

## Topic 7. How to organise an epidemiological surveillance system?

### ***A hand out from the project on “Integrated management of public health programmes at district level”***

*This project was developed by incorporating ideas, suggestions and contribution from an interactive participatory process of dialogue and consultation involving public health and multidisciplinary resource network drawn primarily from mainstream institutions and the civil society network in India.*

*A draft manual evolved covering concepts and values Roles, Skills and Challenges and an Integrated Paradigm for the Public Health Management at District level. It also elaborates on, making a district diagnosis; organizing a health management information system; evolving a district plan; organizing an epidemiological surveillance system; responding to an epidemic and managing an outbreak; managing health programmes; managing human resources; organizing materials management; monitoring and evaluation; leading and building a health team; promoting, communicating and advocating for health; promoting and sustaining community partnerships; and building and sustaining partnerships with the educational sector; civil society, private sector and promoting an inter-sectoral collaboration.*



**Developed by  
Centre for Public Health and Equity, and its  
associates, for the Society for Community Health  
Awareness Research and Action, Bangalore.**

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## Preface

This document is intended to serve as an evolving conceptual **framework for district level public health managers** in the health systems of the South East Asian countries. These managers, their knowledge, skills, attitudes, and openness to new challenges and new paradigms will remain one of the key determinants of the success of countries in reaching the **“Health For All”(HFA) vision** and the **Millennium Development Goals(MDG’s)**.

This document is a practical do it yourself workbook that draws upon some of the wealth of experience and resources in the past and present and tries to help district level managers address the complexities of today’s challenging global, national and local health situation and the emergence of new challenges and reemergence of older ones.

Readers are advised not to treat this document as a comprehensive manual but as **an evolving compilation of concepts in public health management**. This conceptual framework contains suggestions to tackle some of the problems, that the district level public health managers meet in their daily life as they lead, assess, respond, evaluate and learn from numerous health systems challenges. Where possible and feasible it directs the managers to other resources and materials that will provide them additional perspective and details (*see CD accompanying the manual*)

The authors/ facilitators have extensively worked in the community and have had decades of experience in supporting capacity building for public health/ community health in the main stream and civil society linked alternatives sector. They have also tried to draw upon the experience and the field-oriented perspectives of a network of public health capacity builders and trainers from the mainstream public health institutions and civil society training centers (*see list of contributors*).

This is **a work in progress**. The conceptual framework will, we expect, evolve into a guidebook that gets used and adapted by district level public health managers, trainers and supervisors of district level public health programmes. The document is expected to continue to evolve with the feedback from users making it more relevant, responsive, context specific and focused.

We see this document as the beginning of a new journey - **a journey of strengthening district level public health management**.

Dr Ravi Narayan  
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## 7. How to organise epidemiological surveillance system?<sup>1&2</sup>

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The ability to set up optimally functioning disease surveillance system is a critical component of any district health managers responsibility. This 'surveillance section' provides the basic elements and practical approach to setting up and or managing a epidemiological surveillance systems, that will help the district manager and his team be responsive to the disease challenges- both epidemic and non epidemic and help tackling them or taking pre-emptive measures. While ideally an epidemiological surveillance system should focus on all significant health problems in a district, it is usually focussed currently on a nationally predetermined list of key epidemic diseases relevant to that country.

Epidemiology is the fundamental science in public health. Epidemiology helps to understand the natural history of diseases, root causes to promote preventive and therapeutic interventions.

Definition: Epidemiology is "the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems"<sup>3</sup>

It is used to

- describe health status of communities – person, place, period
- understand natural history of diseases
- find causes
- evaluate health service interventions.

Therefore, the principles of epidemiology are essential to understand knowledge about community health, practicing skills, attitude and public health values.

### Knowledge

- Describe and explain how community health is measured
- List strengths and weaknesses of commonly used health indicators (vital and health statistics)
- Describe epidemiological methods – observational, analytic and experimental
- List strengths and weaknesses of case control and cohort studies
- Explain the distinction between association and causation
- Describe how health surveillance works in practice
- Outline the procedures for investigation of an epidemic
- Explain the epidemiological principles of screening programmes
- Describe the uses of epidemiology in public health policy, planning and evaluation

### Skills

- Calculate specific rates and proportions of diseases - incidence, prevalence

- Interpret the data from epidemiological studies and arrive at a logical conclusion
- Distinguish valid from flawed study designs
- Calculate the sensitivity and specificity of screening tests from samples of relevant data

### **Attitudes**

- Be skeptical of, and demand evidence for, opinion statements
- Examine data sources thoroughly before using them
- Demonstrate appreciation of the balance between rights of individuals and collective needs
- Act responsibly in conducting sensitive public health functions
- Respect privacy and protect confidentiality of personal data

### **Values**

- Encourage evidence based district level decision making
- Advocate evidence based managerial/organizational and technical skills to implement health program
- Try to practice evidence based technical, managerial and organizational knowledge at all times
- Promote equity orientation at all level including in analysis of data
- Introduce social audit and concept of accountability and transparency.

## **7.1. The epidemiological approaches**

It will be immensely useful for the district manager if he /she follows the following four epidemiological approaches/steps to understand the health /diseases status of the community.

1. **The first step is the descriptive epidemiology:** It attempts to know the problem by person, place and time by asking the questions such as who is involved, where and when? And finally it wants to know the problem frequency and its distribution in the community.
2. **The second step is analytical epidemiology:** This attempts to analyse the determinants of the health problem and tries to answer the health problem by testing the hypothesis i.e **how and why the problem emerged in the community and how it is continuing?**
3. **The third step is interventional or community experimental epidemiology:** Here the community level program implementation are done to know the effectiveness of interventions and controlling disease conditions.
4. **The fourth steps is called as an evaluation epidemiology:**

Where in the effectiveness of different health services or programs are measured to answer health manager's epidemiological questions such as is there an improvement in health status after and before interventions?

Though the descriptive and analytical epidemiological approaches are useful to address the district health problems but descriptive , community intervention and evaluation epidemiology may be very useful and should be frequently used by district health manager.

### a)Key Information for epidemiology

The basic epidemiological approach to solve the wide scale health problems depends on the key information. The key health status information is needed to plan, manage and evaluate the activities and for better outcome of community health status. The key information needed may be obtained by asking key questions. Usually 6 questions are considered basic to all epidemiological enquiry. These are:

**What** is the health problem, diseases or condition, and what are its manifestations and characteristics

**Who** is affected, with reference to age, sex, social class, occupation and personal habits, attitudes

**Where** does the problem occur, in relation to place of residence? geographical distribution of problem;

**When** does it happen, in terms of days, months, seasons or years?

**How** does the health problem, disease or conditions occur and what is its association with specific conditions, agents, vectors, sources of infection, susceptible groups and other contributing factors?

**Why** does it occur, in terms of the reasons for its persistence or occurrence?

By presenting the problem as mentioned in the figure in terms of who where and when on a paper will give clear information to the district manager the clarity on the problems to have effective intervention.

### i) Measuring frequency

There are two types of frequency measures a) Incidence and b) prevalence

**Incidence:** is the number of new cases occurring in a community.

- Cumulative incidence= number of new cases during a period / the number of persons at risk in the population **at the beginning of the study.**  
Importance: To know the problem **which is becoming** and to have interventions

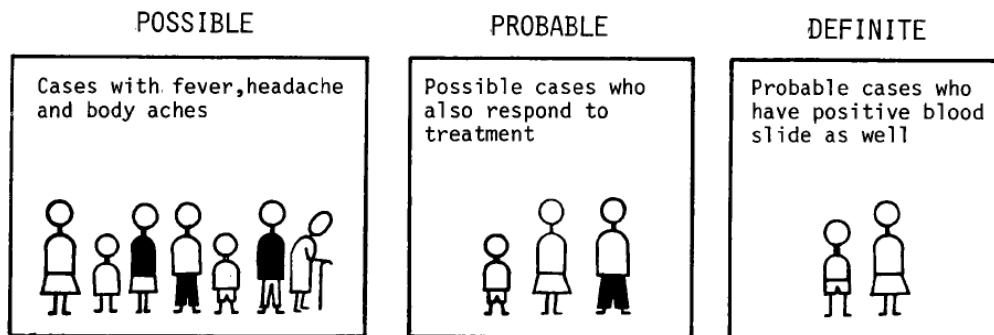
**Prevalence:** Number of old and new cases

- Point Prevalence = Number of existing cases on a specific date /Number of people in the population on this date
  - Period prevalence = Number of cases that occurred in a given period /Number of people in the population during this period
    - For example: annual prevalence rate, lifetime prevalence rate.
- Importance: To know the resources which **became a problem** to provide the health services

## ii) Making use of rates & ratios

To calculate the number of cases and expected cases  
To compare the two populations

## iii) Defining a case



Source: WHO 1989. 'Manual of epidemiology for district health management'<sup>1</sup>

The ability to set up optimally functioning disease surveillance system is a critical component of any health department that delivers the health services. Usually the district health team often struggles to find a guideline or trained manpower to function as a single investigative unit. This struggle or fragmentation of function during disease outbreak is due to blurred roles, responsibilities, and procedures. This 'disease surveillance section' provides the basic elements and practical approach to disease surveillance and how the disease occurrence cycle could be changed so that focused, long-term outcomes will be achieved by pre-emptive measures

## 7.2. What is surveillance?

Surveillance is defined as the ongoing systematic collection, collation, analysis and interpretation of data and dissemination of information to those who need to know in order that action be taken

### In an epidemiological disease surveillance system it is Important to know

- Who get the disease?
- How many get the disease?
- Where they get the disease?
- When they get the disease?
- Why they get the disease?

- What needs to be done as public health response?

### **a) Why do we need to do surveillance?**

- To recognize cases or cluster of cases to trigger intervention to prevent transmission or reduce morbidity and mortality
- To assess the public health impact of health events or determine and measure trends
- To demonstrate the need for public health intervention programme and resources during public health planning
- To monitor effectiveness of prevention and control measures and prevent outbreaks
- To identify high risk groups or geographical areas to target interventions and guide analytic studies
- To develop hypotheses that lead to analytic studies about risk factors for disease causation, propagation or progression

### **i) Key elements of a surveillance system**

All good surveillance systems are based on the following elements:

- Detection and notification of health events
- Investigation and confirmation
- Collection and consolidation of data
- Analysis and interpretation of data
- Feedback on data
- Dissemination of data
- Action including response for prevention and or control

To have an effective surveillance system, several activities to be undertaken at each level and each surveillance system has to decide what will be carried out at the district level and what will be carried out at the peripheral level and what will be the relative importance of these activities at those levels.

### **ii) Reporting units by disease surveillance**

The reporting units for disease surveillance can be divided into rural and urban and public sector and private sector.

In each country the categories of institutions in both rural and urban districts and in the private and public sectors should be clearly delineated so that the district manager can involve them in strengthening and contributing to the surveillance systems.

#### ***Analysis of the surveillance data.***

Surveillance data should be available to all levels of the health system so that each level may participate in contributing to the analysis. Health workers would identify increase of cases; medical officers in primary health centers would be able to detect outbreaks and epidemics and

seasonal trends; and district level staff would be able to do all the above as well as more advanced analysis.

**Functions of a surveillance system:**

Surveillance systems should help in identification of outbreaks and epidemics; identification of appropriate time for preemptive and control measures; identification of health system problems and regional differences within the district; identification of differences between public and private sector and finally the identification of high risk population groups for each disease under surveillance.

**Monitoring of a surveillance system:**

The district health manager can have better control over the quality of disease surveillance system if he/she monitors seven aspects of the surveillance system at the regular intervals. These include: timeliness/completeness; description by time, place and person; trends over time; threshold levels; comparison between reporting units; comparison between private and public units and comparison between providers with and without laboratory. From these different aspects the surveillance system can be monitored and further improved.

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**Further Reading**

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