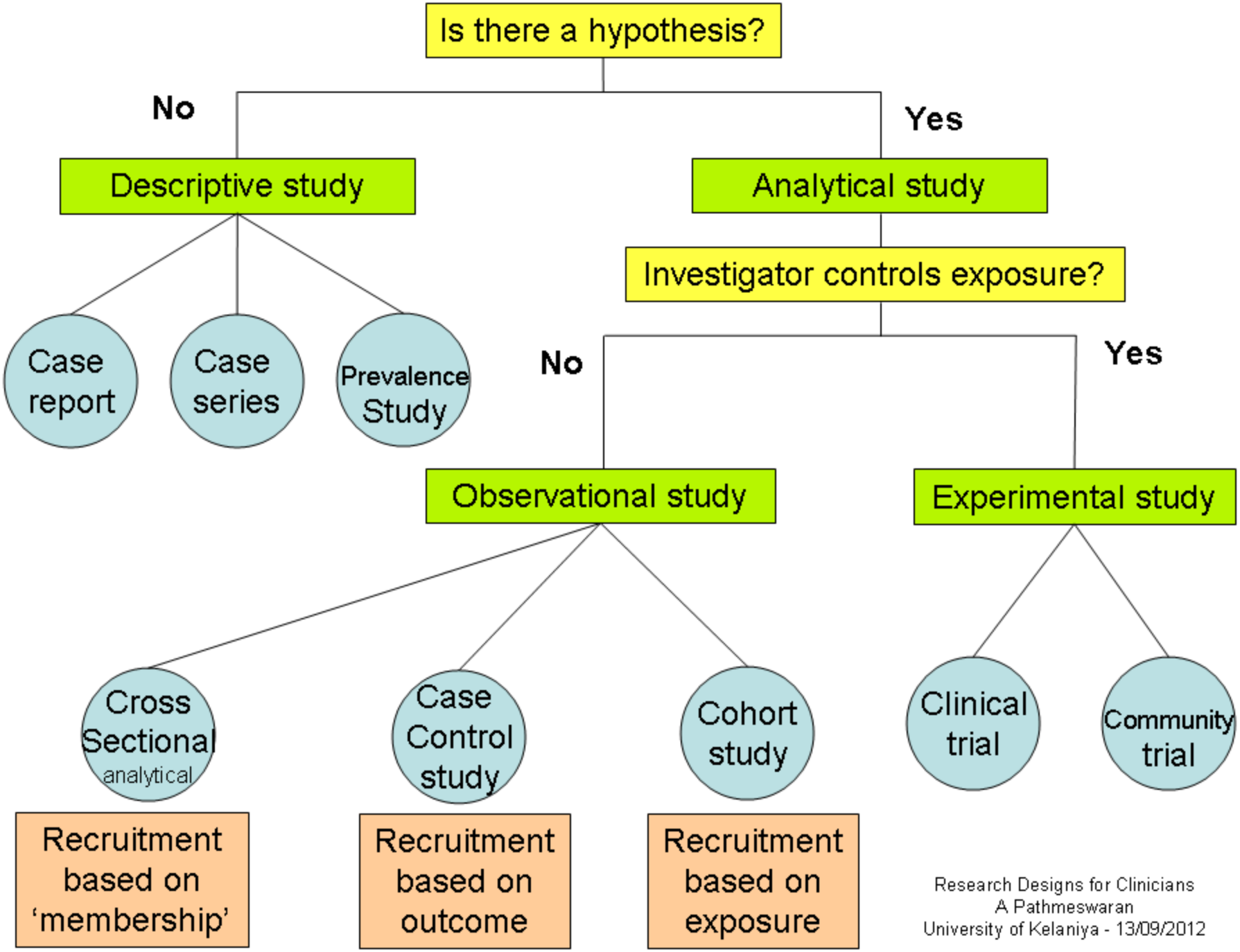
Calculation of Sample Size

- Descriptive study
  - Estimate a mean or percentage
- Analytical study
  - Demonstrate the difference between two means or percentages



Research Designs for Clinicians
A Pathmeswaran
University of Kelaniya - 13/09/2012

What information is needed?

- Depends on the objectives
  - Is it estimation (95% confidence interval) / Descriptive study
    or
    hypothesis testing (P value) / Analytic study
  - Outcome variable numeric or categorical (mean Vs proportion)

Descriptive study

- Estimate a population mean
  - An estimate of the standard deviation
  - Desired width of the 95% confidence interval
- Estimate a population proportion
  - An estimate of the proportion
  - Desired width of the 95% confidence interval

Sample size to estimate a mean

$$n = \frac{z^2(sd)}{d^2}$$

n – sample size

d – desired absolute precision (half the width of the 95% CI)

sd – standard deviation

z – 1.96 for 95% confidence interval

Sample size to estimate a proportion

$$n = \frac{z^2(pq)}{d^2}$$

n – sample size

d – desired absolute precision (half the width of the 95% CI)

p – proportion to be estimated

q – 100 – p

z – 1.96 for 95% confidence interval

1. Calculate the minimum sample size required to determine the prevalence of obesity in an MOH area.
   The expected prevalence is 30% and the investigator would like the total width of the 95%CI to be 10%.

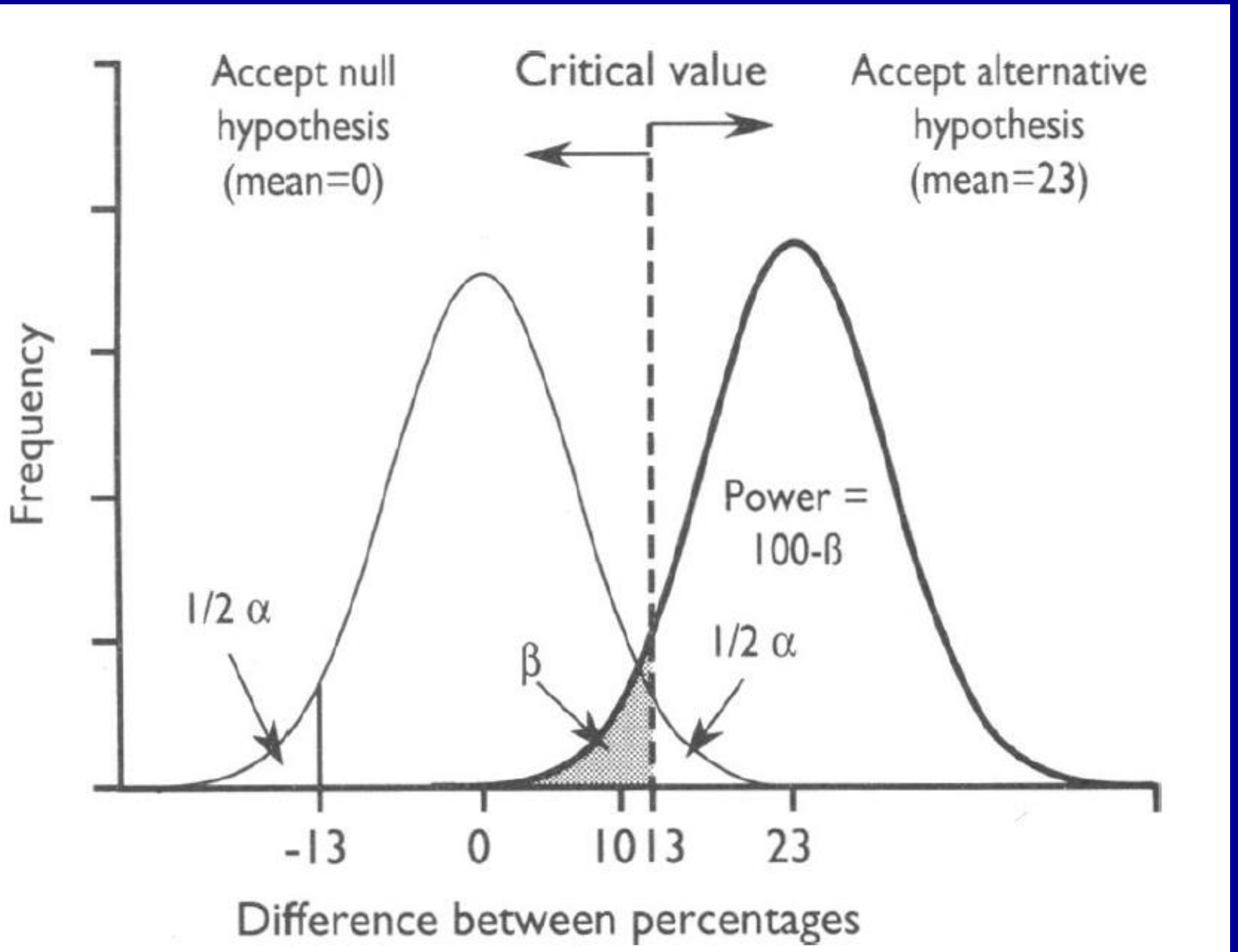
1. The study was done using the above sample size.
   What would be the 95% CI if the point estimate turns out to be -
   a. 20%
   b. 40%
   c. 50%
   d. 60%

2. What would be the effect on the 95% CI if a cluster sampling method had been used?

Analytical study

- Difference between two means
  - Estimates of the two standard deviations
  - Level of significance (usually 0.05)
  - Power (either 80% or 90%)

- Difference between two proportion
  - Estimates of the two proportions
  - Level of significance (usually 0.05)
  - Power (either 80% or 90%)


Accept null hypothesis (mean=0)
Critical value
Accept alternative hypothesis (mean=23)
Frequency
Power = 100-ß
1/2 α
β
1/2 α
-13
0
10
13
23
Difference between percentages

Sample size to estimate difference between two means

$$n = \frac{((1.96+1.28)^2(2(sd^2))}{d^2}$$

n – sample size of one group (total sample size = 2n)

sd – standard deviation in the two groups (for simplicity assumed to be equal

d – expected difference between the two means

Significance 5% (1.96); Power 80% (1.28)

Sample size to estimate difference between two proportions

$$n = \frac{((1.96+1.28)^2(p_1q_1 + p_2q_2))}{(p_1 - p_2)^2}$$

n – sample size of one group (total sample size = 2n)

p_1 & p_2 – expected proportions in the two groups

q – 100 – p

Significance 5% (1.96); Power 80% (1.28)

Calculation of Sample Size

When presenting sample size calculation-

- State the assumptions
- Give references
- Indicate the formula used
- Indicate the computer software used