Notes:

6 Date of onset of illness (dd/mm/yy): / /

Person hospitalised: Yes ☐ No ☐

This case is: ☐ a single case ☐ one of an outbreak
☐ one of a survey ☐ status unknown

Travel history (within last six weeks)
☐Outside Country: _____ Date (dd/mm/yy): / /
☐Other risk area: _____ Date (dd/mm/yy): / /

7 Specimen Data:

	Serum	EDTA Blood	Heparin Blood	ACD Blood	Blood Smear	Sputum	CSF	Swab	Urine	Stool	Tissue		Date Specimen Taken	ACUTE	CONV	Request for Laboratory Investigation	National Lab. Use Only: National Laboratory Specimen No. / I.D:	CAREC Use Only: Case ID: / CAREC No:
1													/ /					
2													/ /					
3													/ /					
4													/ /					
5													/ /					

Date Received (dd/mm/yy) : / /

CARISURV Labform: Rev. 25 Nov,1996

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Appendix K: ACCIDENTAL POISONING REPORT FORM

PATIENT INFORMATION					
Parish	**Date report received at Health Department**			**Date Accidental poisoning occurred**	
Name			**Age** *YRS* *MTHS*	**Gender** M F	
Name of Parent / Guardian (Relationship to Case)			**Date of Birth**	**Hosp name / Docket Number**	
Telephone Number			**Landmarks**		
Home Address			**Where did poisoning occur?** *Circle appropriate site* Home Day Care center School Other, specify……		
CLINICAL DATA					
Substance suspected of causing poisoning			**Quantity ingested**		
SYMPTOMS	**Y N**	**SYMPTOMS**	**Y N**	**SYMPTOMS**	**Y N**
Headache		Drowsiness		Flushing of skin	
Vomiting		Shortness of breath		Dizziness	
Diarrhoea		Convulsions		Delirium	
Burning sensation in mouth		Loss of consciousness		Weakness	
Was this patient hospitalized? **Where?** Y N Adm Date: …… Disch. Date …….. Hospital Name ……		**Outcome of Illness** Survived Died Resolved Sequelae present		**If patient died, state date of death** …… …… Post Mortem done? Y N DK	
Treatment given at Home (i.e. home remedy etc)				**Treatment given at Health Care Facility**	

EXPOSURE HISTORY
Describe the circumstances under which the poisoning incident occurred

LABORATORY DATA			ACTIONS TAKEN / RECOMMENDATIONS
SPECIMEN	**DATE**	**RESULT**	
FINAL CLASSIFICATION CONFIRMED CASE DISCARDED CASE			**Name / Position of person completing form:** **Signature:** **Date:**

SOCIAL AND ENVIRONMENTAL CONDITIONS			
GENERAL STATUS			
SAFETY FEATURES IN HOME			
	Y N	**If no to any, give details**	**Y N**
Presence of appropriate cupboards		Presence of doors	
Presence of appropriate storage areas for household chemicals		Inaccessible to children	
Presence of appropriate storage areas for pharmaceuticals		Presence of child-proof locks	
Presence of appropriate storage areas for other chemicals			
OTHER RELEVANT INFORMATION (Physical Description of agent implicated)			

APPENDIX L: ACUTE FLACCID PARALYSIS (AFP) INVESTIGATION FORM

SURVEILLANCE UNIT, MINISTRY OF HEALTH, JAMAICA
ACUTE FLACCID PARALYSIS INVESTIGATION FORM

CASE DEFINITION: Acute onset of flaccid paralysis in the absence of trauma.

Parish: _____ Case ID:_____
Reporting Site: _____ Final Classification: _____

Demographic Information

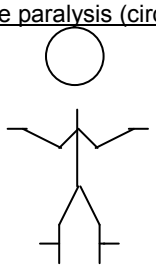
Name: _____ Age: ____ Sex: □M / □F D.O.B. ___/___/_____
Address: _____
_____ Parish: _____
Telephone No.: _____ School/Workplace: _____
Next of Kin: _____ Relation to case: _____
Address of NOK: _____

Clinical Information

Date of 1st exam: ___/___/_____ (dd/mm/yyyy) Examined by: _____
Date of onset of symptoms: ___/___/_____ (dd/mm/yyyy) Location: _____
Date of onset of paralysis: ___/___/_____ (dd/mm/yyyy)

History	Yes	No	Unk	**Presentation**	Yes	No	Unk
Fever?	□	□	□	Sickle Trait?	□	□	□
Malaise?	□	□	□	Flaccid paralysis?	□	□	□
Headache?	□	□	□	Asymmetric?	□	□	□
Nausea?	□	□	□	Sudden onset?	□	□	□
Vomiting?	□	□	□	Sensation loss?	□	□	□
Neck Stiffness?	□	□	□	DTRs reduced?	□	□	□

Describe paralysis (circle affected areas)



Hospitalized? □ Y / □ N / □ Unk If yes, specify hospital: _____
Ward: _____ Consultant: _____ Medical Record No.: _____

Immunization History (OPV)
1st dose: ___/___/_____ 2nd: ___/___/_____ 3rd: ___/___/_____ Booster: ___/___/_____
Documentation: □ Unknown / □ Written / □ Oral (by _____)

Laboratory Information

Specimen	Date collected	Laboratory	Date Rec'd	Test Done	Result
_____	___/___/_____	_____	___/___/_____	_____	_____
_____	___/___/_____	_____	___/___/_____	_____	_____
_____	___/___/_____	_____	___/___/_____	_____	_____
_____	___/___/_____	_____	___/___/_____	_____	_____
_____	___/___/_____	_____	___/___/_____	_____	_____

Exposure History

	Yes	No	Unk	Dates	Details
Case traveled within past 30 days?	□	□	□	___/___/_____	_____
Case had recent contact with a traveler?	□	□	□	___/___/_____	_____
Case been in close contact with a recently vaccinated person (OPV)?	□	□	□	___/___/_____	_____
Other AFP cases area (district/ parish)?	□	□	□	___/___/_____	_____

Follow-up

NATIONAL SURVEILLANCE UNIT/
MINISRTY OF HEALTH, JAMAICA
2-4 KING STREET, OCEAN BUILIDING
KINGSTON, JAMAICA

ACUTE FLACCID PARALYSIS SURVEILLANCE
NEUROLOGICAL EXAMINATION: 60 DAY FOLLOW-UP

Please complete and return promptly:

Hospital: _____ Registration No._____

Ward/Clinic: _____ Consultant: _____

Name of Patient: _____ Age: _____

Sex: Male ☐ Female ☐

Address: _____

Tel. No: _____ Next of Kin: _____

Paralysis Present: Yes ☐ No ☐

If yes, please complete the following:

SITE	DEGREE OF	
	PARALYSIS	PARESTHESIA
Left Leg		
Left Arm		
Right Leg		
Right Arm		
Face		
Respiratory Muscles		
Other Cranial Nerves		

Comments: _____

Final Diagnosis: _____

Signature: _____

Date: _____

APPENDIX M: CONGENITAL SYPHILIS INVESTIGATION REPORT

Parish	Date on Notification Form	Date Investigation assigned	Parish Code

INFANT INFORMATION

Infant's Name	Age	Date of Birth	Gender M F

Name of Mother	Infant's Docket #	Health Centre / Hospital name

Telephone Number	Mother's Age	Home Address
Mother's Docket Number	**Site of Delivery (Hosp/RMC/Home)**	

CLINICAL DATA

SYMPTOMS	Y	N	SYMPTOMS	Y	N	SYMPTOMS	Y	N
Generalized lymphadenopathy			Mucous patches			Anaemia		
Vesiculo-bullous rash			Other rashes			Hepatosplenomegaly		
Pneumonitis			Snuffles			Failure to thrive		
Neurological symptoms			Jaundice					

Was the birth premature?	Was this a stillbirth?	Mother's VDRL Test (Result and Date)

MOTHER'S INFORMATION

# Children alive	# Stillbirths	# Miscarriages	# Lifetime sex partners	Interview Record #

ANC *(this pregnancy)*	VDRL / TRUST Test (Last pregnancy): [Y] [N]
PRIVATE [ ] PUBLIC [ ] # VISITS ……..	Result:……. Treatment [Y] [N]
VDRL / TRUST Test (This pregnancy): [Y] [N]	**Number and Date of doses of BPG**
Result:……. Treatment [Y] [N]	

MOTHER'S CONTACTS

DISPOSITION	RESULTS	TYPE OF TREATMENT	DATE(S) OF TREATMENT
Baby's Father			
Other			

INVESTIGATION DATA			Treatment Given To Infant (With Dates)
TEST	**DATE**	**RESULT**	
VDRL - Mother			
VDRL - Infant			
MHA-Tp - Infant			
CSF - VDRL			
Bone Xrays			**DISPOSITION**
Other			

COMMENTS

FINAL CLASSIFICATION	
CONFIRMED CASE DISCARDED CASE	**Signature:** **Date:** **MO(H) Signature:**

Appendix N: EVENTS SUPPOSEDLY ATTRIBUTED TO VACCINATIONS AND IMMUNIZATIONS (ESAVI) INVESTIGATION REPORT FORM

(Completed form should be directed to parish Medical Officer of Health) *(All dates: dd/mm/yy)*

1) NAME (Surname, Firstname): _____ 2) D.O.B: _____/_____/_____

3) ADDRESS:_____

4) CONTACT TEL #:_____(H)_____(C) 5) N.O.K:_____

6) DATE CLIENT SEEN:____/____/_____

7) TYPE OF VACCINE(S) GIVEN | DATE GIVEN | ANATOMICAL SITE | MANUFACTURER LOT /BATCH #

_____ _____/_____/_____ _____ _____

_____ _____/_____/_____ _____ _____

_____ _____/_____/_____ _____ _____

8) NAME OF FACILITY WHERE WAS GIVEN:

_____

9) ADVERSE EVENTS NOTED: (please circle appropriate responses)

Reaction	Date of Onset	Other Reactions	Date of Onset
Fever	_____/_____/_____	_____	_____/_____/_____
Local Reaction (Pain, Redness, Swelling)	_____/_____/_____	_____	_____/_____/_____
Skin Rash	_____/_____/____	_____	_____/_____/_____
Convulsions	_____/_____/_____	_____	_____/_____/_____
Anaphylactic Rxn	_____/_____/_____	_____	_____/_____/_____

10) DESCRIBE REACTIONS ABOVE: (including clinical course and management) _____

_____

_____

_____

11) REFERRALS MADE: PAEDIATRICIAN/GP: ☐YES ☐NO HOSPITAL: ☐YES ☐NO
FINAL DIAGNOSIS MADE/OUTCOME _____

12) PREVIOUS VACCINATION HISTORY: (please circle appropriate responses)

Circle Vaccines Received:	Reaction: (if yes, please describe)		Description of Reaction
BCG	☐YES	☐NO	☐UNK
OPV	☐YES	☐NO	☐UNK
IPV	☐YES	☐NO	☐UNK
DPT/HepB/Hib	☐YES	☐NO	☐UNK
DPT	☐YES	☐NO	☐UNK
MMR	☐YES	☐NO	☐UNK
Other_____	☐YES	☐NO	☐UNK

13) REVELANT HEALTH HISTORY: a) Is client normally well? ☐YES ☐NO
b) Please describe any acute conditions at time of vaccination:

_____

_____

c) Was client well at time of vaccination? ☐YES ☐NO
d) Please describe any acute conditions at time of vaccination:

_____

_____

14) PERSON COMPLETING THIS (please print)

NAME: _____ Date Completed: _____/_____/_____
POST: _____ Place of Work: _____
Contact # _____ Signature: _____
MO(H) Signature_____ Date: _____/_____/_____

Summary of the frequency rates of minor events, attributed to vaccination or immunization and the times they take to appear.

Vaccine	Local reaction (pain , swelling, redness) 0 – 5 days	Fever (1 – 3 days)	Irritability, malaise and non-specific symptoms
Haemophilus influenzae type b (Hib)	5 – 15%	2 – 10%	-
Hepatitis B	Up to 30% in adults Up to 5% in children	1 – 6%	-
Measles/MMR	Up to 10%	Up to 5%	Up to 5%
Oral poliomyelitis (OPV)	None	Less than 1%	Less than 1 %[a)]
TT/DT	Up to 10%[b)]	Up to 10%	Up to 25%
DPT[c)]	Up to 50%	Up to 50%	Up to 60%
BCG[d)]	Common[e)]	-	-

(**N.B.** the rates corresponding to the administration of vaccines will be lower, given that these symptoms appear normally in children, regardless of vaccination).

a) Diarrhea, headache and muscular pains
b) It is likely that the rates of local reaction increase with the booster from 50 to 85%.
c) Whole cell whooping cough vaccine. The rates for acellular whooping cough vaccine are lower.
d) Local reactogenicity varies from one vaccine to another as a function of the strain and number of viable bacilli.
e) The reaction consists of the appearance of a nodule and subsequent reaction.

Summary of severe events attributed to vaccination or immunization, onset interval and rates

Vaccine	Event	Onset interval	Rates per 1.000.000 dosage
BCG	Suppurative lymphadenitis BCG osteitis Disseminated BCG	2 – 6 months 1 – 12 months 1 – 12 months	100 – 1000 1 – 700 2
Hib	Nil Known	-	-
Hepatitis B	Anaphylaxis Guillan-Barre syndrome (vaccine obtained from plasma)*	0 – 1 hour 0 – 6 weeks	1– 2 5
Measles/ SRP[a)]	Febrile seizures Thrombocytopenia (low platelet count) Anaphylaxis	5 – 12 days 15 – 35 days 0 – 1 hour	333 33 1 – 50
Oral poliomyelitis (OPV)	Vaccine-associated paralytic poliomyelitis (VAPP)	4 – 30 days	Less than 1[b)]
TT/Td	Brachial neuritis Anaphylaxis Sterile abscess	2 – 28 days 0 – 1 time 1 – 6 weeks	5 – 10 1 – 6 6 – 10
DPT	Persistent screaming lasting for more than 3 hours. Seizures Hypotonic hypotensive episode (HHE) Anaphylaxis Encephalopathy	0 – 24 hours 0 – 2 days 0 – 24hours 0 – 1 time 0 – 3 days (average)	1.000 – 60.000 570[c)] 570 20 0 – 1
Yellow fever	Post vaccination encephalitis Allergic reaction/anaphylaxis	7 – 21 days 0 – 1 hour	500 – 4.000 in inf. Under 6 m 5 – 20

a) No reaction (except anaphylaxis) when there is immunity (~90% of those who receive a second dose); febrile seizures are very unlikely in children over six.
b) The risk of VAPP is higher for the first dose (1 in 1.400.000–3.400.000 dosage) than for subsequent doses and contacts, 1 in 5.900.000 and 1 in 6.700.000 doses respectively.
c) Seizures are principally febrile and frequency depends on personal and family background and age, with the risk lower for children under 4 months.
d) Isolated cases with no denominator make evaluation of frequency more difficult for children and adults, but are extremely rare (less than 1 case in 8.000.000 doses.

Appendix O: FEVER AND RASH CASE INVESTIGATION FORM

Complete this form for: *Any patient with fever and generalized rash in whom a health care worker suspect a viral etiology (especially Measles or Rubella)*

Initial Classification: A-Suspected
- ☐ Measles
- ☐ Rubella
- ☐ Dengue
- ☐ Other
- ☐ Unknown

CASE INDENTIFICATION

Parish: _____ Case #M _____

Locality/city: _____

Name: _____ Date of Notification: _____/_____/_____

Name of Parent: _____ Reporting site: _____

Address: _____ Source: ☐ Public / ☐ Private / ☐ Laboratory /

_____ ☐ Community / ☐ Active Search / ☐ Other /

Sex: ☐ Male / ☐ Female / ☐ Unknown

Age: _____ years / _____ months _____ Location type: ☐ Urban / ☐ Rural / ☐ Unknown

CLINICAL DATA

Data of Investigation: _____/_____/_____

Fever? ☐ Yes / ☐ No / Onset date: ____/_____/_____

Rash? ☐ Yes / ☐ No / Onset date: _____/_____/_____

Rash Type: ☐ Maculopapular / ☐ Vesicular / ☐ Other

☐ Unknown

Was the case Pregnant? ☐ Yes / ☐ No

If yes, # weeks of gestation: _____

Delivery at _____

Symptoms:	Yes	No	Unk	
Cough	___	___	___	
Coryza	___	___	___	
Conjunctivitis	___	___	___	
Lymph Nodes	___	___	___	
Arthralgia	___	___	___	
Hospitalized	___	___	___	Date: ___/___/___
Death	___	___	___	Date: ___/___/____

IMMUNIZATION HISTORY

☐ Measles: Number of doses: _____ Date of last dose: _____/_____/_____

☐ MR: Number of doses: _____ Date of last dose: _____/_____/_____

☐ MMR: Number of doses: _____ Date of last dose: _____/_____/_____

POSSIBLE SOURCE OF INFECTION

1. Was there contact with another confirmed measles/Rubella case 7 to 18 days prior to rash onset?
   Yes /No /Unknown; Specify diagnosis of contact: Measles / Rubella
2. Was there a confirmed case of Measles / Rubella in this area prior to this case?
   Yes /No /Unknown; Specify disease Measles / Rubella
3. Did the case travel during 7-8 days prior to rash onset?
   Yes /No /Unknown; Specify area / country: _____
4. Did the case have contact with persons who traveled during 7-18 days prior to rash onset?
   Yes /No /Unknown; Specify area/ country_____
5. Was the case in contact with a pregnant woman while symptomatic?
   Yes / No / Unknown

INVESTIGATOR

Name: _____ Position: _____

Signature:_____ Date of Investigation: _____/_____/_____

Comments: _____

Appendix P: HEPATITIS B INVESTIGATION FORM

PATIENT INFORMATION		
Parish	**Date report received at Health Department (*dd/mm/yy*)**	
Name	**Age**	**Gender** M F
If Child, Name Of Parent / Guardian *(relationship to case)*	**Date of Birth**	**Hosp name / Docket Number**
Telephone Number	**Landmarks**	
Home Address	**Occupation**	

CLINICAL DATA							
Date of onset of illness							**Immunization History**
SYMPTOMS	**Y N**	**SYMPTOMS**	**Y N**	**SYMPTOMS**	**Y N**		**Number of doses of Hepatitis B:**
Fever		Nausea		Vomiting			
Anorexia		Itching/Rash		Jaundice			
Malaise		Arthralgia		Palpable liver			**Date of last dose:**
Fatigue/Lethargy		Abd. Pain/discomfort		Dark urine, pale stools			

Is / Was this patient hospitalized?	**Hosp & Date of Admission**	**Date of discharge**	**Outcome of illness**
			Survived
			Died Date / /

Was patient identified through blood donation testing?	**Date of donation**	**Date result of test rec'd**

Date of repeat HbsAg (>6 mths)	**Which Laboratory?**	**Lab number and Result of repeat HbsAg Test**

EXPOSURE HISTORY			
	Y N	**Dates**	**Details**
Sexual contact with Hepatitis Case			
Blood transfusion in past 6 months			
Haemodialysis? Injections? Injecting drug use?			
Hospitalized in past 6 months			
Tattooing, ear piercing, acupuncture			
Child of Hepatitis B surface antigen positive mother			
Resident in institution, attends daycare			
Health care worker with occupational sharps injury			

LABORATORY DATA							
Specimen	**Date collected**	**Date rec'd**	**Condition**	**Test**	**Result**	**Date sent**	**Comment**
Blood				**HBsAg**			
Blood				**Anti-HBc IgM**			
Blood				**HBeAg**			

FINAL CASE CLASSIFICATION	**Date reported:**
LABORATORY CONFIRMED HEPATITIS B CASE	**Signature:**
HEPATITIS INDETERMINATE	**MO(H) signature:**
	Date:

CONTACT INVESTIGATION							
CONTACT'S NAME (Level of contact with case e.g. Household or sexual)	**SEX**	**AGE**	**ADDRESS**	**Hepatitis B Vaccine status**	**Number of doses**	**HbsAg Test Date**	**RESULT**

CONTACTS RECEIVING HEPATITIS B VACCINE			
NAME	**DATE FIRST DOSE**	**DATE SECOND DOSE**	**DATE THIRD DOSE**

OTHER RELEVANT INFORMATION

Appendix Q: HANSEN'S DISEASE IVESTIGATION REPORT

3.12.4 Leprosy (Hansen's Disease) Case Investigation Form

LEPROSY (HANSEN'S DISEASE) CASE INVESTIGATION FORM

Reporting Centre: Date of report / /

1. Patient information

Name	Age (yrs)	Sex M F
Address	Phone	Occupation

2. Clinical data

Date of onset / /

Immunization history

not applicable

Symptom	Y	N	Symptom	Y	N	Symptom	Y	N
Skin rash								
Hypopigmen-tation			Nerve Thickening					
Sensory loss								
Nodules								
Infiltration								

Is/was this patient hospitalised?	Y	N	Date(s)	Outcome of illness	
				Survived	
				Died	Date:

3. Exposure history

	Y	N	Date	Details
Childhood exposure				
Household contact				
Other prolonged contact				
Droplet exposure				
Other				

4. Laboratory data

Specimen	Date collected	Date rec'd	Condition	Test	Result	Date sent	Comment
Skin smear				Histology			
Biopsy				Histology			

5. Final case classification: Clinically confirmed:
Laboratory confirmed:

Date reported:
To whom:
Route:
Signature:

Appendix R: HIV/AIDS CONFIDENTIAL REPORTING FORM

HIV/AIDS CONFIDENTIAL REPORTING FORM
Send all reports to S.M.O, Surveillance Unit
2 King Street, Kingston
Ministry of Health,
Telephone: 967-1100/1/3/5, Fax # 967-1280
AIDS/STD Helpline Tel: 967-3830

FOR THE EPI – UNIT ONLY: **ACCESS #** _____

TRN: __ __ __--__ __ __--__ __ _ Clinic Site _____ MEDICAL RECORD _____

Trace ( ), Do not contact trace ( ), Contact partners only ( ), Update ( ), Copy sent to CI ( )

1. NAME: _____ _____ _____ _____ Sex: M( ), F( )
Last First Middle Pet name
2. ADDRESS: _____ PARISH: _____ Tel: _____
3. D.O.B.: ___/___/_____ AGE: _____ yrs. OCCUPATION: _____ MARITAL STATUS: ____
dd mm yy weeks if infant employed☐ unemployed☐
4. NEXT OF KIN: _____ _____ _____
Name Relation Address
4a. MOTHER'S NAME _____

5. **Sexual contacts** (Surname) **First Name** **Relation** **Address** **Parish**

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____
_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

6. SEXUAL PRACTICE of Patient: Heterosexual ( ) Homosexual ( ) Bisexual ( ) Not known ( )

7. **Risk History**	8. **Clinical Status** **DATE:** ___/___/___	
Blood transfusion …….. Y( ) N( )	Weight loss (>10%)……..Y( ) N( )	Candidiasis …… Y( ) N( )
Crack/Cocaine use …… Y( ) N( )	Cough (>4 weeks)…….Y( ) N( )	If Yes: Oral/ Oesophageal/ Vaginal
Intravenous drug use …. Y( ) N( )	Fever (> 1 month) ….. .....Y( ) N( )	Gen. Lymphadenopathy…Y( ) N( )
Current STD……Y( ) N( )	PCP .....….…....Y( ) N( )	Diarrhoea (> 1 month) …. Y( ) N( )
History of STD …….. Y( ) N( )	Recurrent Pneumonia……..Y( ) N( )	Chronic Herpes simplex . .Y( ) N( )
Genital Ulcers/sores ….. Y( ) N( )	Tuberculosis…… ……....Y( ) N( )	(> 1 month)
Sex with CSW…..…… Y( ) N( )	If Yes: Pulmonary/ Extra Pulmonary/ Disseminated	Shingles……Y( ) N( )
CSW…… .Y( ) N( )	CNS involvement ……..Y( ) N( )	Gen. Dermatitis……Y( ) N( )
Multiple Partners..…… Y( ) N( )	Severe Bacterial Infection..Y( ) N( )	Invasive cervical cancer…Y( ) N( )
Ever in Prison…...……..Y( ) N( )	(specify)_____	Kaposi's Sarcoma……. Y( ) N( )
	If pregnant, please complete box on reverse of this form	Other _____

10. TRANSMISSION CATEGORY: Sexual ( ) Vertical ( ) IV Drug Use ( ) Haemophiliac ( ) Blood Transfusion ( )

11. CD4 COUNT_____CD4/CD8 ratio_____Date of CD4 count ___/___/_____ Viral Load_____ Date of Viral load ___/___/_____

12. IS PT ON ANTIRETROVIRAL TREATMENT (ARV)? Y( ) N( ) START DATE OF ARV: ____/____/_____

13. CURRENT STATUS OF PT: HIV (no symptoms) ( ) HIV(minimal symptoms) ( ) Advanced HIV (CD4 count 201 – 350) ( )
AIDS ( ) AIDS Death ( )

14. DATE OF ONSET OF SYMPTOMS: ____/____/____

15. **Date diagnosed as Advanced HIV/AIDS** ____/___/___ **Date of Death** ___/___/___

16. CONFIRMATORY HIV TEST DATE: ___/___/___

CONFIRMATORY Lab: _____ Result: Pos☐ Neg ☐

Rapid Test: Date:___/___/___ Result: Pos ☐
Test Type: _____ Neg ☐

Where tested? Antenatal Clinic☐ Private Antenatal ☐ STI Clinic ☐ Blood Bank ☐ Hospital ☐ Private doctor ☐
Other ☐ Specify _____

P.T.O …… /2

6. Number of children under 15 years of age: _____

7.1 Blood transfusion: _____/_____/_____ Hospital transfused: _____ 7.2 Deportee? Y ( ) N( ) _____ Country

FOR PREGNANT PATIENTS ONLY, PLEASE ENTER THE FOLLOWING INFORMATION:
Estimated gestational Age: _____ weeks Estimated date of delivery: ____/____/____

Clinic site: _____ Parish_____ Clinic MRN #:_____

Patient referred to: VJH clinic ( ) UHWI ( ) Spanish Town ( ) CRH ( ) Mandeville ( ) St Ann's Bay ( )

Other: _____ Date of referral appointment: ____/____/____ Pt. Not referred ( ) Pt. Refused referral: ( )

Post test counseling done by: _____ (Enter name) Date of Post test counseling: ___/___/___

PREGNANCY OUTCOME:

Mother Delivery date: ____/____/____	Received ART during pregnancy? Yes ( ) No ( ) Don't Know ( ) AZT ( ) NVP ( ) HAART ( ) Other _____ ART adherence (Y/N):	Pregnancy outcome: ( )Live birth ( )Still birth Other _____		
Baby #1 **Last name:** _____ **First name:**_____	Received ART at delivery? Yes ( ) No ( ) Don't Know ( ) AZT ( ) NVP ( ) HAART ( ) Other _____	PCR result: 6 weeks	PCR result: 3 months	ELISA: 18 months
Baby #2 **Last name:** _____ **First name:**_____	Received ART at delivery? Yes ( ) No ( ) Don't Know ( ) AZT ( ) NVP ( ) HAART ( ) Other _____	PCR: 6 weeks	PCR result: 3 months	ELISA: 18 months

Definitions:

- Multiple partners --- Persons who report having sex with more than one person within a year.
- CSW --- Commercial sex worker
- PCP --- Pneumocystis Jiroveci Pneumonia
- CNS involvement --- Unexplained recent onset of seizures, dementia, toxoplasmosis, CMV, Cryptococcus, encephalopathy
- Recurrent pneumonia --- Two or more episodes within a 1-year period
- Gen. lymphadenopathy --- Two or more sites with enlarged lymph nodes

PLEASE NOTE:

- ❑ Enter all dates in the format dd/mm/yy.
- ❑ Reporting physicians are advised to initiate interview of index case to identify sexual contacts and encourage partner notification.
- ❑ If all sexual partners have been investigated, please tick "Do not contact trace" on front of form.
- ❑ **DO NOT SEND PATIENTS to the Ministry of Health, 2-4 King Street with confidential reporting forms.**
- ❑ If you have an "update" on the clinical condition or death of a patient please complete and send new reporting form.
- ❑ Send report under confidential cover to the MO(H) at the Parish Health Department or S.M.O. at top of form.

PATIENT'S DOCTOR: _____ Address/hospital: _____ Tel: ____-_____
SOURCE OF INFORMATION: _____ REPORTED BY: _____ Date reported: ____/____/____

Confidential patient counseling, information for providers, and automated information are available from AIDS/STD Helpline
Tel: 967-3830, 967-3764, 1-888-991-4444 Hours: 10:00 a.m. – 10:00 p.m. Monday through Friday
Web Page: www.jamaica-nap.org

Revised: June 23/09

Appendix S: LEPTOSPIROSIS INVESTIGATION FORM

LEPTOSPIROSIS CASE INVESTIGATION FORM							
Reporting Centre:_____				Date of Report: YYYY/MM/DD			
1. Patient information							
Name:					Age (yrs)	Sex M F	
Address					Phone	Occupation	
2. Clinical data							
Date of onset: YYYY/MM/DD Sudden Gradual						**Immunization history**	
Symptoms	Y N	Symptoms	Y N	Symptoms	Y N		
Headache		Conjunctival suffusion		Stiffness			
Fever		Myalgia		Weakness		Not applicable	
Anorexia		Rash		Liver tenderness			
Vomiting		Bleeding		Hepatomegaly			
Jaundice							
Is/was this patient hospitalized?		Y N	Date(s)	Outcome of illness			
				Survived			
				Died		Date:	
3. Exposure history							
During the 3 weeks prior to onset:			Y N	Date:	Details		
Contact with animals (including pets) or their excreta at home or in travel							
Contact with known (or possibly) contaminated water							
Ingested possibly rodent-contaminated food/drink							
Contact with case of leptospirosis							
4. Laboratory data							
Specimen	Date collected	Date received	Condition	Test	Result	Date sent	Comment
Blood-1st				Leptospira Agglut. Titre ELISA IgM			
Blood- 2nd				Leptospira Agglut. Titre ELISA IgM			
Blood, urine, CSF, Tissue				IF Identification isolation, PCR			
5. Final case classification Laboratory confirmed Discarded				Date reported: To Whom : Route: Signature:			

Appendix T: MALARIA INVESTIGATION FORM

Reporting Centre: _____ Date of reporting: YYYY /MM / DD
Patient's name: _____ Age: _____yrs Sex: M F

Present Address	Permanent Home address
Workplace Address	School Address

Clinical Data
Date of onset of THIS attack: YYYY /MM / DD Place of onset of THIS attack: _____

Name/Address/Phone No. of Reporting Physician:_____
_____

Symptom/ Signs	Y/N	Symptom /Signs	Y/N	Symptom/Signs	Y/N	Symptom/Signs
Fever		Chills		Myalgia		Headache
Sweating		Nausea		Vomiting		Other (Specify)
Complications						

LABORATORY RESULTS
Optima: Date taken YYYY /MM / DD Positive Negative Not taken
Smear: Date taken YYYY /MM / DD Positive Negative Not taken
SPECIES: Vivax Ovale Falciparum Not determined

Has patient been out of country? Yes No	Has patient's contact been out of country? Yes No
If yes, list all countries visited with dates	If yes, list all countries visited with dates

Malaria prophylaxis taken? Yes No Drugs: Chloroquine Primaquine Fansidar Other _____

Local Travel History / Overnight stay in past 3 months	(Contact info)
Blood transfusion within past 2 years? Yes No If yes, date/s	Has the patient had a past history of confirmed malaria? No/Yes _____

Treatment (Dose and Duration)
Chloroquine _____Primaquine _____ Quinine_____
Pyrimethamine/sulphadoxine_____ Amodiaquine _____ Mefloquine_____

Final case classification: Malaria Y / N Laboratory confirmed Y/ N	**CLASSIFICATION**: Imported Induced Cryptic Introduced Indigenous Congenital

Additional Information:_____
_____
_____
_____
_____

Signature:_____ Investigator: _____Date reported: YYYY /MM / DD

Appendix U: MENINGITIS/ ENCEPHALITIS INVESTIGATION FORM

MENINGITIS/ENCEPHALITIS INVESTIGATION FORM

Reporting Centre:			Date of Report / /			
Initial Diagnosis:						
Patient information						
Name:			Age:	Sex: M F		
Address:			Phone:	Occupation: Institution:		
Next of Kin: Address: Phone:						
Clinical data						
Date of onset of illness / /				***Immunization History***		
Symptoms/Signs	Y/N	Symptoms/Signs	Y/N		Number of Doses	Date of Last Dose
Fever		Paresis/Paralysis		BCG		
Headache		Paresthesias/Hyperesthesias		DPT		
Nausea		Vesicles-hands & feet		DT		
Vomiting		Delirium		OPV		
Neck Stiffness		Tremors		IPV		
Disorientation		Convulsions		MMR		
Itching,Rash		Spacity		MR		
Ecchymoses		Coma		M		
Drowsiness		Abdominal pain/ distention		HiB		
Irrtability		Neckache/backache		Hepatitis B		
Cough		Visual disturbances		Pentavalent		
Stupor		Other (specify)		Other		
Confusion						

Exposure History	**Y/N**	**Details**
Case/Institutional Contact		
Recent History of Viral Illness		
Travel history		
Consumption of Lettuce, Cabbage, Snails,Shrimp, etc		
Snail Infestation of Premises		
Dead Birds on Premises		
Other		

Hospitalization History	***Treatment History***
Institution	Prior treatment with antibiotics ? Y N
Date of Admission / /	Date / / Type
Date of Discharge/Death / /	Current treatment

Laboratory Data				
Specimen	Date Collected	Department	Test/Result	Comments
CSF		Microbiology	Gram stain: Zn: India Ink: Bacterial Culture:	
			Antigen Detection:	
		Haematology	WBC count: Differential: RBC count:	
		Biochemistry	Protein Glucose	
		Parasitology	Examination of Larvae/Worms:	
Blood		Haematology	WBC count: Differential:	
		Biochemistry	Glucose	
		Microbiology	Gram Stain: Bacterial culture: Antigen Detection:	
Acute Blood				
Conval. Blood				
Stool				
Vesicle Swab				
Brain Tissue				

Additional Information/ Action Taken / Control Measures Implemented

Hypothesis as to source, method of transmission and existence of reservoirs or carriers

Final Diagnosis _____

(If Haemophilus influenzae or Meningococcal meningitis, complete Section B)

PHN signature: Date of investigation:

PHI signature: Date of Investigation:

MO(H) Comment/signature:

Section B

(To be completed for Haemophilus influenzae and Meningococcal Meningitis)

Number of persons sleeping / living in the Household_____

Number if persons under 5 years_____

Is there any ill person in the household Y/N

Name	Age	Sex	Immunization Status	Complaint	Prophylaxis

If yes, list names, sex and complaint

(NB. Check for the following symptoms: fever, sore throat, cough, runny nose, post nasal draining)

Has there been any death in the last 3 months in the neighbourhood? Y/N

If yes give name, age, sex, address

Name	Age	Address	Sex	Cause of death

Has any member of the family travelled abroad in the last 3 months? _____If yes, to where? (address)

_____

Have there been any visitors from abroad in the last 3 months? _____

If yes, from where? (address) _____

Appendix V: NEEDLE STICK, SHARP OBJECT INJURY AND FLUID EXPOSURE REPORT

Needle Stick, Sharp Object Injury and Fluid Exposure Report

_____ DOB: _____ Parish: _____ Sex: ~~M F~~

Occupation: _____

2. Date/Time of Exposure/Injury: _____

5. Reported by: _____ Date: _____

7. Institution where exposure/injury occurred: _____

8. Where did the exposure/injury occur?

A	Ward *(specify)* _____	☐	G	Operating Theatre	☐
B	Dressing Room	☐	H	Dialysis Unit	☐
C	Phlebotomy room	☐	I	Labour & Delivery Room	☐
D	Outpatient clinic	☐	J	Service/ Utility Area (*laundry, garage, disposal, etc.*)	☐
E	ICU	☐	K	Other *(specify):* _____	
F	A&E / Casualty	☐			

9. Name of the source patient: _____ ☐ Source Unknown

10. Docket No. _____ ☐ Not Applicable

11. Source patient HIV Status: ☐ Positive ☐ Negative ☐ Unknown

☐ Source Patient tests positive for other blood borne pathogen *(specify)*

_____

12. Type of exposure: ☐ Sharp item ☐ Body Fluid exposure *(specify type and volume)*:

_____

13. In the case of body fluid exposure, was the skin of the exposed person intact? ***(if not body fluid exposure skip this question)***

☐ YES ☐ NO (*explain*) _____

_____

14. Specify Sharp Item *(if not sharp item, skip to Question 17)*:

☐ Needle, specify gauge _____

☐ Blade

☐ Branula, specify gauge _____

☐ Glass, specify *(broken test tube, etc.)* _____

☐ Other Needle *(suture needle, etc.)* specify type & size

☐ Other *(specify)* _____

15. Was the injury: ☐ Superficial (little or no bleeding) ☐ Moderate (skin punctured, some bleeding)

☐ Severe *(deep stick/cut, or profuse bleeding)*

16. If the injury was to the hands, did the sharp item penetrate: *(check one)*

☐ Single pair gloves ☐ No gloves ☐ Other *(specify)*_____

Did the injury/exposure occur:

Restraining Patient

Disassembling device or equipment

☐ In preparation for reuse of reusable instrument *(sorting, disinfecting, sterilizing, etc.)*

☐ While recapping used needle

☐ Withdrawing a needle from rubber or other resistant material *(rubber stopper, I.V. port, etc.)*

☐ Device left on floor, table, bed or other inappropriate place

☐ Other after use, before disposal *(in transit to trash, cleaning, sorting, etc.)*

☐ From item left near or on disposal container

☐ While putting the item in a disposal container

☐ After disposal, stuck by item protruding from opening of disposal container

☐ Item placed on side of disposal container
☐ After disposal, item protruded from trash bag or inappropriate waste container
☐ Other, describe

_____

18. Describe the circumstances leading to this injury: *(please note if a device malfunction was involved)*

_____
_____
_____

19. State the location of the exposure/injury:

_____

20. Hepatitis B immunisation? ☐ None ☐ YES Dates:

_____

21. Immunisation Card seen? ☐ YES ☐ NO
22. Has the injured person had any previous needle stick injuries? ☐ YES ☐ NO
23. If yes, were the previous incidents reported? ☐ NO ☐ YES Date(s):

_____

24. Risk Category: ☐ Low ☐ Moderate ☐ High
25. Was area bled/flushed/washed? ☐ YES ☐ NO
26. Was disinfectant used?** ☐ YES ☐ NO

**NOTE: The use of bleach, alcohol, Savlon or other disinfectants is not recommended.

27. Action taken by head of department:

a. Counselling? ☐ YES ☐ NO
b. Blood taken for HIV testing? ☐ YES ☐ NO *(if "NO", explain)*

_____

c. Blood taken for Hepatitis B Antigen? ☐ YES ☐ NO *(if "NO", explain)*

_____

d. PEP Medication Given? *(see last page of this form for PEP Guidelines)*
☐ YES TYPE _____ Date/Time Started

_____

☐ NO *(if "NO", explain)*

_____

☐ Low Risk ☐ Not Available ☐ Exposed Person Refusal* ☐ Other *(specify)*_____

*In the case of refusal the exposed person must sign the attached waiver form

To be sent to Medical Officer of Health for surveillance

Form completed by:

Name: _____

Designation: _____

Signature: _____

Post Exposure Prophylaxis (PEP) Dosages:

All of the following are to be given within 1-2 hours or at most 24-36 hours after exposure* and continued for four weeks:
Either:
a. Zidovudine (AZT) 300 mg bid or 200 mg po tid after meals AND Lamivudine (3TC) 150 mg po bid after meals
OR
b. Combivir (AZT + 3TC) 1 tablet po bid with or without food

Indinavir should be used in addition to either a. or b. when there is a very high risk to the exposed person. 800 mg po q8h on an empty stomach. Drink at least 48 oz of fluid/24 hours.

***Studies in animals (no human studies done) suggest that treatment is not effective when started more than 24-36 hours after exposure. Commencement of treatment later is recommended if considered highest risk.**

PEP Refusal form:

I, _____, hereby waive my right to take the PE Prophylaxis to prevent possible infection of the HIV virus. I understand that by refusing to take the medication I am putting myself at greater risk for infection.

Signed: _____

Date: _____

Witness signature: _____

Witness (print name neatly): _____

Appendix W: OPHTHALMIA NEONATORUM INVESTIGATION REPORT

Parish	**Date on Notification Form**	**Date Investigation assigned**	**Parish Code**

INFANT INFORMATION

Infant's Name	**Age**	**Date of Birth**	**Gender** M F
Name of Mother	**Infant's Docket #**	**Health Centre / Hospital name**	
Telephone Number	**Mother's Age**	**Home Address**	
Mother's Docket Number	**Site of Delivery (Hosp/RMC/Home)**		

CLINICAL DATA

SYMPTOMS	**Y**	**N**	**SYMPTOMS**	**Y**	**N**
Muco-purulent or purulent conjunctivitis			Oedema and swelling of eyelids		
Redness of conjunctivae and palpebrae			Chemosis of conjunctivae		
Eyelids sticking together					

History of vaginal discharge in mother? Y N	**Any Treatment given at birth?** Silver Nitrate Drops **Y N** Tetracycline Drops **Y N**
Treatment given at Home (i.e. home remedy etc)	

MOTHER'S INFORMATION

# Children alive	**# Stillbirths**	**# Lifetime sex partners**
# Miscarriages	**ANC *(this pregnancy)*** PRIVATE [ ] PUBLIC [ ] # VISITS ……..	

LABORATORY DATA			**TREATMENT**
TEST	**DATE**	**RESULT**	
GRAM STAIN			
CULTURE			

COMMENTS

FINAL CLASSIFICATION CONFIRMED CASE DISCARDED CASE	**Signature:** **Date:** **MO(H) Signature:**

Appendix X: PERTUSSIS INVESTIGATION FORM

PERTUSSIS CASE INVESTIGATION FORM

Reporting Centre: Date of report / /

1. Patient information

Name	Age (yrs)	Sex M F
Address	Phone	Case #

2. Clinical data

Date of onset of illness / /

Symptom	Y N	Symptom	Y N	Symptom	Y N
Cough more than 2 weeks		Vomiting after cough			
Paroxysms		Pneumonia			
"whoop"		Encephalitis			

Immunization history

Number of doses:
DPT
DtaP
Date of last dose / /

Is / was this patient hospitalised?	Y N	Date(s)

Outcome of illness
Survived
Died: Date: / /

3. Exposure history

	Y N	Dates	Details
Has there been contact with a case During the past 3 weeks?			
Has the patient received antibiotics?			

4. Laboratory data

Specimen	Date collected	Date rec'd	Condition	Test	Result	Date sent	Comment
Throat swab				Culture			
Nasal swab				Culture			
N/P washings				FA			
Serum				IgM EIA			

5. Final case classification

Suspected
Epidemiologically confirmed
Laboratory confirmed

Date reported:
To whom:
Route:
Signature:

A Caribbean Communicable Disease Surveillance Manual for Public Health Action, CAREC October 1999

Appendix Y: RHEUMATIC FEVER/ HEART DISEASE

Notes 1. Date example: 25-JUNE-01, 2. Please write in Block, 3. Revised: September 18, 2001 L:/LINK/COMMUNICATION/WARD_DOC/SCHEMA/RFEVER.PPT
PLEASE FAX INVESTIGATION FORMS TO EPIDEMIOLOGY UNIT AT 967-1280

RHUEMATIC FEVER/RHEUMATIC HEART DISEASE INVESTIGATION FORM

Case identification Notification Site: _____ Parish: _____

Patient	**Next of Kin / Guardian/ Contact**	**School or Work Information**
Name_____ Pet Name_____	Name_____	Name_____
Sex_____ Birth Date_____ Age_____	Address_____	Address_____
Address_____	Relationship_____	Telephone_____
Community_____	Telephone_____	
Telephone_____		

Hospital_____ Date Admitted_____ Date Discharged_____ Docket#_____

Hospital_____ Date Admitted_____ Date Discharged_____ Docket#_____

Clinical Information (Circle)

Major Manifestation	**Date**	**Minor Manifestation**	**Date**
Carditis: Yes No Unk	_____	Joint Pains: Yes No Unk	_____
Polyarthritis: Yes No Unk	_____	High Temperature (Fever): Yes No Unk	_____
Chorea: Yes No Unk	_____	History of Rheumatic Fever: Yes No Unk	_____
Erythema marginatum: Yes No Unk	_____	Previous Rheumatic Heart Disease: Yes No Unk	_____
Subcutaneous Nodules : Yes No Unk	_____	Positive C-reactive protein test: Yes No Unk	_____
		Increase erythrocyte sedimentation rate: Yes No Unk	_____
		Increase in the PR interval (ECG): Yes No Unk	_____
		PR Measurement_____ **(mm)**	

Laboratory evidence of recent streptococcal infection (Circle) **Date**_____
Elevated ASTO: Yes No Unk Throat swab pos for group A. Beta haemolytic step: Yes No Unk

Cardiac Involvement (Circle)		**Severity of Heart Dam**
Mitral Stenosis (MS):	Yes No Unk	None
Mitral Regurgitation (MR):	Yes No Unk	Very Little
Aortic Stenosis (AS):	Yes No Unk	Moderate
Aortic regurgitation (AR):	Yes No Unk	Serious
Tricuspic Stenosis (TS):	Yes No Unk	Not Determined
Tricuspic Regurgitation (TR):	Yes No Unk	
Heart Failure:	Yes No Unk	
Bacterial Eendocarditis:	Yes No Unk	

Echocardiogram Findings Circle
VALVULAR LESION MS MR AR AS TR MS+MR MR+AR MS+TR MS+AS
MS+TS MS+MR+TR MR+TR+AR MR+TR+AS OTHER NONE
Ventricular Size: Normal Enlarged
Pericarditis: Present Absent
Myocarditis: Present Absent
comments_____

History and Prophylaxis Circle	**Prophylaxis Received** Yes No
Initial attack: Yes No Unk	**Prophylaxis Type** Injection Oral
If No, year of initial attack: _____	**Frequency** Regular Irregular
# of recurrences since initial attack_____	**No. of Benzathine penicillin injection received in the last 12 months** _____
	Drug Reaction? Yes No
	Specify Reaction:_____
	Prophylaxis Site: _____

Status (circle) Suspected Confirmed Discarded Dead
Date of change in Status _____ _____ _____ _____
Local for medical exam ---------- Next Medical Date ----------

Investigators Comments: _____

_____ **Signature**_____ **Date**_____

MOH Comments: _____

_____ **Signature**_____ **Date**_____

Appendix Z: TETANUS INVESTIGATION FORM

TETANUS AND NEONATAL TETANUS CASE INVESTIGATION FORM

Reporting Centre: Date of report / /

1. Patient information

Name: Name of mother (if NNT)	Age (yrs)	Age (days)	Sex M F
Address Phone #	Case #	Occupation	

2. Clinical data

Date of onset of illness / /

Immunization history

Symptom	Y	N	Symptom	Y	N
Contraction of chewing and neck muscles			Body stiffness		
Contraction of abdominal muscles			Facial grimace		
Inability to suck developing 3-28 days after birth			Arching of back		
Muscular spasms or convulsions					

Number of doses TT

Patient

Mother

Date of last dose / /

Is / was this patient hospitalized?	Y	N	Date(s)

Outcome of illness

Survived

Died Date / /

3. Exposure history

	Y	N	Date	Details
Puncture wound within past 28 days?				
Intramuscular/subcutaneous drug use				
Contact with animal excreta (eg farm)				
Recent circumcision				
Baby delivered at home				
Traditional birth attendant				

4. Laboratory data

Specimen collection un-necessary

Final case classification	Clinically confirmed NNT Clinically confirmed tetanus	Date reported: To whom: Route: Signature:

AA: TUBERCULOSIS INVESTIGATION FORM

MINISTRY OF HEALTH, JAMAICA
TUBERCULOSIS INVESTIGATION FORM

Notification Date: (dd/mm/yyyy) Source:
Investigative Officer Assigned:
Sections 1 to 6 must be submitted to the Parish MO (H) 6 weeks or less after notification date (i.e. date of case recognition as suspected Tb.)

Section 1 – Demographic information:

Last Name:	First Name:	Pet Name:
Sex: M / F (Circle one)	Age:	DOB:
Address:		
Parish:	Phone (H):	Cellular/e-mail:
Occupation:	Workplace/school:	
Work/school address:		Phone (W):
Jamaican residence? Y / N	6 wk Travel History:	

Section 2 – Clinical information:

Date of onset of symptoms: (dd/mm/yyyy)					
Symptoms		**Duration**	**Symptoms**		**Duration**
Fever	Y / N		Chest Pain	Y / N	
Cough	Y / N		Night sweats	Y / N	
Haemoptysis	Y / N		Weight loss	Y / N	
HIV infection	Y / N		Other:	Y / N	

Referred by:		Address:	Phone:
Referred To:		Admission Date:	Ward:
Med. Records No.:		Physician/Consultant:	
Other med. Condition: ☐ Pregnant / ☐ Renal disease / ☐ Liver dysfunction / ☐ other:			
History of BCG: Y / N		Scar seen? Y / N	

Section 3 – Laboratory investigation:

Mantoux:	Date:	Pos / Neg (circle)	Reading (mm):
X-ray:	Date:	Pos / Neg (circle)	Findings:
Sputum 1:	Date:	Smear: Pos / Neg (circle)	Culture: Pos / Neg (circle)
Sputum 2:	Date:	Smear: Pos / Neg (circle)	Culture: Pos / Neg (circle)
Sputum 3:	Date:	Smear: Pos / Neg (circle)	Culture: Pos / Neg (circle)
HIV test:	Date:	Pos / Neg / Not done (circle)	HIV Lab:

Section 4 – Case classification:

Classification:	etaD :demrifnoC ☐	etaD :dedracsiD ☐
Treatment history: (Tick which apply)	/ (tluafed) IAT ☐ / despaleR ☐) detaert ylsuoiverP ☐ / esac weN ☐ (cinorhC ☐ / eruliaF tnemtaerT ☐	
Disease Site: (Tick)	yranomluP ☐	artxE ☐-Pulm. - Site:

TAI – Treatment After Interruption

Section 5 – Treatment initiation:

Anti-Tb Treatment:	Date Started:		Date completed:
Supervision:	Duration in Hosp:		Duration at home:
Drugs used (Tick)**:**	**Dosage:**	**Weekly Regimen:**	**Comments:**
(H) dizainosI ☐			
(R) nicipmafiR ☐			
(Z) edimanizaryP ☐			
(S) nicymotpertS ☐			
(E) lotubmahtE ☐			
(T) enozatecaoihT ☐			

Date Investigation Completed: ___ /____ /____ (dd/mm/yyyy)
Name of Investigator: _____ Signature _____
Parish MO(H) Comment: _____
Date: ____ / ____ / _____ (dd/mm/yyyy)

Name of Case: _____

(Sections 7 & 8 to be completed and submitted to the Parish MO(H) when case has completed treatment.)

Section 7 – Treatment continuation and termination:

Continuation phase:	Date Started:		Date completed:
Supervision method:			
Drugs used (Tick):	**Dosage:**	**Weekly Regimen:**	**Comments:**
☐ Isoniazid (H)			
☐ Rifampicin (R)			
☐ Ethambutol (E)			

Follow-up Laboratory investigation:

X-ray:	Date:	Pos / Neg	Findings:
2-month check	Date:	Smear: Pos / Neg (circle)	Culture: Pos / Neg (circle)
4/5-month check	Date:	Smear: Pos / Neg (circle)	Culture: Pos / Neg (circle)
6/8-onth check	Date:	Smear: Pos / Neg (circle)	Culture: Pos / Neg (circle)
Other:	Date:	Smear: Pos / Neg (circle)	Culture: Pos / Neg (circle)
Other:	Date:	Smear: Pos / Neg (circle)	Culture: Pos / Neg (circle)
Ab resistance tests	Date:	Results:	

Ab - antibiotic

Section 8 – Case classification re Treatment Outcome:

Classification:	**Date (dd/mm/yyyy)**	**Action**
☐ Cured		
☐ Treatment completed		
☐ Treatment interruption (default)		
☐ Treatment failure		
☐ Death		
☐ Transferred out of parish		
☐ Lost to follow-up		

Date Investigation Completed: ___ /____ /____ (dd/mm/yyyy)

Name of Investigator(s): _____ _____

Signature of Investigator(s): _____ _____

Parish MO(H) Comment: _____

_____

_____

Date: ____/____/_____ (dd/mm/yyyy)

Reg. Epidemiologist/RTD Comment: _____

_____

Date: ____/____/_____ (dd/mm/yyyy)

Date received at National Surveillance Unit: Date: ____/____/_____ (dd/mm/yyyy)

National Tb Coord. Comment: _____

_____

_____

Name of Case: _____

Section 6 – Home and Contact investigation:

Name & Age	Relation-ship to case	Address	Tb Signs? (circle)	Previous BCG? (circle)	Mantoux Date (dd/mm/yy)	Mantoux reading (mm)	X-ray Date (dd/mm/yy)	X-ray findings	Contact classification:
			Yes / No	Yes / No					
			Yes / No	Yes / No					
			Yes / No	Yes / No					
			Yes / No	Yes / No					
			Yes / No	Yes / No					
			Yes / No	Yes / No					

Tb signs include: Persistent cough (lasting over 3 weeks), fever, night sweats, and weight loss.

Previous confirmed case(s) in family: Yes / No / Unk. (circle); If yes, list them.			
Name:	**Relationship to case:**	**Date of illness:**	**Properly treated? Yes / No (circle)**
			Yes / No / Unk (circle)
			Yes / No / Unk (circle)
			Yes / No / Unk (circle)

Population of household:		**Number of rooms for sleeping:**		**Socio-economic status of household:**	
Ventilation:	☐ Good / ☐ Fair / ☐ Poor (Tick one)			**Milk supply:**	☐ Pasturized / ☐ Non-pasturized
Cleanliness:	☐ Good / ☐ Fair / ☐ Poor (Tick one)			**Comments:**	
Water supply:	☐ Good / ☐ Fair / ☐ Poor (Tick one)				

Additional Information/Action Taken: _____

_____

Hypothesis as to source: _____

Appendix BB: TYPHOID INVESTIGATION FORM

TYPHOID FEVER CASE INVESTIGATION FORM

Reporting Centre:_____ Date of Report: YYYY/MM/DD

1. Patient information

Name:	Age (yrs)	Sex M F
Home address: Work address: Nature of duties:	Phone	Occupation

2. Clinical data

Date of onset: YYYY/MM/DD

Symptoms	Y	N	Symptoms	Y	N	Symptoms	Y	N
Fever			Cough					
Malaise								
Anorexia								
Constipation								
Diarrhoea								

Immunization history

Number of doses

Date of last dose

Is/was this patient hospitalized?	Y	N	Date(s)	Outcome of illness	
				Survived	
				Died	Date:

3. Exposure history

During the 3 weeks prior to onset:	Y	N	Date:	Details
Known case				
Food				
Water				
Carrier				
In 4 weeks prior to onset: Travelling/visiting if considered risk Change of work environment Bathing in rivers/pools				

4. Laboratory data

Specimen	Date collected	Date received	Condition	Test	Result	Date sent	Comment
Blood			Culture				
Stool			Culture				
Stool			Culture				
Urine			Culture				

5. Final case classification

Laboratory confirmed

Discarded

Phage type:

Date reported:
To Whom :
Route:
Signature:

Appendix CC:

LINE LISTING OF NOTIFIED (DISEASE/HEALTH EVENT) CASES FOR (MONTH(S), YEAR); (TOWN, PARISH)

Name	Sex	Age	Address/Phone #	Date of Onset	Care Site	Sample Taken (Specify type)	Date Sample Taken	Symptoms Experienced

N.B. This is the basic format which may be adjusted on a situation-by-situation basis to be more specific for the diseases being captured (For e.g., immunization data will be added in the event of a fever & rash/measles outbreak)

Appendix DD:

CLASS I REPORTING FORM - INDIVIDUAL NOTIFICATION (ON SUSPICION)

Date of Report: _____ / ____ /_____ (DD/MM/YY) NEW CASE / PREVIOUSLY REPORTED CASE (Circle One)

Diagnosis: _____ _____

Case Demographic Information

Name (including pet name): _____ Sex: _____ Age:_____ D.O.B ____ / ____ / _____(dd/mm/yy)

Address: Lot #:_____ Street:_____ Street Type: _____

Include landmark) (Name) (Drive, Road, Close etc)

Community: _____ Neighbouring Community/District: _____ Parish:_____

Workplace/School: _____ Occupation: _____

(H) Phone #.: _____ (Wk) Phone #: _____ History of overseas travel in past 4-6 weeks? Y / N

Specify area/country: _____

Name of NOK/Parent: _____ Relationship to case: _____

Address of NOK/Parent: _____ Phone No.: _____

Clinical Information:

Symptoms: _____ Hosp./Facility Name: _____

_____ Medical Record # _____

Date of onset: ___ / ___ / _____ d/mm/yy) Date seen: ___ / ___ / _____ (dd/mm/yy) Case admitted to Hosp?: Y / N (Circle one)

Specimen Taken Y / N Type: _____ Date of Admission: _____ / ____ / _____ (dd/mm/yy)

Specimen Date: ___ / ___ / _____ (dd/mm/yy) Laboratory:_____ Ward: _____

Result(s): _____ If dead, Date of Death: _____ / ____ / _____ (dd/mm/yy)

Notifier Information

Name of notifier: _____ Phone #:_____ Received by MO(H) _____/ _____ / _____ (dd/mm/yy)

Address: _____ Email: _____ Parish MO(H) Signature _____

Comments : _____ Forwarded to R.S.O. _____ / _____ / _____ (dd/mm/yy)

_____ Forwarded to Surveillance Unit _____ / _____ / _____ (dd/mm/yy)

Appendix EE:

List of Selected Communicable Diseases

Exotic Communicable Disease	Host(s)	Vector(s)	Signs and Symptoms	Mode of Transmission	Incubation Period	Infectious Agent	Diagnostic Test	Endemic Countries
Cholera	Humans	N/A	- Sudden onset of water stool. - Nausea & vomiting. - In untreated cases, rapid dehydration, acidosis and renal failure. - Asymptotic infection is more frequent than clinical illness.	- Through ingestion of food or water contaminated with feces and vomiting of infected person.	From less than a day to five days	*Vibrio cholerae* (serogroup 01 and 0.139)	- isolation of the agent from feces	Australia, Bangladesh, Bermuda, India Kenya, New Zealand, Pakistan, South Africa, Sri Lanka, Zimbabwe
Coccidioido-mycosis	Humans	N/A	- flu-like illness - fever - cough - headaches - rash - myalgias.	- Inhalation of airborne arthroconidia after disturbance of contaminated soil by humans or natural disasters	from one to four weeks	*Coccidioides immitis*	- Stain; Skin test; Antibody tests	Canada
Crypto-sporidiosis	Humans and animals	N/A	- water diarrhea - dehydration - stomach cramps or pains - weight loss - fever - nausea - vomiting	- ingestion of the parasites from contaminated food and water.	2 to 10 days	microscopic parasites of the genus *Cryptosporidium*	Identification of parasites in the stool samples	Bangladesh India Pakistan
Filariasis	Humans, cats, civets	Mosquito (Culex, Aedes and Anopheles)	- Fever - Lymphadenitis - Chronic signs – hydrocele and elephantiasis of the limbs, breasts and genitalia.	- Through the bite of a mosquito infected with Filariasis.	3-6 months (B. malayi) 6-12 months (W. bancrofti)	*Filaria* parasites	- isolation of filarial parasites in blood film	Australia Hiati India Kenya New Zealand South Africa
Japanese Encephalitis	Humans	Mosquito (*Culex tritaeniorhynchus* group)	- Acute encephalitis; can progress to paralysis, seizures, coma and death	- through the bite of an infected mosquito	5 to 15 days	Japanese encephalitis (JE) virus: *flavivirus*	- sample of serum and/or cerebral spinal fluid seven days after the onset of symptoms, and these must be tested for antibodies in a	Australia Sri Lanka

Exotic Communicable Disease	Host(s)	Vector(s)	Signs and Symptoms	Mode of Transmission	Incubation Period	Infectious Agent	Diagnostic Test	Endemic Countries
							laboratory	
Legionellosis	Humans	N/A	- symptoms like many other forms of pneumonia - high fever - chills - cough - muscle aches and headaches in some people	- inhalation of air or water droplets that is contaminated with the bacteria (*Legionella pneumophila)*	2 to 14 days	*Legionella pneumophila*	- Chest X-rays are needed to find the pneumonia caused by the bacteria - other tests can be done on sputum (phlegm), as well as blood or urine to find evidence of the bacteria in the body.	England Ireland Netherlands Scotland
Leishmaniasis	Humans, domestic dogs	Phlebotomine sand flies	- Fever - Hepatoesplenomegaly - lynphadenopty - Anemia - Progressive emaciation and weakness	- Through bite of infected phlebotomine sand flies	Days to weeks, months, or years Usually 2-6 months	*Leishmania*	- culture of leishmania from a biopsy specimen	Bangladesh, England, India Ireland, Kenya, Netherlands, Pakistan, Scotland, South Africa, Zimbabwe
Lyme Disease	Humans, mice and other small animals	Ticks (blacklegged)	- fever - headache - fatigue - characteristic skin rash called erythema migrans - If left untreated, infection can spread to joints, the heart, and the nervous system	- through the bite of infected blacklegged ticks	3-30 days (rash to appear)	*Borrelia burgdorferi*	- based on symptoms, physical findings (e.g., rash), and the possibility of exposure to infected ticks - laboratory testing is helpful in the later stages of disease.	Australia Canada USA
Malaria	Humans	Mosquito (Anopheles)	- fever - chills - sweats - cough - diarrhea - respiratory distress - headache	- through the bite of an infected mosquito	- 9 days to 2 weeks (P. falciparum) - 12-18 days (P. vivax & P. ovale) - 18-40 days (P. malariae)	*Plasmodium vivax*, *P. malariae*, *P. falciparum* and *P. ovale*	- isolation of malaria parasites in the blood film	Bangladesh, India, Kenya, Pakistan, South Africa, Sri Lanka, West Indies(Guyana), Zimbabwe
Mumps	Humans	N/A	- fever - headache - muscle aches - tiredness - loss of appetite - followed by swelling of salivary glands	- spread through direct contact with respiratory secretions or saliva or through fomites	12-25 days	mumps virus	- paired sera; IgM antibodies; Viral culture	Ireland Netherlands Scotland
Murray Valley encephalitis	Humans, water birds	Mosquito (*C. annulirostris)*	- fever - headache - nausea - vomiting	- through the bites of an infected mosquito	7 to 28 days	*flavivirus*	- rise in antibody titre to the virus in two blood specimens taken seven to ten days apart	Australia
Norwalk-like virus	Humans	N/A	- acute-onset vomiting - watery non-bloody	- through the fecal-oral route, either by	24 and 48 hours	*Norovirus caliciviridae*	- identification of the virus in the stool sample	Bangladesh Bermuda

Exotic Communicable Disease	Host(s)	Vector(s)	Signs and Symptoms	Mode of Transmission	Incubation Period	Infectious Agent	Diagnostic Test	Endemic Countries
			diarrhea with abdominal cramps - nausea - Low-grade fever also occasionally occurs - vomiting - dehydration is the most common complication, especially among the young and elderly	consumption of fecally contaminated food or water or by direct person-to-person spread - Environmental and fomite contamination may also act as a source of infection				India Pakistan West Indies
Onchocerciasis (River blindness)	Humans	blackfly	- skin rash - eye lesions - and/or subcutaneous bumps under the skin.	- spread from person to person by the bite of an infected blackfly	9 to 24 months	*Onchocerca volvulus* (worm)	- Superficial skin biopsies will identify the parasite microscopically	Kenya South Africa Zimbabwe
Poliomyelitis	Humans	N/A	- sore throat and - fever - gastrointestinal disturbances (nausea, vomiting, abdominal pain, constipation or, rarely, diarrhea - influenza-like illness	- Person-to-person spread of poliovirus via the fecal-oral route is the most important route of transmission - although the oral-oral route may account for some cases.	3–35 days	*Poliovirus*	- isolation of Poliovirus from the stool or pharynx	India
Rabies	Mammals	Rabid animals like rats, bats, dogs etc	- fever - headache - general malaise As the disease progress - insomnia - anxiety, confusion - slight or partial paralysis - excitation, hallucinations -agitation - hypersalivation - difficult swallowing - hydrophobia - encephalopathy and ultimately death.	- through bite by an infected animal	- days to several years, but is typically 1 to 3 months	Rabies virus	- tests are performed on samples of saliva, serum, spinal fluid, and skin biopsies of hair follicles at the nape of the neck. Saliva can be tested by virus isolation or reverse transcription followed by polymerase chain reaction (RT-PCR)	Sri Lanka
Ross River virus	Humans	Mosquito	- flu-like symptoms - fever - chills - headache - pains in the muscles and joints	- through the bites of infected mosquito	5 to 21 days	Ross River virus	- blood test to diagnose Ross River virus infection	Australia

Exotic Communicable Disease	Host(s)	Vector(s)	Signs and Symptoms	Mode of Transmission	Incubation Period	Infectious Agent	Diagnostic Test	Endemic Countries
			- some joints can become swollen - joint stiffness may be particularly noticeable in the morning. - sometimes a rash occurs on the body, arms or legs					
Scrub Typhus	Humans	- human body louse - squirrel flea and louse	- headache - chills - fever - prostration - confusion - photophobia - vomiting - rash (generally starting on trunk)	- through the bites of mites	10 to 12 days	*Rickettsia prowazekii*	- culture; Paired serum antibodies (IF and EIA);	Australia New Zealand
Schistosomiasis	Humans, dogs, cats, pigs, cattle, water, buffalo, horses and wild rodents	N/A	- symptoms are related to the number and location of eggs in the human host. - diarrhea - abdominal pain - hepatoesplenomegaly - urinary manifestation (frequency and hematuria at the end of urination)	- Infection is acquired from water containing free swimming larvae (cercariae) that has developed in snails.	2 weeks to 1.5 months	*Shistosoma mansoni, hematobiun and japonicun*	Microscopic demonstration of eggs in the stool.	Kenya South Africa Zimbabwe
Tick-borne encephalitis	Humans	Tick	- fever - fatigue - headache - muscle pain. This may be followed by a week-long asymptomatic interval before signs of CNS involvement develop: - meningitis - encephalitis - myelitis, which can result in severe neurologic sequelae	- through the bite of an infected tick - rarely, by ingesting unpasturized dairy products primarily from infected goats, but also sheep or cows.	7 days to 2 weeks	*flavivirus*	Viral culture; Paired sera; Identify by IgM antibodies or nucleic acid in serum or CSF	England Ireland Netherlands Scotland
Trichinellosis /Trichinosis	Humans, domestic pigs	N/A	First symptoms - nausea - vomiting - fatigue	- ingestion of meat that contains infective Trichinella cysts	- abdominal symptoms can occur 1-2 days	*Trichinella*	- blood test or muscle biopsy can show if you have trichinellosis	England Netherlands Scotland

Exotic Communicable Disease	Host(s)	Vector(s)	Signs and Symptoms	Mode of Transmission	Incubation Period	Infectious Agent	Diagnostic Test	Endemic Countries
			- fever - abdominal discomfort Followed by - headaches - fever - chills - cough - eye swelling - aching joints and muscles pain - itchy skin - diarrhea - constipation In heavy infections - difficulty coordinating movements - heart and breathing problems		- further symptoms usually start 2-8 weeks			
Trypanosomiasis	Humans	tsetse fly	- fever -severe headaches - irritability - extreme fatigue - swollen lymph nodes - aching muscles and joints If infection invades the CNS - progressive confusion - personality changes - slurred speech - seizures - difficulty in walking and talking	- through the bite of a tsetse fly infected with the Trypanosoma brucei rhodesiense parasite. The tsetse fly is common only to Africa	1 to 4 weeks	*Trypanosoma brucei rhodesiense*	- blood samples, a spinal tap, and skin biopsies, especially if you have a chancre to identify parasite	Kenya South Africa Zimbabwe
West Nile fever	Humans, birds	Mosquito	Serious Symptoms - high fever - headache - neck stiffness - stupor - disorientation - coma - tremors - convulsions - muscle weakness - vision loss - numbness - paralysis Milder symptoms - fever	- spread by the bite of an infected mosquito. Transfusions, Transplants, and Mother-to-Child - in a very small number of cases, WNV also has been spread through blood transfusions, organ	3 to 14 days	West Nile Virus	- virus-specific IgM in serum or CSF can be detected in nearly all patients. The IgM persists for about one year. Use paired serum samples. [www.cdc.gov]	Canada

Exotic Communicable Disease	Host(s)	Vector(s)	Signs and Symptoms	Mode of Transmission	Incubation Period	Infectious Agent	Diagnostic Test	Endemic Countries
			- headache and body aches - nausea - vomiting - swollen lymph glands - skin rash on chest, stomach and back No symptoms in 80 % of people	transplants, breastfeeding and even during pregnancy from mother to baby.				

References:

www.cdc.gov/mmwr/preview/mmwrhtml/00025779.htm retrieved on the 18th October, 2006.

www.who.int/entity/mediacentre/factsheets/fs107/en/index.htm retrieved on the 18th October, 2006.

http://www.cdc.gov/ncidod/dbmd/diseaseinfo/coccidioidomycosis_t.htm

http://hazmap.nlm.nih.gov/cgi-bin/hazmap_generic?tbl=TblDiseases&id=263

www.cdc.gov/ncidod/dvbid/j**encephalitis**/qa.htm

http://www.gavialliance.org/Resources_Documents/immunization_forum/archives/if_nov2004_je.php

Appendix FF: Post disaster forms

Fax: (876)754-5793

Form: Shelter 1

MINISTRY OF HEALTH
DAILY SHELTER SURVEILLANCE FORM
FAX TO EMERGENCY OPERATION CENTRE (E.O.C.)

Date: ___/___/_____ Day / week number _____ Ending ___/___/_____

Parish: _____ Telephone #. of Reporting Agency: _/__/__/__/__/__/__

SITE: (specify by placing a tick (✓) beside the relevant option)
Shelter |____| Senior Citizens Homes |____| Children's Homes |____|
School |____| Geographical Area _____

Other |____| (specify)_____

Shelter/Site Name:_____

Address: _____

Population/No. of Residents/Patients _____

A. **SURVEILLANCE DATA:** (Record no. cases in line provided)

	HEALTH CONDITIONS	AGE								TOTAL
		Under 5 Yrs		Over 5 Yrs						
				5 - 19		20 – 59		60+		
		Males	Females	Males	Females	Males	Females	Males	Females	
1.	Fever with Rash									
2.	Fever *(100F or 38C)*									
3.	Gastroenteritis									
4.	Accidents									
5.	Violence *(intentional)*									
6.	Respiratory Illness									
-	*Upper*									
-	*Lower*									
7.	Asthma									
8.	Skin rashes									
9.	Conjunctivitis									
10.	Other *(specify)*									
	TOTAL									

B. ENVIRONMENTAL HEALTH CONDITIONS

1. **Water Supply:**
Available Yes |____| No |____|
Quantity_____ gallons
Water Source *(tick relevant option)* Sufficient* |____| Insufficient |____|
Public System (pipe) |____| Rain |____| Surface |____| Ground |____|
Other |____| (Specify)_____

Treatment:
Chlorinated |____| Filtered |____| Boiled |____| Other |____| (specify)_____

Comments: (issues, supply status, and areas affected)

_____

_____

* 70 gals. Per day/person (of 3 gals. of drinking water/day)

2. **Sanitary Facilities:**
No. of toilets: (WC)____ No. Damaged____
(Pit) _____ No. Damaged ____
(Other) _____
Sewage System: Status

_____
_____

Comments: (issues, supply status, and no. and location of site affected)

_____
_____

3. **Solid Waste Management:**
Solid Waste Collected/removed daily: Yes |____| No |____|
Are plastic bags or bins available: Yes |____| No |____|
Animal Carcasses Removed: Yes |____| No |____| Buried: Yes|____| No |____|
Comments: (issues, supply status, and areas affected)

_____
_____

4. **Vectors:**
Mosquitoes_____ (*specify type*): *Aedes* _____ *Anopheles* _____ *Culex* _____
Rodents_____ Flies_____ Other _____
Control Activities
(Specify):_____
_____

Comments: (issues, supply status, and areas affected)

_____
_____

5. **Food Safety**
High Risk Food Prepared (*beef, chicken, fish, shellfish, milk & milk products, mayonnaise, gravy etc*)
_____
Quantity of food condemned: _____
Food Storage: _____
Food Preparation: _____
No. Handwashing Facilities _____ Status_____

Comments: (issues, supply status, and areas affected)

_____
_____

ITEM LIST	**LIST OF INSTITUTION/SITE NEEDS**
Number of persons requiring meals	
Number of persons requiring basic medication	
Water supply Needs	
Sanitary Facilities Needs	
Plastic bags Needs	
Other (specify)	

Person Completing Form _____ (Print) for MO(H) signature:

_____

MOH comments: _____

Shelter Form:. 2

MINISTRY OF HEALTH
DAILY/WEEKLY PARISH SHELTER SUMMARY REPORT
E.O.C.

From: _____ Page ___of ____

Day/Week number:_____ (ending ____/____/_____) Date: _____/_____/_____

Surveillance Data **Disease** ← **Shelter** →

Shelter

#	Name	Patients/ Residents
Shelter 1	_____	_____
Shelter 2	_____	_____
Shelter 3	_____	_____
Shelter 4	_____	_____
Shelter 5	_____	_____
Shelter 6	_____	_____

	Shelter number					
	1	**2**	**3**	**4**	**5**	**6**
1. Fever and Rash						
<5 yrs						
≥ 5 yrs						
2. Fever						
<5 yrs						
≥ 5 yrs						
3. Gastroenteritis						
<5 yrs						
≥ 5 yrs						
4. Accidents *(Unintentional injuries)*						
< 5 yrs						
≥ 5 yrs						
5.Violence *(Intentional)*						
< 5 yrs						
≥ 5 yrs						
6. Respiratory Illness						
Upper						
< 5 yrs						
≥ 5 yrs						
Lower						
< 5 yrs						
≥ 5 yrs						
Asthma						
< 5 yrs						
≥ 5 yrs						
7. Skin Rashes						
8. Conjunctivitis						
9. Other (specify)						

NB. Insert name of shelter and assigned shelter number to the left. In the table insert at the top (first row) the assigned shelter numbers. Use additional forms if there are more than 6 shelters.

Person Completing Form _____ (Print) MO(H) signature: _____

MOH comments:

_____

_____

Fax: (876) 967-1280

MINISTRY OF HEALTH
DAILY/WEEKLY PARISH SURVEILLANCE REPORT
E.O.C.

Form: Surveillance 3

From: _____ Page ___of ____

Day/Week number:_____ (ending ____/____/_____) Date: _____/_____/_____

Surveillance Data **Disease** ← **Sites** →

SITE

Number	Name	Patients/ Residents
Site 1	_____	_____
Site 2	_____	_____
Site 3	_____	_____
Site 4	_____	_____
Site 5	_____	_____
Site 6	_____	_____

	Site Number 1	2	3	4	5	6
1. Fever and Rash						
<5 yrs						
≥ 5 yrs						
2. Fever						
<5 yrs						
≥ 5 yrs						
3. Gastroenteritis						
<5 yrs						
≥ 5 yrs						
4. Accidents *(Unintentional injuries)*						
< 5 yrs						
≥ 5 yrs						
5. Violence						
< 5 yrs						
≥ 5 yrs						
6. Respiratory Illness						
Upper						
< 5 yrs						
≥ 5 yrs						
Lower						
< 5 yrs						
≥ 5 yrs						
Asthma						
< 5 yrs						
≥ 5 yrs						
7. Skin Rashes						
8. Conjunctivitis						
9. Other (specify)						

Person Completing Form _____ (Print) for MO(H) signature:_____

MOH comments: _____

_____

Appendix GG: List of Malaria and yellow Fever endemic countries

The following list shows all countries where malaria occurs. In some of these countries, malaria is present only in certain areas or up to a particular altitude. In many countries, malaria has a seasonal pattern. These details are provided in the Country list, together with information on the predominant malaria species, status of resistance to antimalarial drugs and recommended chemoprophylactic regimen.
(* = *P. vivax* risk only)

AFRICA
Algeria*
Angola
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Central African Republic
Chad
Comoros
Congo
Congo, Democratic Republic of (former Zaire)
Côte d'Ivoire
Djibouti
Egypt
Eritrea
Ethiopia
Equatorial Guinea
Gabon
Gambia
Ghana
Guinea
Guinea-Bissau
Kenya
Liberia
Madagascar
Malawi
Mali
Mauritania
Mauritius*
Mayotte
Morocco*
Mozambique
Namibia
Niger
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Sierra Leone
Somalia
South Africa
Sudan
Swaziland
Tanzania, United Republic of
Togo
Uganda
Zambia
Zimbabwe

ASIA
Afghanistan
Armenia*
Azerbaijan*
Bangladesh
Bhutan
Cambodia
China
Georgia*
India
Indonesia
Iran, Islamic Republic of
Iraq*
Korea, Democratic People's Republic of*
Korea, Republic of*
Kyrgyzstan
Lao People's Democratic Republic
Malaysia
Myanmar
Nepal
Oman
Pakistan
Papua New Guinea
Philippines
Saudi Arabia
Solomon Islands
Sri Lanka
Syrian Arab Republic*
Tajikistan
Thailand
Timor-Leste
Turkey*
Turkmenistan*
Uzbekistan
Vanuatu
Viet Nam
Yemen

CARIBBEAN/ CENTRAL AND SOUTH AMERICA
Argentina*
Belize
Bolivia
Brazil
Colombia
Costa Rica
Dominican Republic
Ecuador
El Salvador
French Guiana
Guatemala
Guyana
Haiti
Honduras
Mexico
Nicaragua
Panama
Paraguay
Peru
Suriname
Venezuela

COUNTRIES AND TERRITORIES ENDEMIC FOR YELLOW FEVER

Countries and territories with yellow fever reported or disease in the past plus presence of vectors and animal reservoirs create a potential risk of infection and transmission

AFRICA

Angola
Benin
Burkina Faso
Burundi
Cameroon
Central African Republic
Chad
Congo
Congo, Democratic Republic of (Former Zaire)
Côte d'Ivoire
Equatorial Guinea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea-Bissau
Kenya
Liberia
Mali
Mauritania
Niger
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Sierra Leone
Somalia
Sudan
Tanzania, United
Republic of
Togo
Uganda

CARIBBEAN/ CENTRAL AND SOUTH AMERICA

Bolivia
Brazil
Colombia
Ecuador
French Guiana
Guyana
Panama
Peru
Suriname
Trinidad and Tobago
Venezuela