

**TATA INSTITUTE OF SOCIAL SCIENCES
DEONAR, MUMBAI 400 088**

**Programme: Master of Health / Hospital Administration
Master of Public Health in Social Epidemiology
Master of Public Health in Health Policy, Economics and Finance**

Course No. and Title: SFC5 : Introduction to Epidemiology and Biostatistics

(Weightage: Exam: 60%, Epidemiology – 30% and Biostatistics – 30%)

Year: First Year Class

First Semester Examination

(2011-2013 Batch)

Date: October 11, 2011

Time: 10.30 a.m. to 12.30 p.m.

INSTRUCTIONS TO STUDENTS

a. Answer each Section on separate answer books

Section I - Epidemiology

- Q.1. Define Epidemiology. Differentiate between observational and experimental epidemiological studies. Write a brief note on case control study . (7 marks)**
- Q.2. Write a short note on (any 2) (8 marks)**
- i. Sensitivity vs. Specificity**
 - ii. Epidemic Investigation of Diarrhoea outbreak in Govandi**
 - iii. Errors during epidemiological studies**
- Q.3. A prospective cohort study was conducted to study the relation between Alcoholism and Liver cancer. From 4000 Alcoholics, only 3240 could be followed up after 20 years, out of which 158 cases had Liver cancer. In case of 2920 Non-Alcoholics who successfully completed the study, 89 were found to be having Liver cancer. Analyse the above study and calculate relevant epidemiological indices. (15 marks)**

TABLE T/2
Critical Values of Students' t

df	$\alpha = .1$.05	.02	.01	.005	.002	.001
1	6.314	12.706	31.821	63.657	127.320	318.31	636.62
2	2.920	4.303	6.965	9.925	14.089	22.327	31.598
3	2.353	3.182	4.541	5.841	7.453	10.214	12.924
4	2.132	2.776	3.747	4.604	5.598	7.173	8.610
5	2.015	2.571	3.365	4.032	4.773	5.893	6.869
6	1.943	2.447	3.143	3.707	4.317	5.208	5.959
7	1.895	2.365	2.998	3.499	4.029	4.785	5.408
8	1.860	2.306	2.896	3.355	3.833	4.501	5.041
9	1.833	2.262	2.821	3.250	3.690	4.297	4.781
10	1.812	2.228	2.764	3.169	3.581	4.144	4.587
11	1.796	2.201	2.718	3.106	3.497	4.025	4.437
12	1.782	2.179	2.681	3.055	3.428	3.930	4.318
13	1.771	2.160	2.650	3.012	3.372	3.852	4.221
14	1.761	2.145	2.624	2.977	3.326	3.787	4.140
15	1.753	2.131	2.602	2.947	3.286	3.733	4.073
16	1.746	2.120	2.583	2.921	3.252	3.686	4.015
17	1.740	2.110	2.567	2.898	3.222	3.646	3.965
18	1.734	2.101	2.552	2.878	3.197	3.610	3.922
19	1.729	2.093	2.539	2.861	3.174	3.579	3.883
20	1.725	2.086	2.528	2.845	3.153	3.552	3.850
21	1.721	2.080	2.518	2.831	3.135	3.527	3.819
22	1.717	2.074	2.508	2.819	3.119	3.505	3.792
23	1.714	2.069	2.500	2.807	3.104	3.485	3.767
24	1.711	2.064	2.492	2.797	3.091	3.467	3.745
25	1.708	2.060	2.485	2.787	3.078	3.450	3.725
26	1.706	2.056	2.479	2.779	3.067	3.435	3.707
27	1.703	2.052	2.473	2.771	3.057	3.421	3.690
28	1.701	2.048	2.467	2.763	3.047	3.408	3.674
29	1.699	2.045	2.462	2.756	3.038	3.396	3.659
30	1.697	2.042	2.457	2.750	3.030	3.385	3.646
40	1.684	2.021	2.423	2.704	2.971	3.307	3.551
60	1.671	2.000	2.390	2.660	2.915	3.232	3.460
120	1.658	1.980	2.358	2.617	2.860	3.160	3.373
∞	1.645	1.960	2.326	2.576	2.807	3.090	3.291

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Section II - Biostatistics

Instructions to students:

- i) Answer ALL Questions.
- ii) All questions carry equal weight
- iii) Scientific calculators are allowed

Q=1

- a. How do ordinal data differ from nominal data; and ratio scale differ from interval scale? What are the advantages and disadvantages of transforming continuous measurements into ordinal ones?
- b. Under what condition is use of the mean, median and mode preferred?

OR

- a. What is the need to study dispersion? Discuss any two measures of dispersion in brief with its advantages and disadvantages
- b. Define the event. When two events are said to be

- (i) Exhaustive (ii) Mutually exclusive
- (iii) Independent (iv) Equally likely

Q=2

The following data come from a study that examines the efficacy of saliva cotinine as an indicator for exposure to tobacco smoke. In one part of the study, seven subjects- none of whom were heavy smokers and all of whom had abstained from smoking for at least one week prior to the study- were each required to smoke a single cigarette. Samples of saliva were taken from all individuals 2, 12, 24, and 48 hours after smoking the cigarette. The cotinine levels at 12 hours and at 24 hours are shown below.

Subjects	Cotinine Levels (nmol/l)	
	After 12 Hours	After 24 Hours
1	73	24
2	58	27
3	67	49
4	93	59
5	33	0
6	18	11
7	147	43

Let μ_{12} represent the population mean cotinine level 12 hours after smoking the cigarette and μ_{24} the mean cotinine level 24 hours after smoking. It is believed that μ_{24} must be lower than μ_{12} .

- a. Construct a one-sided 95% confidence interval for the true difference in population means $\mu_{12} - \mu_{24}$.
- b. Test the null hypothesis that the population means are identical at $\alpha=0.05$ level of significance. What do you conclude? **[Table is given]**

Q=3

- a. Define the terms: Statistical hypothesis, critical region, type-I and type-II errors.

OR

- a. What is the value of Bayes' theorem? How is it applied in diagnostic testing?
- b. The available evidence suggests that the risk of a child being born with spina bifida is 0.56/1000 births. You are involved in reviewing the 6200 births reported in a particular city during a particular year, in order to determine the number of spina bifida cases reported. Determine the probability of no child born with spina bifida and three or more children born with spina bifida.

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