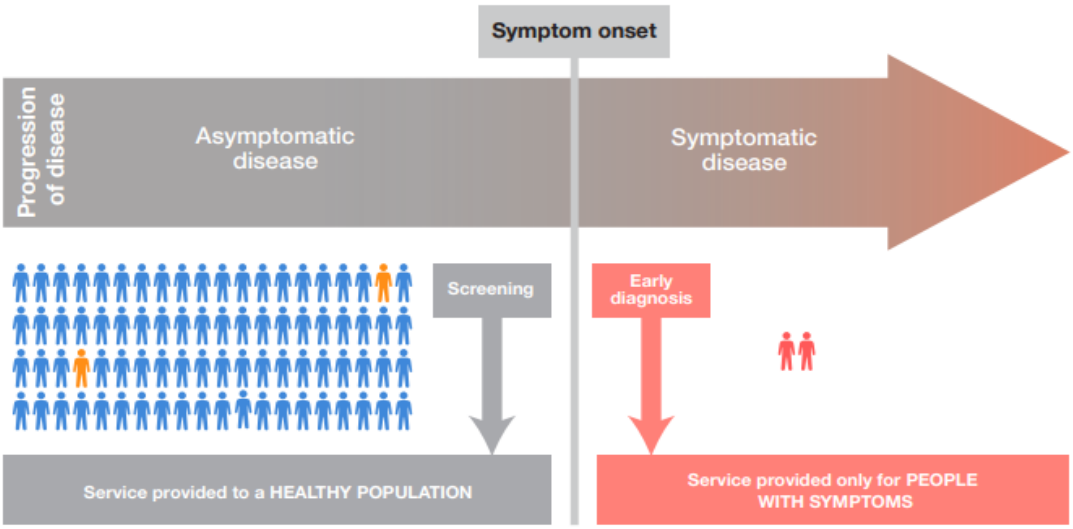
Strategies for Identifying Diseases

1- **Screening** is a rough sorting process. It operates like a sieve. separating the people who probably do have the condition from those who probably do not. A screening test is never 100% accurate; it does not provide certainty but only a probability that a person is at risk (or risk-free) from the condition of interest.

Screening is not the same as early diagnosis. Screening invites people who do not have symptoms to undergo testing, whereas early diagnosis is intended to detect conditions as early as possible among people with symptoms.



(Fig. 1) Distinguishing screening from early diagnosis

Aims of screening programs

1- Reduce mortality by early detection and early treatment of a condition Such as in breast cancer.

2- Reduce the incidence of a condition by identifying and treating its precursors; cervical cancer.

3- Reduce the severity of a condition by identifying people with the condition and offering effective treatment; like in diabetic retinopathy
4- Increase choice by identifying conditions or risk factors at an early stage in a life-course when more options are available. Such as antenatal screening.

Principles of Screening

1 .The condition should be an important health problem.

2 .There should be an accepted treatment for patients with recognized disease.

3 .Facilities for diagnosis and treatment should be available.

4 .There should be a recognizable latent or early symptomatic phase.

5 .There should be a suitable test or examination.

6 .The test should be acceptable to the population.

7 .The natural history of the condition, including development from latent to declared disease, should be adequately understood.

8 .There should be an agreed policy on whom to treat as patients.

9 .The cost of case-finding (including a diagnosis and treatment of patients diagnosed) should be economically balanced in relation to possible expenditure on medical care as a whole.

10 .Case-finding should be a continuous process and not a “once and for all” project.

Steps in a simplified screening pathway

1- Identify the population eligible for screening
2- Invitation and information
3- Testing
4- Referral of screen positives and reporting of screen-negative results
5- Diagnosis
6- Intervention, treatment and follow-up
7- Reporting of outcomes

Measuring Test Performance

This means some of the healthy people will receive an abnormal or positive test result (false positive) and some people with the condition will receive a normal or negative screening result (false negative). Measures of test performance are:

•**sensitivity:** the ability of the screening test to identify people with the condition as positive.

• **specificity:** the ability of the screening test to identify healthy people as negative.

- **Positive predictive value:** is the likelihood that the screening participant has the condition that screening targets when the test is positive.
- **Negative predictive value:** is the likelihood that the screening participant does not have the condition that screening targets (the person is healthy) when the test is negative

Test result	Has the condition (cases)	Does not have the condition (healthy)
Positive	True positive	False positive
Negative	False negative	True negative

These values can be used to calculate:

Sensitivity = $\frac{\text{true positive}}{\text{true positive + false negative}}$

Specificity = $\frac{\text{true negative}}{\text{true negative + false positive}}$

Positive predictive value = $\frac{\text{true positive}}{\text{true positive + false positive}}$

Negative predictive value = $\frac{\text{true negative}}{\text{true negative + false negative}}$

*The positive predictive value and the numbers of false positives vary according to the prevalence of the disease in each country (the sensitivity and specificity remain the same).

2- **Case finding** is the examination of an individual or group suspected of having, or at risk of, a condition. Case finding is a targeted approach to identifying conditions in a select group of patients who may or may not already have symptoms. There are two types of case finding as bellow:

passive case finding: Health workers diagnose people who present themselves to a healthcare facility.

active case finding: Health workers actively go out into the community to screen people who are at high risk of disease. These include people who have been in close or casual contact with patients (contact tracing)

3- **Surveillance:** The ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control.

Goal of Public Health Surveillance

Provide information that can be used for health action by public health personnel, government leaders, and the public to guide public health policy and programs.

Uses of Public Health Surveillance

1. Identify patients and their contacts for treatment and intervention
2. Detect epidemics, health problems, changes in health behaviors
3. Estimate magnitude and scope of health problems
4. Measure trends and characterize disease
5. Monitor changes in infectious and environmental agents
6. Assess effectiveness of programs and control measures
7. Develop hypotheses and stimulate research

Types of Public Health Surveillance

Passive Surveillance

- Diseases are reported by health care providers
- Simple and inexpensive
- Limited by incompleteness of reporting and variability of quality

Active Surveillance

- Health agencies contact
- health providers seeking reports

- Ensures more complete reporting of conditions
- Used in conjunction with specific epidemiologic investigation

Surveillance Process

1. Data Collection
2. Data Analysis
3. Data Interpretation
4. Data Dissemination
5. Link to Action