M.Sc. (Epidemiology)

Semester Course

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**DEPARTMENT OF EPIDEMIOLOGY AND BIOSTATISTICS
KAHER, BELAGAVI.**

Contents

Mission

**"To strengthen research in each and every KLE constituent units,
And
Sensitize faculty for Quality Research Culture of Internationally established
standards"**

Preamble

Biological sciences have very large variability, and it is difficult to understand completely all the parameters contributing for the event under study. In this situation applied statistics, as a science, has a great role to play for identifying the variables and their contributions in health and disease.

Statistics has been responsible for accelerating progress in all applied sciences by defining the correct methods of planning, collecting, analyzing and interpreting data for establishing cause and effect relationship.

No science can be learned or progress without continuous updates, hence collecting meaningful information, organizing information, and interpretation of the process and its outcome, is always the necessity of all applied sciences, so the applied statistics does not need introduction.

Department of Epidemiology and Biostatistics

The Department of Epidemiology and Biostatistics is aimed to help in meeting the mandatory need of teaching and research of applied statistics in various Graduate, Post Graduate, Post P.G. and Ph.D. Courses offered by KLEs J. N. Medical College, Belagavi, KLEs V.K. Institute of Dental Science, Belagavi, KLEs College of Pharmacy, Bangalore, KLEs College of Pharmacy, Belagavi, KLEs College of Pharmacy, Hubli, KLEs Institute of Physiotherapy, Belagavi, KLEs Institute of Nursing, Belagavi, and KLEs BMK Ayurveda College of Belagavi.

Department of Epidemiology and Biostatistics has been offering the following courses from academic year 2014:

- ✓ B. Sc. Biostatistics & Population Sciences (3 Years) – 12th Standard (Pre-University) with Statistics or Mathematics, Biology alongwith Mathematics are also eligible.

- ✓ M.Sc. in Biostatistics (2 Years) – Three years graduate degree with statistics or mathematics,
- ✓ M.Sc. in Epidemiology (2 Years) – Three years graduate degree with Statistics or Mathematics, Health, Medical and Allied Subjects.
- ✓ M. Sc. in Population Studies (2 Years) - Three years graduate degree in any subject with Statistics/ Mathematics or graduates in Health Science subjects including Nursing and Pharmacy.
- ✓ Ph.D. in Biostatistics – Candidates with Post Graduation in Statistics or Mathematics from a recognised University.

Other Courses
- ✓ Certificate Course in Biostatistics (Regular 6 months/Distance 1 year through correspondence with contact teaching modules or online) – designed to meet the research need of Research Scholars and faculty.
- ✓ P.G. Diploma in Biostatistics (Regular 1 year /Distance 2 years through correspondence with contact teaching modules or online) – Medical and Allied subject graduates interested to pursue research career, with at list one paper in Statistics at Graduation level or Certificate in Biostatistics from any University.
- ✓ Intensive Course in Biostatistics & Research Methodology (Regular 4 Weeks/Part Time 6 Weeks through correspondence with contact teaching modules or online) – This is a skill enhancement course, and can be attended by any graduate desirous to develop research aptitude.

Its faculty with necessary knowledge and skills to deal with statistical analyses in applied research, and to train in quantitative analysis, along with risk managerial skills in their field of interest is well equipped. Substantial facilities are available for higher education.

M.Sc. (Epidemiology)

The syllabus of the M.Sc. (Epidemiology) course, besides compulsory background courses and courses of general interest, includes a variety of subjects in the field of Epidemiology and Biostatistics - theoretical and applied - as subjects of interest in Public Health, Medicine, Hospital Management, Pharmacy, Physiotherapy, Statistical Softwares

and Demography. The M.Sc. (Epidemiology) course will provide trained manpower, for the sectors needing epidemiologically churning of data for decision making.

What will they learn

Students will gain specialized knowledge and skills required to teach the subject matter, and design, monitor and manage research in medical and allied fields. They will also implement and manage National Health Policy and Programs including advocacy. Management of the research projects funded and unfunded will also be part of syllabus.

Careers in health and medicine's teaching, research and services

Internationally and nationally the demand for trained Epidemiologists far exceeds the availability. Furthermore, the course adds value to medical practice, healthcare and research.

Eligibility for M.Sc. (Epidemiology)

Graduates with Medical and Allied Health Disciplines, including Statistics/ Biostatistics from any recognized University from Karnataka or other university with minimum 50 percent marks alongwith at least 1 year working experience in Medical Facilities are eligible.

Total Intake – 21

Selection Procedure

To maintain high academic standards, the selection of students will be by:

- Written examination, and
- Personal interview

Assessment and teaching schedule

The course will include theory classes followed by practical assignments comprised of four semesters of two years duration. The practical assignments will be evaluated for the Internal Assessment marks. Average marks obtained in practical assignments, and an examination as replica of final examination before final examination in each semester will be the Internal Assessment marks.

Students will have to complete dissertation by using hospital/ National Health Survey data. This will give them necessary exposure to understand the real data generation and data management issues.

Final year students will also be part of consultancy teams for data analysis; cleaning, analysis and interpretation of thesis data of Research Scholars.

Attendance

Students are expected to have 80% of total attendance in theory and practical's. However, students will be expected to cover missed theory and practical classes, giving extra time after discussing with the concerned teacher.

Medium of instruction: English

Course Fees: As per University norms

Duration of course - Two years of four semesters

Examination pattern

Theory				
Type of questions	**No. of questions**	**Questions to be answered**	**Marks per question**	**Total marks**
Long Essay	03	02	20	2x 20=40
Short answer	07	05	08	5 x 08=40
Sub Total: 13 papers of 80 marks each (13 x 80=1040)				1040
Theory's Internal assessment (13 x 20=260)				260
Practical, Research project/ Dissertation				
Details/ Semester	1st	2nd	3rd	4th	Total
Practical	50	50	50	50	320
Viva-Voce	30	30	30	30	
Internal/ assessment	20	20	20	20	80
Project/ Dissertation					
Details	**Synopsis**	**Data quality**	**Analysis/ interpretation**	**Defense**	**Total**
Report	**25**	**60**	**65**	**50**	**200**
G. Total					**1900**

One External Examiner and one Internal will form the practical examination team.

Internal Assessment

For internal assessment 35% marks are essential to appear for University examinations.

Assessment:

- Minimum 50% overall, 50% marks in theory, Research Project and practical, and 35% in Internal Assessment, together shall qualify to pass the M.Sc. in Epidemiology.

Results:

Student scoring less than 50% of the total marks in an individual subject, has to reappear for the same subject in subsequent examination conducted by the university. Clearing half of the papers is mandatory for eligibility of admission in subsequent semester, alongwith clearing the backlog.

- Class shall be awarded asper University rules

  Grade   Percent marks

  A   75% and above

  B   60% and above but less than 75%

  C   50% and above but less than 60 %

Syllabus and scheme of examination

First Year - Semester 1

1.1 Basic Epidemiology I	(60L + 20T)

Health and Disease Concept (2L), Aims and Approach of Epidemiology (13L+2P), Rates and Ratios (5L+6P), Measurement of Morbidity and Mortality (15L+8P), Methods of Generalization of Epidemiological measurements (20L+4P), Concepts of Experimental Epidemiological (5L).

1.2 Epidemiology II: Epidemiology of Communicable and Non communicable	
	(48L+32P)

Basic concepts of Communicable Diseases in terms of Host (5L+2P), Environment and Agent with focus on control and prevention (13L), including investigation and management of outbreak of diseases (5L), their indicators and evaluation (5L+10P).
Epidemiology of locally prevalent diseases (5L)

Viral diseases
Dengue, Japanese Encephalitis(JE) (5L+2P)

Chronic diseases
Tuberculosis (1L+1P), Leprosy (1L+2P), HIV (5L+3P),
Cardiovascular (1L+2P), Diabetes and Hypertension (2L+10P).
(Their methods of measurement and evaluation)

1.3 Basic Biostatistics	(48L + 32P)

Types of Data
Concepts of a Statistical Population and sample from a population, Qualitative and Quantitative data, Nominal and Ordinal data, discrete and Continuous Data
Different types of scales - nominal, ordinal, ratio and interval (3L).

Collection and Scrutiny of Data
Primary data - designing a questionnaire and a Schedule, checking their consistency (2L).
Secondary data - its major sources including some Government publications (2L), Scrutiny of data for internal consistency and detection of errors of recording (1L+1P).

Presentation of Data
Construction of tables with one or more factors of classification (2L).
Diagrammatic/ Graphical Representation of data.
Frequency Distributions, Cumulative Frequency Distributions and their Graphical Representation, Histogram, Frequency Polygon and Ogives. Stem and leaf chart. Box plot (10L+7P).

Analysis of Quantitative Data
Univariate data-Concepts of Central Tendency, Location(4L+8P),
Dispersion and Relative Dispersion, Skewness and Kurtosis, and their measures including those based on Quantiles and Moments (8L+10P).

Analysis of Categorical Data
Consistency of Categorical Data. Independence and association of attributes. Various measures of association for two – three way classified data. (4L+4T).

Probability concepts and Probability Distributions, Normal, Binomial, Poisson and Geometrical. Sample Size for different Designs (12L+2P).

1.4 Biostatistics II – Inferential	(48L + 32P)

Concepts of sampling vs. population (2L),
Simple random (6L+5P),
Stratified (7P+6P),
Cluster (6L+4P),
Systematic (2L+2T),
Multistage (2L+1T), Inverse (1L+1T),
Non-Probability (quota, purposive) Sampling Techniques (2L+1T),
Including methods of point and Interval Estimations for these Techniques (20L+12T).

Methods in Statistical Inference
Sampling from a distribution (2L), Definition of a random sample - simulating random sample from Standard Distributions (5L+4P),
Concept of Derived Distributions of a function of Random Variables (2L+2P). Concept of a Statistic and its Sampling Distribution (2L+2P),
Point estimate of a parameter(1L),
Concept of bias and Standard Error of an estimate (1L).
Standard Errors of Sample Mean (1L),
Sample Proportion (1L), Sampling Distribution of sum of Binomial (1L),
Poisson (1L) and Mean of Normal Distributions (2L).
Independence of sample mean and variance in random sampling from a Normal Distribution (without derivation) (1L). Statistical Tests and Interval Estimation (2L+1P), Null and Alternative Hypotheses (1L), Types of Errors, p-values (2L+2P), Statement of Chi-square (2L+2P), t test (1L+1P), and F statistics (2L+2P). Testing for the mean and variance of Univariate Normal distribution (1L+1P), testing of equality of two means (2L+1P) and testing of equality of two variances of two univariate normal distributions and related confidence intervals (2L+2P). Testing for the significance of sample correlation coefficient in sampling from bivariate Normal distribution (1L+1P), equality of means and equality of variances in sampling from Bivariate Normal distributions (2L).

Large sample tests
Use of Central Limit Theorem for testing and interval estimation of a single mean and a single proportion and difference of two means and two proportions (4L+4P),
Fisher's Z transformation and its uses (1L+1P). Pearson's chi-square test for goodness of fit and for homogeneity for standard distributions (4L+4P). Contingency table and test of independence in contingency table (2L+2P).

Analytical Mathematics
References
1. Apostol,T.M. (1985): Mathematical Analysis, Narosa Publishing House.
2. Burkill, J. C. (1980): A First Course in Mathematical Analysis, Vikas Publishing House.
3. Deshpande, J. V. (1981): Text Book of Mathematical Analysis, Tata McGraw Hill.
4. Goldberg, R. R. (1970): Methods of Real Analysis, Oxford and IBH
5. Khuri, A. I. (1983): Advanced Calculus with Applications in Statistics, Wiley.
6. Searle, S. R. (1982): Matrix Algebra Useful for Statistics, Wiley,
7. Shanti Narayan, (1998): Matrix Algebra, S. Chand & Co.

Basic Statistics
References

1. Bhat B.R, Srivenkatramana T and Rao Madhava K.S.(1996): Statistics: A Beginner's Text, Vol. I, New Age International (P) Ltd.
2. Croxton F.E, Cowden D.J and Kelin S (1973): Applied General Statistics, Prentice Hall of India.
3. Goon A.M., Gupta M.K., Das Gupta.B. (1991): Fundamentals of Statistics, Vol.I, World Press, Calcutta.

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1. Anderson T.W and Sclove S.L (1978) An Introduction to the Statistical Analysis of Data, Houghton Miffin\Co.
2. Cooke, Cramer and Clarke (): Basic Statistical Computing, Chapman and Hall.
3. Mood A.M, Graybill F.A and Boes D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill.
4. Snedecor G.W and Cochran W. G. (1967): Statistical Methods. Iowa State University Press.
5. Spiegel, M. R. (1967): Theory & Problems of Statistics, Schaum's Publishing Series.

Suggested readings

1. P.S.S. Sunder Rao, J. Richard, Introduction to Biostatistics and Research Methods, Prentice-Hall of India Private Limited, 2006.
2. Armitage, P., Statistical Methods in Medical Research, London, Blackwell Scientific Publications, 1989.
3. Hill, A.B., Principles of Medical Statistics, London, Edward Arnold, 1981.
4. Reid, Norma, G., Research Methods and Statistics in Health Care, London, Adward Anrold, 1987.
5. Omran, A.R. The Clark-Omran System of research design in epidemiology. Raleigh, NC: University of North Carolina, 1972.
6. Pauli, H.G. Training in research methodology: (Advisory Committee on Medical Research, 25th Session, Geneva, 10-13 October 1983). Geneva: World Health Organization, 1983.
7. Health Research Methodology, A Guide for Training in Research Methods, World Health Organization, Oxford University Press, 1993.
8. Armitage, P., Statistical Methods in Medical Research, London, Blackwell Scientific Publications, 1989.
9. Altman, D.G., Practical Statistics for Medical Research, London, Chapman and Hall, 1992.
10. Indrayan A, Basic Methods of Medical Research, Third Edition, AITBS Publishers, J-5/6 Krishna Nagar, Delhi – 110051, India.

Probability Theory

1. Bhat B.R, Srivenkatramana T and Rao Madhava K.S. (1997): Statistics: A Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Edward P.J., Ford J.S.and Lin (1974): Probability for Statistical Decision-Making, Prentice Hall.
3. Goon A.M., Gupta M.K., Das Gupta.B. (1999): Fundamentals of Statistics, Vol.II, World Press, Calcutta.

4. Mood A.M, Graybill F.A and Boes D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill.

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1. Cooke, Cramer and Clarke (): Basic Statistical Computing, Chapman and Hall.
2. David S (1996): Elementary Probability, Oxford Press.
3. Hoel P.G (1971): Introduction to Mathematical Statistics, Asia Publishing House.
4. Freund J.E (2001): Mathematical Statistics, Prentice Hall of India.
5. Goon A.M., Gupta M.K., Das Gupta.B. (1991): Fundamentals of Statistics, Vol.I, World Press, Calcutta.
6. Hodges J.L and Lehman E.L (1964): Basic Concepts of Probability and Statistics, Holden Day.
7. Mood A.M, Graybill F.A and Boes D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill.

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1. Bhat B.R. Srivenkatramana T and Rao Madhava K.S. (1997): Statistics: A Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Rohatgi V.K (1967): An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor G.W and Cochran W. G. (1967): Statistical Methods. Iowa State University Press.

Sampling
1. Cochran W.G and Cox G.M (1957): Experimental Designs, John Wiley and Sons.
2. Das M.N and Giri (1986): Design and Analysis of Experiments, Springer Verlag
3. Murthy M.N(1967): Sampling Theory and Methods, Statistical Publishing Society, Calcutta.
4. Sampath S. (2000): Sampling Theory and Methods, Narosa Publishing House.
5. Sukhatme B.V(1984) : Sample Survey methods and Its Applications, Indian Society of Agricultural Statistics.
6. Des Raj (2000) : Sample Survey Theory, Narosa Publishing House.
7. Goon A.M.,Gupta M.K.,Das Gupta.B. (1986): Fundamentals of Statistics, Vol.II, World Press, Calcutta.
8. Kempthorne O. (1965): The Design and Analysis of Experiments, Wiley Eastern.

Semester – 2

2.1 Epidemiology Analytical - III	(48L + 32P)

Application of Basic Principles and Methods (as covered in previous Semester) in the design and conduct of Epidemiologic studies (10L + 10P).

Ecological/Geographical Studies
Uses and Interpretation of Ecological Studies, Advantages and Disadvantages of Ecological Investigation, Ecological Fallacy and Ecological Bias (5L + 2P)
Cross-sectional, Case Series Studies, Case Control Studies, Retrospective, Prospective (Longitudinal), Nested Study Designs (20L + 10P)
Cohort Studies (Retrospective and Prospective) (5L+5P)

Intervention Studies and RCTs
Characteristics, Confounding and bias, Randomization
Migrant studies: Design Strategies (8L + 5P)

2.2 Biostatistics III - Multivariate Analysis	(48L + 32P)

Regression Analysis
Bivariate Data (1L), Scatter Diagram (1L+1P), Product Moment Correlation Coefficient and its Properties (2L+1P). Coefficient of Determination (1L). Concepts of Error in Regression (1L).
Principle of Least Squares (1L). Fitting of Linear Regression and Related Results (3L+2P).
Fitting of Curves Reducible to Polynomials by Transformation (2L+2P),
Rank Correlation — Spearman's and Kendall's Measures (2L+1P),
Multivariate data, Multiple regression (6L+4P),
Multiple Correlation and Partial correlation in three variables, their measures and related results (2L+2P).
Logistic Regression (3L+3P),
Survival Analysis (4L+2P),
Path Analysis (2L+2P), Multicollinearity and Discriminant Analysis (2L+2P),
Factor Analysis with its uses, including their utility in Health and Disease (3L+2P).

Demography-I	(48L + 32P)

Population Censuses World and India (6L),
Concepts of Population Evolution (2L),
Population Change (13L+10P),
Population Structure including their stability and its measures (12L+10P),
Methods in Population Projections and its utility in health and Human Resource Management (15L+12P).
Concept and Measures of Fertility

Demography-II – Geriatrics, Sociology/ Psychology/ Anthropology	(48L + 32P)

Concept and Measures of Mortality (8L+4P),
Life tables (5L+5P),
Urbanization (4L+4P),
Migration (4L+4P),
Education (3L+3P)(including their utility in health),
Population Genetics (20L)

Multivariate

1. Draper, N.R., and Smith, H., Applied Regression Analysis, New York, John Wiley & Sons, 1981.
2. Hand, D.J., and Taylor,C.C., Multivariate Analysis of Variance and Repeated Measures, London, Chapman and Hall, 1987.
3. Maxwell, A.E., Multivariate Analysis in Behavioural Research, London, Chapman and Hall, 1977.
4. McCullagh, P., and Nelder, T.A., Generalized Linear Models, London, Chapman and Hall, 1990.
5. Cochran, W.G., and Cox, G.M. Experimental Designs, Bombay; Asia Publishing House, 1962.

Demography

1. Murdock S.R., Ellis D.R., Applied Demography : An Introduction for Basic Concepts Methods and Data, Bouldev, Co., West View Press,1991.
2. United Nations Manual X, Indirect Techniques of Demography Estimation, New York, United Nations Population Division,1983.
3. Keyfitz N, Applied Mathematical Demography, Second Edition, New York, Springer Verlag, 1985.
4. Brass W, The Relational Gompertz Model of Fertility by Age of Women. World Fertility Survey Data, London, World frtility Survey, 1980.
5. Bongaarts J, Population Policy Options in the Developing World, New York, Population Council, Research Division Working Paper No. 59, 1994.
6. Bongaarts J, Bulatao RA, Completing the Population Transition, New York, Population Council, Research Division Working Paper No. 125, 1999.
7. Singh S.N., M.K.Premi, P.S.Bhatia , Ashish Bose Population transition in India Vol.1 & 2, B.R. Publishing Corporation, Division of D.K Publishers. Distributors (P) Ltd , Delhi 110007,1989.
8. Henry S Shryock, Jacob S Siegel & Associates, The Methods & Material of Demography, U.S. Bureau of the Census, U.S. Government Printing Office, Washington D.C. - Vol I & II, 1980.

Second Year - Semester – 3

3.1 Epidemiology IV – Clinical/ Applied/ EBD	(48L + 32P)
Clinical Epidemiology including Utility Hospital Based Studies (15L+10P), Epidemiological Measures used in Clinical Epidemiology; (10L+10P) Clinical Trials and Experimental Designs (13L+10P) Concepts of EBM and converting Epidemiological Studies in to EBM Tools (10L+2P)	
3.2 Hospital Statistics – ICD Concept/ Health Informatics	**(48L + 32P)**
Medical Records Management and its Statistical Measures: Indoor and Outdoor admissions Statistics (6L+4P), Bed Occupancy, Average Stay, Bed Turnover Rate (10L+10P), Including Generating Evidence Based Medicine using service data (10L+5P). International Classification of Diseases: Concepts, Certification of birth and death, Generation of reports (20L+12P), Notifiable diseases (2L+1P).	
3.3 Research Methodology	**(48L + 32P)**
Concepts and Definitions (5L), Formulation of Objectives (4L+4P), Study Designs and basic Analytical Methods for their Analysis (7L+5P), Relevant Sampling Techniques (5L+4P), Importance of Sampling size, Feasibility, Drawing Conclusions (6L+5P), Critical Appraisal of Published Articles (8L+4P), Methods of Data Collection (5L+4P), Questionnaire Development and Pre-Testing of Questionnaire (4L+4P), Internal & External Validity of Questions (4L+2P).	
3.4 Dissertation	
Writing synopsis, Seminars to finalize Synopses, Preparation of Questionnaire, Pre-testing and Finalizing of Questionnaire, Data Collection	

Epidemiology

1. Siegel, S., Non-Parametric Statistics for Behavioural Sciences, New York, McGraw-Hill,1988
2. Park K., Test Book of Preventive and Social Medicine, Edition 21, 2011.
3. Lilienfed, A.M. and D. Lilienfed, Foundation of epidemiology, 2nd Edition, New York, Oxford Publications, 1979.
4. D.J.Finney (1978): Statistical Methods in Biological Assays, Charles Griffics & Co.
5. A.P. Gore and S.A. Paranjpe (2000) : A Course in Mathematical & Statistical Ecology,
6. Kluwer. Z.Govindarajulu (2000): Statistical Techniques in Bioassay, 2nd Edition, S.Karger.
7. D.W.Hosmer & S.Lemeshaw (1989): Applied Logistic Regression Wiley.
8. R.C.Elandt Johnson (1975) : Probability Models & Statistical Methods in Genetics
9. Wiley. C.C.Li (1976): First Course in Population Genetics, Boxwood Press.
10. E.C.Pielou (1977): An Introduction to Mathematical Ecology, John Wiley.

Semester – 4

4.1 SPSS/ EXCEL/EPI info	(48L + 32P)

Introduction to Computers, Hardware, Softwares (2L),
EPI info

Working with Software Packages
MS-Excel (2L+1P),
SPSS (2L+1P),
Classification (4L+2P),
Tabulation and Frequency Tables (2L+1P).
Bar Graphs, DOT Diagram and Histogram, Stem-and-Leaf Plots, Box Plots (6L+4P).
Summary Statistics Two-way tables and plots (4L+1P).
Product Moment Correlation Coefficient, Rank Correlation Coefficient (2L+1P).
Curve fitting by Method of Least Squares: Exponential and Polynomial (4L+3P).
Regression Analysis(4L+4P),
Correlation ratios, multiple and partial correlation coefficients (4L+2P). Regression equations (6L+4P).
Rank and Inverse of a Matrix Solution of set of Linear Equations (2L+2P).
Fitting of Binomial, Poisson, Negative Binomial, Normal and Gamma Distributions (6L+6P).

4.2 Epidemiology V	(48L + 32P)

Applied Nutrition
Nutritional Deficiency Disorders their Control and Prevention in Community
Nutritional Assessment and its Analysis (20L+16P)
MCH with indicators, Analysis and Determinants (15L+10P)

Geriatrics
Health Profile Registry, Social Economic implications and management of Geriatric Population (6L+6P)
Population Policy, Health Policy including their utility in Health (5 L),
Human Resource Management(2L),

4.3 Dissertation

Analysis, writing, submission and publication

Books recommended for Epidemiology:

1. Maxy Roseman John M. Last. Maxcy-Roseman Public Health and Preventive Medicine, Appleton-Century-Crofit, Newyork
2. Hobson W., The Theory and Practice of Public Health, Oxford Med. Publication
3. Barker D.J.P. Practical Epidemiology, Churchill Livingstone.
4. Park J. E. & K. Park. Text book of P. & S.M. M/S Banarsidasm Bhanot.
5. Mahajan B.K. and M. C. Gupta, Text book of P & S. M. Jaypee Publications.
6. Sir Austin Bradford Hill, Principles of Medical Statistics, the Lancet Ltd. No.7 Adam Street, Adelphine, London, 1967.
7. John J. Hanlon, Public Health Administration and Practice, MOSBY.
8. Mac. Mohan & Pugh Epidemiology Principles and Methods, Little Brown & Co. Boston. U.S.A.

9. Robert S. Goodheart Maulice E.Shills, Modern Nurtitionin Health, K. M. Varghes & Co.
10. Mawner & Kramer, Epid: An Introductory Text, 1985 W.B. Sanuders Co.,
11. Hunters Diseases of Occupations: Edited by P.A.B. Raffle, P.H. Adams, P. J. Baxter and W. R. Lee Edward Arnold Publishers (1994), Great Britain.
12. Committee reports and policy documents- Medical Education and Health Policy;
13. Bhore Committee Report (1946) Health Survey and Development Committee, Govt. of   India, Delhi.
14. Mudaliar Committee Report (1961) Health Survey and Planning Committee, Govt. of India, Delhi.
15. Shrivastav Report (1974). Health Services and Medical Education-A Programme for immediate action, Group on Medical Education and Support Manpower, Ministry of Health and Family Welfare, Govt. of India. New Delhi.
16. ICSSR/ICMR (1981).Health for All- An alternative strategy- Report of a Joint study group of ICSSR/ICMR. Indian Institute of Education, Pune.
17. National Health Policy, (1982) Ministry of Health and Family Welfare, Govt. of India, New Delhi.
18. Compendium of Recommendation of various committees on health and Development (1943)-1975).Central Bureau of Health Intelligence (1985) Directorate General of Health Services, Ministry of Health and Family Planning, New Delhi.
19. Bajaj, J. S. etal (1990) Draft National Education Policy for Health Sciences, I.J.M.E., Vol.29, No.1 &2(Jan-August 1990)

Additional Reading

1. Indian Council of Medical Research, "Policy Statement of Ethical considerations involved in Research on Human Subjects", 1982, ICMR New Delhi.
2. Code of Medical Ethics framed under section 33 of the Indian Medical Council Act.1956. Medical Council of India, Kotla Road, New Delhi.
3. Francis C.M. Medical Ethics, J. P. Publication, Bangalore, 1993.
4. Indian National Science Academy, Guidelines for care and use of animals in Scientific Research, New Delhi, 1994.
5. Internal National Committee of Medical Journal Editors, Uniform requirements for manuscripts submitted to biomedical journal , N Eng. J. Med 1991: 424-8.
6. Kirkwood B. R., Essentials of Medical Statistics, 1st Ed Oxford: Blackwell Scientific Publications 1988.
7. Mahajan B.K. Methods in Bio statistics for medical students, 5th Ed. New Delhi.
   Jaypee, Brothers Medical Publishers, 1989.