

Course title: Applied Quantitative Data Analysis in Development Practice				
Course code: MPD 146		No. of credits: 3	L-T-P: 20-12-22	Learning hours: 45
Pre-requisite course code and title (if any):				
<ul style="list-style-type: none"> • MPD102- Group Practicum - from where students carry their own data sets collected from the field. • MPD115- Quantitative Approaches & Methods for Development Practice 				
Department: Department of Policy & Management Studies				
Course coordinator(s): Dr Chandan Kumar			Course instructor(s): Dr Chandan Kumar	
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Course type: Elective			Course offered in: 3 rd Semester	
Course description				
<p>The basic premise of this course lies in developing a set of skills among students for quantitative data analysis for programme and policy design. MA-SDP students collect an enormous amount of data while undertaking the course MPD 102, which is designed for a community needs assessment. While some of these data are analysed by the students using basic descriptive statistical methods, hands-on experience in developing a dataset based on the information collected from the community and analysing them using inferential statistical methods help students complete an entire process of an independent study. This training can also be useful in applying such techniques on large-scale datasets such as National Family Health Survey (NFHS), National Sample Survey (NSS), Longitudinal Ageing Study in India (LASI), India Human Development Survey (IHDS), etc. which are already collected by different agencies, and which is widely used in development planning.</p>				
Learning objectives:				
<ul style="list-style-type: none"> • To provide students with a practical overview of survey data processing, exploration, and analyses • To enable students to conduct advanced statistical analysis on large-scale survey data using statistical software. • To enable students independently conceptualize a study satisfying a development inquiry, analyze the respective research questions using available secondary data, interpret and document the findings. 				
Course content				
Module	Topic	L	T	P
1.	Introduction This module will hone on illustrations of quantitative data analyses and their ability to facilitate decision-making in development practice. Discussions will also be made on the select large-scale survey data available to use for satisfying development-oriented inquiries in the Indian context.	4		
2.	Data Processing and Exploration Data processing starts with selecting a data collection strategy and ends when data transformations are complete. This module will provide an overview of the survey data processing and data exploration along with the practical exercises using the data of group surveys conducted by the students in the 2 nd semester. The tutorial will cover the following aspects: <ul style="list-style-type: none"> • Creating or Importing data files using statistical software (e.g., STATA, R) • Transforming data into variables useful for analysis • Translating the data across formats • Modifying data files (collapse, merge, append and reshape) • Describing the data – summarizing and tabulating the variables with descriptive statistics • Presenting data with graphs 	8	2	8

	<ul style="list-style-type: none"> • Formatting the output tables (publication quality tables) 			
3.	<p>Conceptualization and Data Analyses</p> <p>This module will focus on the process and nuances of conceptualizing an analytical framework for a research study. In addition, discussions will be made on analytical procedures, estimation of sample statistics, statistical tests and model-building using survey data. This module will cover the following topics:</p> <ul style="list-style-type: none"> • Research Hypothesis and Analytical Framework • Tests for One-way and Two-way tables (Tests for Goodness of fit, Independence, and Homogeneity) • Types of Multivariate Models (ANOVA-type, regression-type, ANCOVA-type) • Factor Analysis • Logit and Linear models for proportions • Model Building • Adjustment of survey-design 	8	4	
4.	<p>Analysis of Small-Scale Sample Surveys</p> <p>Application of statistical tools and techniques for small sample size datasets: Group Practicum based survey data will be considered as a practice dataset to learn structuring and developing a database, and apply methods of descriptive statistical analysis such as sample distribution, mean, standard deviations, standard error and confidence interval, tests for mean/proportion, correlation etc.</p> <p>In the practical session, students will be required to apply the knowledge gained in the previous modules to structure the data and address problems in the data set, if any. Students will be given exposure to common errors in data processing and analysis, specific to their survey data collected from the field. They will be required to undertake exercises related to both data structuring and data cleaning.</p>		2	4
5.	<p>Analysis of Large-Scale Surveys for Development Inquiries</p> <p>Students will explore and analyze the Large-scale survey data based on well-defined study objective(s) linked to development and sustainability issues including education, health, water and sanitation, gender, socioeconomic and regional differences in development indicators etc.</p> <p>The tutorial session will focus on understanding salient aspects of large-scale surveys (NFHS, NSS, LASI, IHDS): sampling, stratifications, unit of analysis, and the concept of data hierarchy. This will also include analysis of large-scale surveys: bi-variate and multi-variate associations, regression (linear and logit regression) models applicable to the specific study.</p> <p>Students will be required to carry out an analysis of the data set complete in all respect using appropriate software. Different elements of analysis will be clearly delineated and documented in the form of a small research study based on secondary data.</p>	2	4	10
		22	12	22

Evaluation criteria:

Course grades will be based on the following criteria:

- **Minor-1:** Written (along with Computer Practical) Test (20%)
- **Minor-2:** Presentation of Analysis based on Group-Practicum Data (20%)
- **Major:** Term paper submission (50%) and presentation (10%)

Details: A term paper will be submitted by the students. This will be based on a select topic focusing on specific development issues using large-scale survey data analysis. The term paper will have a word limit of 3000-4000 words. The guideline on the structure and content of the term paper is given below:

- (1) Introduction: background and rationale of the study, existing research gaps.
- (2) Methodology: conceptual framework, source of data, measures, hypothesis (if any), statistical analysis.
- (3) Results: sample distribution, bivariate and multivariate results.
- (4) Discussion: relevance of study findings in the context of existing knowledge, policy implications, strength and limitations of the study and future scope.

Learning outcomes

Upon completion of this course, students would be able to:

1. create datasets using raw data collected during the primary survey in the community and analyze them with a well-defined objective.
2. use appropriate statistical techniques/methods based on the nature of data: Application of appropriate statistical techniques will be assessed based on the evaluation of the brief report (based on Community Need Assessment Data) where students will be asked to apply suitable statistical techniques based on the nature of variables and sample size.
3. use large scale survey data in exploring different development inquiries ranging from problem identification to programme and policy design. The term paper will be based on current development challenges and how large-scale nationally representative surveys can be used to generate evidence and evaluate policies (Test 4).

Pedagogical approach

Interactive pedagogical style to maximize the learning opportunity through hands-on experience. Use of statistical package (STATA, R) for data processing and analysis.

Suggested readings**Module 1:**

- International Institute for Population Sciences (IIPS) and ICF (2017). *National Family Health Survey (NFHS-4), 2015-16: India*. Mumbai: IIPS. <http://rchiips.org/nfhs/NFHS-4Reports/India.pdf>
- Ministry of Statistics and Programme Implementation, Government of India. *National Sample Survey*. <http://www.mospi.gov.in/national-sample-survey-office-nsso>
- National Council of Applied Economic Research and the University of Maryland (2017). *India Human Development Survey (IHDS), 2005*. doi:10.3886/ICPSR22626.v11. <https://ihds.umd.edu/>
- Lehtonen R, Pahkinen E (2004). *Practical Methods for Design and Analysis of Complex Surveys*. West Sussex, England: John Wiley & Sons Ltd.

Module 2:

- Acock AC (2014). *A Gentle Introduction to Stata, 4th Edition*. Texas: Stata Press.
- Minot N (2009). *Using Stata for Survey Data Analysis*. <http://www.ifpri.org/publication/using-stata-survey-data-analysis>
- StataCorp. (2017). *Stata: Release 15*. Statistical Software. College Station, TX: StataCorp

<https://www.stata.com/manuals/r.pdf>

Module 3:

- Jarman KH (2013). *The Art of Data Analysis*. Hoboken, New Jersey: John Wiley & Sons, Inc.
 - Daniels L, Minot N (2019). *An Introduction to Statistics and Data Analysis Using Stata: From Research Design to Final Report*. California: SAGE Publication, Inc.
 - Hamilton LC (2013). *Statistics with STATA: Updated for 12th Version*. Eighth Edition. Boston: Brooks/Cole, Cengage Learning.
 - Baum CF (2006). *An Introduction to Modern Econometrics Using Stata*. Texas: StataCorp LP.
- Cameron AC, Trivedi PK (2009). *Microeconometrics Using Stata*. Texas: StataCorp LP.

Student's responsibilities

Attendance: At-least 75% attendance will be required.

Practical Exercises:

- As part of Module 4, group exercises will be carried out in which students will use their group survey data and will be assigned to prepare and present a brief report using quantitative data analysis.
- The practical exercises in Module 5 will include the data analysis by each student, specifically conceptualised to develop his/her term paper as outlined in the course content and evaluation criteria.

Course reviewers

1. Dr. Manoj Alagarajan, Department of Development Studies, International Institute for Population Sciences (IIPS), Mumbai.
2. Dr. Lucky Singh, Scientist-D, National Institute of Medical Statistics (NIMS), New Delhi.

Additional Information

This Course outline was prepared by Dr Chandan Kumar and approved in the 55th Academic Council Meeting on 10th August 2023 at TERI School of Advanced Studies, New Delhi.