SCREENING FOR DISEA

SCREENING TEST RESULT BY DIA

Screening test results	Diagnosis	
	Diseased	**Not Diseased**
Positive	a (True positive)	b (False positive)
Negative	c (False negative)	d (True negative)
Total	a + c	b + d

a- those with positive test result, and who have the disease
b- those with positive test result, but who do not have the di
c- those with negative test results, but who have the disease
d- those with negative results who do not have the disease

EVALUATION OF A SCREENING TE

The following measures are used to evaluate a s

(a) Sensitivity = a / (a

(b) Specificity = d / (b

(c) Predictive value of a positive test = a / (a

(d) Predictive value of a negative test = d / (

(e) Percentage of false negatives = c / (

(f) Percentage of false positive = b / (

SCREENING TEST RESULT BY DIA

Screening test results	Diagnosis	
	Diseased	Not Diseased
Positive	40 (a)	20 (b)
Negative	100 (c)	9840 (d)
Total	140 (a + c)	9860 (b + d)

EVALUATION OF A SCREENING TE

(a)	Sensitivity (true positive)	= (40 / 140) x 100	=
(b)	Specificity (true negative)	= (9840 / 9860) x 100	=
(c)	False negative	= (100/140) x 100	=
(d)	False positive	= (20/9860) x 100	=
(e)	Predictive value of a positive test	= (40/60) x 100	=
(f)	Predictive value of a negative test	= (9840/9940) x 100	=

SENSITIVITY

- This term was introduced by Yarushalmy in 1940 index of diagnostic accuracy.
- **Definition:** Ability of a test to identify correctly have the disease, that is **"true positive".**
- A 90 percent sensitivity means that 90 percent o people screened by the test will give a **"true po** the remaining 10 percent will give a **"false nega**

SPECIFICITY

- **Definition:** The ability of a test to identify corre
not have a disease that is the **"true negative".**
- A 90 percent specificity means that the 90 perce
diseased persons will give a true negative result
non- diseases people screened by the test will b
classified as **"diseased"** when they are not.

Over Lapping of distribution

- **In diagnostic tests that yield a quantitative res**
  sugar and blood pressure) the situation is diffe
- There will be overlapping of the distribution of
  diseased and non diseased persons.
- False positive and false negative comprises the
- When there is distribution overlap it is not poss
  assign the individuals with these values to eithe
  diseases group on the basis of screening alone.

Diagnosis of brain tumours by E

EEG results	Brain tumour	
	Present	
Positive	36	
Negative	4	
Total	40	

(a) Sensitivity = 36 / 40 x 100 = 90%

(b) Specificity = 306,000 / 360,000 x 100 = 85

Diagnosis of brain tumours by C assisted axial tomography

CAT results	Brain tumour	
	Present	
Positive	39	
Negative	1	
Total	40	

(a) Sensitivity = 39 / 40 x 100 = 97.5%

(b) Specificity = 342,000 / 360,000 x 100 = 95

PREDICTIVE ACCURACY

- In addition to sensitivity and specificity, the per
  screening test is measured by its **"Predictive va**
  reflects the diagnostic power of the test.
- **Depends on:**

a. Sensitivity
b. Specificity
c. Disease prevalence

PREDICTIVE ACCURACY

- The "Predictive value of a positive test" indica
  probability that a patient with a positive test re
  the disease in question.
- The more prevalent a disease is in a given popul
  accurate will be the predictive value of a positi
- The predictive value of a positive results falls as
  prevalence declines.

FALSE NEGATIVES AND POSITIVE

- **FALSE NEGATIVES:** Means that patients who act
  disease are told that they do not have the disea
  them a **"false reassurance"**
- These patients with **"false negative"** test result
  development of signs and symptoms and may po
  treatment.
- A screening test which is very sensitive has few
- The lower the sensitivity, the larger will be the
  negatives.

- **FALSE POSITIVES: "False positives"** means that do not have the disease are told that they have
- In this case, normal healthy people may be subj diagnostic tests, at some inconvenience - until t disease is established.
- A screening test with a high specificity will have
- False positives not only burden the diagnostic fa also bring discredit to screening programs.

YIELD

- **Yield :** It is the amount of previously unrecogniz diagnosed as a result of the screening effort.
- **Depends on:**

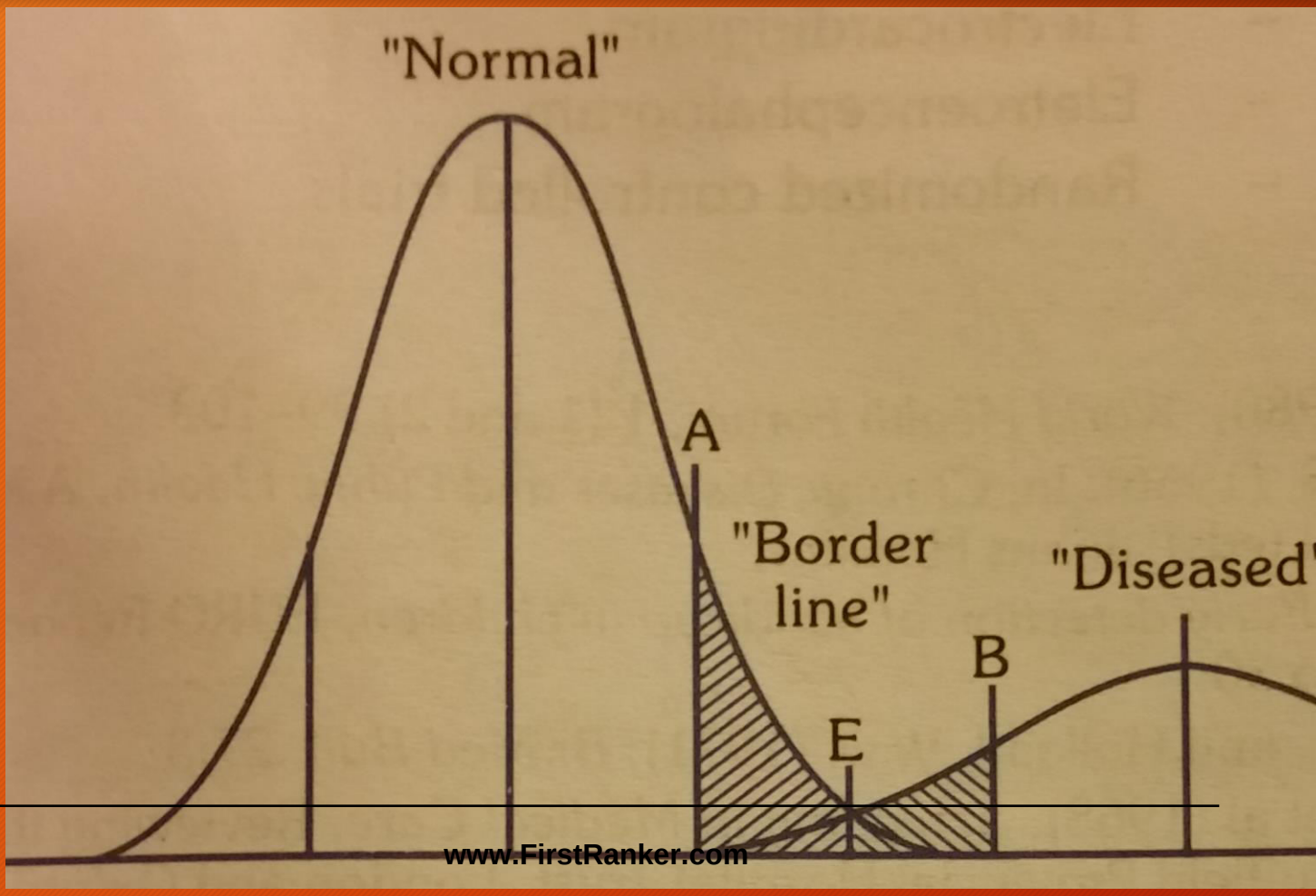
a. Sensitivity
b. Specificity
c. Prevalence of disease
d. Participation of the individual

- **Example:** By limiting a diabetes screening progr 40 years, we can increase the yield of screening
- High risk populations are usually selected for sc increasing yield.

COMBINATION OF TESTS

- Two or more tests can be combined to enhance sensitivity of screening.
- **Example: Syphilis screening** affords an example screeners are first evaluated by an RPR test.
- This test has high sensitivity, yet will yield false
- However all those positives to RPR are then sub which is a more specific test, and the resultant have syphilis.

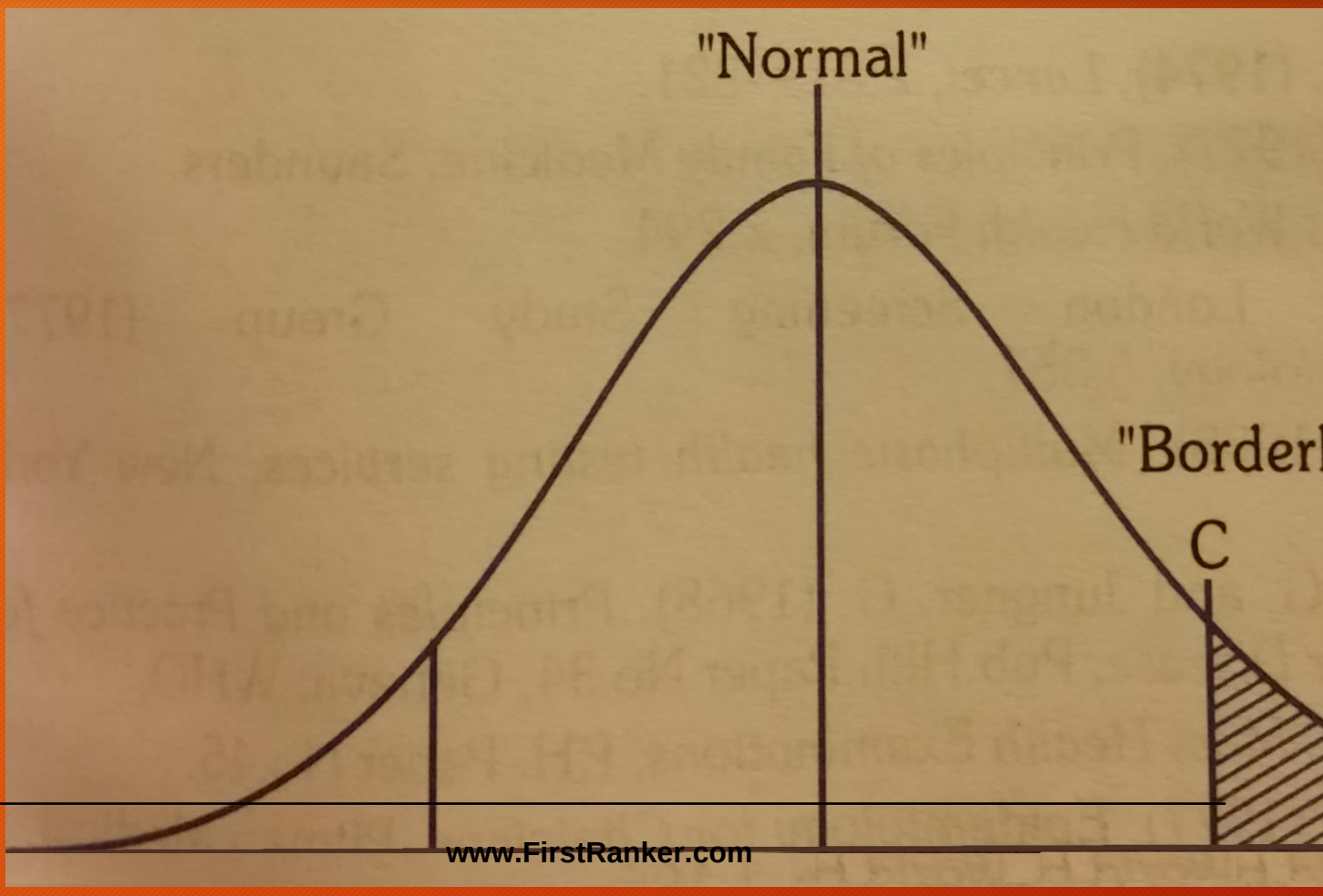
a. Bimodal Distribution in a popu



PROBLEM OF BORDERLINE

- Figure a: Is a bimodal distribution of a variable and "diseased population". Note that the two
- If the disease is bimodal, as may be expected i genetically transmitted characteristics, the sha "border-line" group will comprise a mixture of disease and persons without the disease (i.e mi positive and false negatives).
- The point at which the distribution intersect (i. frequently used as the cut-off point between th "diseased" persons, because it will generally m positives and false negatives.

b. Unimodal Distribution in a pop



- **Figure b:** Is a Unimodal distribution. Many varia
pressure, blood sugar, show this type of distribu
are continuously distributed around the mean, c
normal or skewed distribution.
- In these observations, there is no sharp dividing
"normal" and **"diseased".**
- The **"borderline"** groups,(C-D) will comprise a l
sample of persons. The question arises whether
between the **disease** and **normality** should be s

- If the **cut- off** point is set at a level of A or C, it test highly sensitive, missing few cases but yield positives.
- If the **cut-off** point is set at B or D, it will increa the test.
- Furthermore in the unimodal distribution, once has been adopted, all persons above the level (would be regarded a **"diseased".**

- **Example: Diabetes**
- If the **cut-off** point for blood glucose is lowered (say less than 120 mg per cent), the sensitivity increased at the cost of specificity.
- If the **cut-off** point is raised (say to 180 mg per sensitivity is decreased.
- In other words no blood sugar level which will e separation of all those with the disease from th disease.

PROBLEM OF BORDERLINE

- In Screening a prior decision is made about the
  the basis of which individuals are classified as "
  "diseased"
- **Factors:**

a. **Disease Prevalence:** When prevalence is high
   screening level is set at a low level which will
   sensitivity.

b. **The Disease:** If the disease is very lethal (Cer
   early detection improves prognosis, a greater
   sensitivity, even at the expense of specificity,

POINTS TO BE TAKEN IN CONSIDE

1. People who participate in the screening progra
   those who have most to gain from it. Example
2. Test with greater accuracy may be more exper
   consuming, and the choice of the test therefo
   on compromise
3. Screening should not be developed in isolation
   integrated into the existing health services.
4. The risks as well as the expected benefits mus
   the people to be screened. Risk include compl
   possibility of false positive and false negative.

SOME SCREENING TESTS

Pregnancy	Middle-aged
Anaemia	Hypertension
Hypertension Toxemia	Cancer
Rh status	Diabetes mellitus
Syphilis (VDRL Test)	Serum cholesterol
Diabetes	Obesity
Cardiovascular disease	Hypertension
Neural tube defects	
Down's syndrome	
HIV	

SOME SCREENING TESTS

Infancy

LCB	Visual defects
Congenital dislocation of hip	Hypothyroidism
Congenital heart disease	Developmental
Spina bifida	Haemoglobinop
Cerebral palsy	Sickle cell anae
Hearing defects	Undescended te

EVALUATION OF SCREENNG PRO

- **1. Randomized control Trials:** In this one group
  screening test, and a control which receives no
- **Example:** Cancers. If the disease has a low freq
  population, and a long incubation period RCT m
  following tens of thousands of people for 10-20
  perfect record keeping .

EVALUATION OF SCREENNG PRO

- **2. Uncontrolled Trials:** These are used to see if disease detected through screening appear to li diagnosis and treatment than patients who were
- **Example:** Uncontrolled study of Cervical cancer indicated that deaths from that disease could b reduced if every women was examined periodic

EVALUATION OF SCREENNG PRO

- **3.Other Methods:** Methods like Case Control stu comparison in trends between areas with differe screening coverage.
- It can be determined whether intervention by s better than the conventional method of managi

THANKS