A Handbook for Postgraduate students of Community Medicine

Book · August 2017

CITATIONS
0

READS
77

1 author:

Pavan Pandey
Jhpiego
17 PUBLICATIONS **3** CITATIONS
SEE PROFILE

BIOSTATISTICS

PUBLIC HEALTH

Research

A Handbook for Postgraduate Students of Community Medicine

Sampling

Epidemiology

Grants

DR PAVAN PANDEY

VERSION 1.0

ETHICS

SCIENTIFIC WRITING

Be the

Change

that you wish to see in the world:

M K Gandhi

Contents

INTRODUCTION: WHY I WROTE THIS HANDBOOK

It has been only been two years since I completed my post-graduation but I believe that during these two years I got much better exposure about the working of the Indian health system than during three years of post-graduation. Although I got several opportunities to work in different research projects during my post-graduation, though systematic exposure to the working of Indian health system, however, was insufficient. During the past five years, I (along with many more students and teachers) noted that teaching of community medicine is not uniform across India. In addition, it is my firm belief that the teaching of community medicine in current form is not as per the needs of Indian health system. Although a curriculum and guidelines exist for post-graduation in community medicine; they are not followed uniformly everywhere and in my view, the present curriculum is outdated and in no way prepare a community medicine PG to the overcome the challenges faced by Indian health system.

Currently, at most places, stress is given on acquiring theoretical knowledge, seminar/journal club presentation, publication of papers, and undergraduate teaching. All these are an essential part of post-graduation but not the end in itself. More crucial is the application of

theoretical knowledge in the field to solve the real world health problem(s) and learning from such experiences. It would be wrong to blame teachers alone for the present scenario because I believe there is a lack of interest and knowledge about community medicine from student side as well. All this and more gave me the inspiration to write this handbook so that coming generations of community physician are better prepared to serve Indian health system. I do not claim that this handbook is complete or perfect but this will certainly guide you to utilise your time as a post-graduate student in a better way. I expect some of you reading this handbook to contact me to share your experience, views, and suggestions to make this handbook better and more useful to students. This is the first draft of the handbook and some topics are yet to be finalised while some are incomplete; which of course can wait but your time is precious thus I decided to share with you the topics which I believe are as of now complete.

With Best Wishes

Dr Pavan Pandey

POLITE REQUEST: If you want to contribute towards improving this handbook then please email your thought and suggestions to

dnameispaone@gmail.com

1. Welcome! सु स्वागतम!

Congratulations on opting community medicine as your post-graduate speciality. All the members of Indian Association of Preventive and Social Medicine (IAPSM) fraternity are pleased to have you with us. I hope that each and every member of community medicine fraternity will try their best to make your post-graduation a memorable experience and will facilitate your transformation into a proficient community physician. There can be all but only two reasons for choosing community medicine: first and more common is that you did not get the branch of your choice and so you decided to settle for community medicine. Second and a less common reason is that you are actually interested or I may say in love with (just like me) community medicine and you have decided to dedicate your life to it. In either case, embrace that you are here and try to make the most of your time while you are here. I hope that this post-graduation will be a stepping stone for your bright career and will inspire you to make individuals, families, communities, and our country a bit healthier than they already are.

In the world there are three types of doctors – the *first type are those "who diagnose & treat, the second type are those 'who diagnose*

& treat & counsel for prevention' and ***there is a rare third type 'Who diagnose & treat & counsel for prevention & advocate for policy changes at local community level, district, state & national level for promotion of health'. A proficient community physician would be categorised as the third type*** (from personal communication with Dr Rajesh, PGI Chandigarh). So as a community physician you are expected to *treat* illness, *educate* the patients on preventing complications/recurrence and simultaneously work on a *research* project(s) to generate scientific evidence so as to *advocate* for *policy* change(s) in order to minimise the impact of diseases at the population level. This handbook intends to orient you about the world of community medicine and how you should prepare yourself for the journey in the world of community medicine.

Technically speaking, everything which affects human health directly or indirectly comes under the pursuits of community medicine whether it is the food we eat, place we defecate, air we breathe, place where we live, work or receive treatment. This makes community medicine an extremely broad field; community medicine borrows concepts and principles from various scientific disciplines way beyond medical sciences such as statistics, social science, communication, management etc. to

improve the health of the population. This is because community medicine is not limited to the hospitals rather it involves working with the people in the community where they live and interact with their surroundings. Like any other post-graduation course, an MD in community medicine is an intensive course. It is because other than treating illness you have to devise a strategy for their prevention and it is will be your responsibility to see that how these strategies are performing in the real world. But before anyone can help you to become a proficient community physician you have to help yourself, I advise that you should commit yourself to self-study, be proactive, always be open to new ideas and never hesitate to questions what you don't understand. During the coming three years, you should grab all the opportunities which present itself, whether it's a conference, a lecture, a health camp, an ASHA meetings, Polio vaccination session, a focal outbreak or a village health and nutrition day meeting. Try to spend your evening hours in the wards (specifically medicine, paediatrics, obstetrics, & gynaecology) of the hospital attached to your medical colleges as this will help you improve clinical skills and will also provide you with the unique opportunity to practice clinical epidemiology. In the coming three years, you are expected to expand your knowledge base, acquire transferable skills

and develop insight into the working of Indian health system by working on academic activities, research projects, and your dissertation.

As a community medicine student, **your job is not to memorise every single data** out there, but your job is to generate and utilise data to improve the health of masses. So it will be my advice to you that do not bother yourself with numbers and data because it is in their nature to change. Instead, keep a notebook and write in it all the latest number you come across with their source and whenever anyone bothers you with data open your notebook and politely tell them the data they are interested in. In your day to day life actively observe the health-related behaviour of both healthy and sick individuals and use your knowledge to educate them to improve their health-related behaviour.

Everyone values their personal development, but I recommend all students of a particular college to work and study as a team to learn from each other's insight, experience, knowledge and working style. Community medicine requires an array of skills, ranging from biostatistics to epidemiology to sociology to anthropology. Not everyone can excel in all these areas, but through collective efforts, everyone can help

each other in overcoming their weaknesses. I wish each and every one of you the very best for your all future endeavours!!!

Dr Pavan Pandey

And welcome again!!!

----------*****----------

2. GOALS AND OBJECTIVES OF POST-GRADUATION IN COMMUNITY MEDICINE

Goal: The overall goal of post-graduation in community medicine is to acquire knowledge, skills and competencies to assess the health needs of the population; devise strategy, policies and program to fulfil these needs.

Specific expected objectives:

1. Provide leadership and serve as a resource person to communities for identification, assessment, and addressing current and emerging public health problem(s). Demonstrate competency to formulate specific strategies and program based on sound scientific evidence for promoting health and controlling health problems identified through such assessment.

2. Comprehend and demonstrate the ability to synthesise valid scientific evidence(s) to advance existing knowledge related to the issues affecting the health of masses and individual patients.

3. Comprehend and demonstrate the understanding of principles involved in health need assessment.

4. To acquire knowledge and understanding of the fundamental concepts and methods of epidemiology and their application in improving the health of masses.

5. To acquire the ability to formulate an epidemiological intervention on the basis of evidence (when available), to appropriately respond to a public health problem.

6. To acquire a basic understanding of biostatistical concepts and methods so as to undertake an independent research project/study.

7. Comprehend and demonstrate the clinical skills to treat common illness under the pursuits of primary health care.

8. To acquire sound understanding about working of Indian health system.

9. To acquire competency in designing and organising an effective health education campaign directed at public health problems.

10. Comprehend and demonstrate a good understanding of the socio-cultural, political and ethical issues surrounding any public health problem.

11. Comprehend and demonstrate a sound understanding of the principle, theories, methods, and interventions used in health promotion.

----------*****----------

3. EPIDEMIOLOGY

The distinct entity of community medicine is '*epidemiology*'. There are several definitions of epidemiology but most widely used is "Epidemiology is the study of the distribution and determinants of health-related events in specified populations, and the application of this knowledge to improve the health of the masses. Rather than looking at an individual patient Epidemiology concern itself with the whole or part of the population. A much broader definition of epidemiology is: "It is the **study (scientific, systematic, data-driven)** of the **distribution** (**frequency, pattern**) and **determinants** (**causes, risk factors**) of health-related states and events (not just diseases) in **specified populations** and the **application** of (since Epidemiology is a sub-discipline within community medicine) this study to the **control of health problems**" . There are six core functions of epidemiology: **public health surveillance, field investigation of health events, conducting epidemiological studies, health care evaluation, intersectoral linkage and health policy development.**

In order to become a competent community physician, you have to first become a proficient epidemiologist. Epidemiology teaches us

how to use valid scientific methods (epidemiological study) for addressing and analysing health-related problems in a community. Following are the minimum expectations from a community physician in terms of Epidemiology:

I. Ability to use the knowledge and tools of epidemiology to assess and solve health-related problems of a given population.
II. Evaluate epidemiological studies conducted earlier, including critical appraisal of the research question, study design, methods, statistical analyses, results and their interpretation.
III. Ability to formulate a research question with appropriate research objective based upon literature review; thereafter design and conducts an epidemiological study to answer the research questions.
IV. To select appropriate study designs, sampling strategies, measurement methods, questionnaire development and strategy for data collection & analysis for specific research aims.
V. Competency to teach the basic principle of epidemiology to undergraduate and non-medical personnel.
VI. Theoretical competency to plan and conduct a health intervention trial.

VII. Competency to report and appraise the epidemiological studies within the frameworks of recommended reporting guidelines (STROBE, CONSORT, STARD, PRISMA etc).

It is recommended that student makes themselves familiar with the basics of epidemiological study design before the end of the first year so that they can decide what kind of study design they want to adopt for their thesis. Along with skills for field epidemiology, you must make yourself familiar with the concepts of clinical epidemiology. This will increase your competency in identifying public health problems existing in the hospitals as well as in the community; thus broadening your scope for conceiving critical research questions. Along with learning the theoretical concepts of epidemiology I strongly advise you to practice epidemiology at every chance you get. The hospital attached to your medical college generates a tremendous amount of data (related to morbidity and mortality) for a large number of diseases. As a group exercise, you can use the hospital data to calculate different types of epidemiological measure of disease burden (rates, ratio, proportion, incidence and prevalence) for your institute. This will give you practical exposure in using secondary data for statistical analysis. You can even design a dashboard of indicators for monthly reporting by various

departments for discussion. In addition, you can practice on the HMIS monthly progress report generated for different blocks and for the whole districts. This can help you in identifying seasonal trends in the incidence and prevalence of different health related events. There are several other organisations/personnel which generates a tremendous amount of health-related data on monthly basis e.g. ICDS, ANM, ASHA, and other health worker cadre which is of public health importance, you can innovate to use their data to improve your understanding of epidemiology.

Suggestive reading list for epidemiology:

I. *Principle of epidemiology in public health practices*; CDC, USA (freely available online).

II. **Rothman KJ.** *Epidemiology: an introduction.*

III. **Rothman KJ, Greenland S.** *Modern Epidemiology*. Lippincott, Williams & Wilkins

IV. **Ashchengrau and Seage.** *Essentials of Epidemiology and Public Health* –– Jones and Bartlett

V. **MacMahon B, Trichopolous D.** *Epidemiology, principles and methods*. (2nd Edition) Little Brown and Co. 1996

VI. **Porta M, Last JM.** *A Dictionary of Epidemiology*. Oxford University Press.

VII. **Rose G.** *The Strategy of Preventive Medicine*. Oxford University Press

VIII. **Sackett DL, Haynes RB, Guyatt G**. *Clinical Epidemiology: a basic science for clinical medicine*. Lippincott, Williams & Wilkins.

IX. **Szklo M, Nieto FJ.** *Epidemiology: Beyond the Basics*. Jones & Bartlett.

X. **Michael Gregg.** *Field Epidemiology*

----------*****----------

4. MEDICAL-BIOSTATISTICS

If *epidemiology* is the "engine" of community medicine then *biostatistics* is the "fuel" on which the community medicine runs. Application of statistical principle in the field of medical science comes under the domain of biostatistics. Many of your colleagues from other departments will definitely approach you for calculation of sample size for their thesis or they will consult you about which statistical test is most appropriate for their data set. Make sure that you do not disappoint them and yourself. Following are the minimum competencies expected from you regarding biostatistics:

I. Ability to apply principles of biostatistics in epidemiological research design.
II. Ability to calculate sample size for different types of epidemiological study designs.
III. Ability to analyse the data at hand and use appropriate statistical test(s) to obtain results.
IV. Ability to interpret, summarise, and communicate results of any epidemiological studies to the common man, colleagues, professional

audiences and policy makers, in the context of public health principles.

V. Ability to operate at least one statistical software packages for data entry, management and analysis.

VI. Ability to utilise the secondary data for conducting statistical analyses, obtaining results and drawing a conclusion.

Some student might hate mathematics, but I would like to make it clear that medical biostatics is not all about mathematics; rather it is about obtaining and utilising data to draw a valid conclusion for improving the health of the population. Medical biostatics is all about data; what is the best method to obtain data (survey methodology), what is the best method to analyse data, how to obtain valid results from available data, how to interpret results and determine implications of results at hand. In my view, without understanding the basics of biostatics it would be difficult (if not impossible) for you to become a fine community physician.

Like in any other fields of arts and science, the popular belief that 'practice makes you perfect' holds true for biostatistics; the more you practice the more quickly you will learn. Whenever you come across any bio-statistical jargon like multivariate, regression, ANOVA, t-test, sample size and most commonly p-value etc. then don't just skip these

terms for a later occasion, instead try to learn about these terms one at a time. A practical way to learn biostatistics and its role in the research is to follow the sequence of step in any scientific research from its inception (review of literature) to its completion (results & discussion) and understand what competency is required in terms of biostatistics that might is expected at each stage. All these books are good and you need not buy/read each one of them. Just pick any books from those mentioned below.

1. **Rosner, Bernard**. *Fundamentals of Biostatistics*
2. **WW Daniel.** *Biostatistics: Basic Concepts and Methodology for the Health Sciences.*
3. **Abhay Indrayan.** *Medical Biostatistics:* Chapman & Hall/CRC Biostatistics Series
4. **Betty R. Kirkwood, Jonathan A.C. Sterne.** *Essential of Medical Statistics*
5. **Blastland M, Dilnot A**. *The tiger that isn't*-Seeing through a world of numbers.
6. **Statistics Toolkit** by Rafael Perera, Carl Heneghan and Douglas Badenoch ----------*****----------

5. COMPUTER PROFICIENCY

I strongly advocate that a community medicine PG should be competent in operating a computer, specifically Microsoft Office package i.e., Microsoft Word, PowerPoint, and Excel. It would be better if you can join a local computer teaching class or all PGs of a department hire a professional to teach Microsoft Office package in the computer lab of your department itself. It is essential to learn how to operate a computer efficiently because there are numerous features/applications in the Microsoft Office which are vital in today's world, which of course you will eventually learn but you will waste precious time in the process. It is also advocated that you should buy a personal laptop if you already do not have one, as it will give you more time to practice Microsoft Office and various statistical packages, in addition, it will provide a portable place to store your data, books, videos, and presentations. All of this is recommended because you cannot survive in the world of community medicine if you are not able to operate computer efficiently.

In addition to Microsoft Office, a PG of community medicine should able to operate the statistical software. Statistical software is an application by the means of which you can analyse your

statistical data for obtaining meaningful results. In order to become proficient community physicians, you should able to operate at least one of many statistical packages available. SPSS is the most commonly used software but it is not available for free, some other packages such as Epi-info and R- statistical package can be downloaded from the internet free of charge. The Internet is filled will videos, instruction manuals, online courses and mock data sets for learning these packages. I recommended that none of you should be dependent on others to learn these statistical packages; you should take care of your own learning and be your own master. After making yourself familiar with the basics of these packages you must learn the advanced features of these software. Many institutes (CMC, Vellore in particular) provide onsite training in these statistical packages, surf the internet to get more information. I will recommend that you should learn to operate one such software before the start of your thesis. I will also recommend that in addition to analysing your own data, you should also analyse the data from the thesis of your colleagues from other departments as this will give you more hands-on practices in operating statistical packages.

----------*****----------

6. RESEARCH METHODOLOGY

In the world of science, fact/hypothesis are proved or discarded on the basis of results obtained through valid scientific experiments and conduction of such scientific research comes under the domain of research methodology. It is defined as the science of studying how research is done scientifically in order to generate evidence that is valid and reproducible using approved methods. Before you are able to undertake your thesis or write even a research protocol you should know how to properly conduct research and what the different steps/components of scientific research are. Acquiring the knowledge about steps involved in conducting a research is thus the very first step towards becoming a competent researcher and a community physician. Thus I advise you that research methodology should be one of the first things which you should learn during the first year of PG. You can learn more about research methodology through workshops conducted by many institutes. In addition, many courses are available online. Once you acquire basic knowledge and skills related to research methodology you should support PGs of other departments in writing their research protocol, this will give you hands-on experience in designing and writing research protocol.

Suggestive reading:

1. **Ranjit Kumar** 4th edition. Research Methodology; *A step by step guide for beginners.*
2. **C R Kothari;** *Research Methodology*
3. **Bowling A. (2009)** *Research methods in health: investigating health and health services.* Maidenhead: Open University Press.
4. **Bowling A, Ebrahim S, eds. (2005)** *Handbook of health research methods: investigation, measurement and analysis.* Maidenhead: Open University Press.
5. **Hulley SB, Cummings SR, Browner WS, Grady DG, Newman TB.** *Designing Clinical Research: An Epidemiologic Approach*
6. **J. H. Abramson, Z. H. Abramson.** *Research Methods in Community Medicine: Surveys, Epidemiological Research, Programme Evaluation, Clinical Trials, Sixth Edition*
7. **Richard H. Morrow and Peter G. Smith:** *Field Trials of Health Interventions: A Toolbox*
8. **Colin Robson, Kieran McCartan;** *Real World Research, 4th Edition*
9. **Abhaya Indrayan**; *Basic Methods of Medical Research*

----------*****----------

7. PROPOSAL/PROTOCOL WRITING

After conceiving the idea what you want to research you need to draw a plan of action for conducting your research. A research proposal/protocol is a blueprint of the research to be conducted detailing the manner/methodology in which the research would be undertaken. For every research project, you will ever undertake in your life you will have to write and submit a research proposal/protocol first. This proposal will be scrutinised by ethical committee members and grant bodies before granting you the permission/fund to undertake the research. Thus you must master the skills needed to write research proposal before the end of the first year of post-graduation or if possible earlier. Many universities have a pre-designed format for submitting a research proposal, find out about any such format recommended by your institute/university. Many researchers publish their research protocol in the journal as scientific articles. Do go through the websites of the prestigious journal for retrieving protocols in order to review such published protocol. Medical education unit of Delhi University has drafted a template for writing research protocol search on the internet to download a sample.

Suggestive reading:

1. Beverly A Browning; *Grant writing for dummies*
2. Otto O Young. *Guide to effective grant writing: How to write a successful NIH grant applications*
3. E Karsh, A S Fox. *The only grant writing book you'll ever need*
4. The National Science Foundation (NSF): online guidelines for scientific research proposal writing, which can be accessed here: http://www.nsf.gov
5. Purdue online writing lab. Introduction to grant writing *https://owl.english.purdue.edu/owl/resource/981/1/*
6. *https://grants.nih.gov/grants/how-to-apply-application-guide/format-and-write/write-your-application.htm*

----------*****----------

8. ETHICS

Ethics or **moral philosophy** is a branch of philosophy that involves systematising, defending, and recommending concepts of right and wrong conduct (from Wikipedia.org/ethics). Every sphere of human action/intention needs some kind of external regulation for its proper conduct. Following this lead, research and investigation into the cause of disease or health behaviour need some kind of regulation which safe guards the rights of all those (humans & animals) involved in research. This aspect falls under the domain of 'ethics' or more specifically 'public health ethics'. Those who are involved in research related to any aspect of human's health are responsible for the protection of participants' rights, safety, and welfare, and for scientific integrity. This becomes crucial in countries like India, as a developing nation many of those who participate in the research are not always aware of their every right as a research participant. Each investigator is held responsible for the local laws and ethical standards that apply to their role in a research project. Every investigator who collects data through direct or indirect contact with individuals is responsible in their individual capacities to protect the rights of those participating in the research. A very simple

example is that many of you or your friends/colleague would carelessly post a picture or other details related to patient/participant on the social media without their permission. This is a violation of the patient's privacy and ethical rights. Before you share any information related to patient/participant it is your duty to obtain informed (written/oral) consent for reproduction of any kind of data. More so if you are so called 'principal investigator' and you delegate data collection to the so called data collectors (any other third party) it is your responsibility as investigators for the protection of rights of a study subject. It is your responsibility to train data collectors in the principles and practice of research ethics. In many instances due to a lack of awareness among research investigators and lack of standard training guidelines rights of study participants are violated. This violation may not have a happy ending for all those (including investigators & data collectors) involved in a research project. During post-graduation and probably for rest of your life, many of you will be involved in a variety of healthcare research projects. Thus it is advised that during any research project you must ensure that study participant rights are upheld; it is the only way to protect your integrity.

Following are the suggestive reading and resources:

a. Merritt MW, Labrique AB, Katz J, Rashid M, West KP Jr., et al. (2010) A Field Training Guide for Human Subjects Research Ethics. PLoS Med 7(10): e1000349. doi:10.1371/journal.pmed.1000349

b. JHSPH Human Subjects Research Ethics Field Training Guide

c. "Research Ethics Training Curriculum, 2/e" by Family Health International

d. Responsible Conduct of Research: A Guide for Faculty

----------*****----------

9. ACADEMIC ENGLISH WRITING

Most of us learned English as a second language either in school or in college. Many of you might have noted some grammatical mistake in the language used in this handbook; this is because I am still working on my academic English. Writing academic English is an essential skill to be acquired during your post – graduation because all major journals in India and world over require manuscript to be submitted in English. Also, the presentation given in conferences and the grant proposal submitted to funding agencies need to be in proper academic English. Acquiring the ability to write academic articles, presentations, and research proposal in good-quality academic English is thus essential to advance your career. Scientific article written in poor quality English are likely to be either rejected or sent for revision of language by journal editors. I strongly recommend that you should acquire the skills in academic English writing.

Many students may be confident in speaking in English in everyday situations, but you still need to make yourself familiar with the content of academic English writing. Academic English writing involves writing English using the proper form of grammar, punctuation, avoiding plagiarism, appropriate referencing,

and as per journal's recommendations if any. To make yourself familiar with academic English you must make a habit of reading articles from prominent journals in order to better understand the words used frequently in scientific article and style of writing. Again a lot of material in the form of online courses, e-books, pdfs, articles and website are available to learn these skills.

Suggested reading:

1. Academic writing handbook: London school of hygiene and tropical medicine available from **http://www.lshtm.ac.uk/edu/qualityassurance/academicwritinghandbook.pdf**
2. Murray, R & Moore, S -*The Handbook of academic writing: A fresh approach*. Open University Press-McGraw-Hill
3. **Hilary Glasman-Deal;** *Science Research Writing for Non-Native Speakers of English: A Guide for Non-Native Speakers of English*

----------*****----------

10. SCIENTIFIC WRITING

Writing is a very important part of science; it is used to document and communicate ideas, activities, and findings to others. There could not be any progress in the field of science if scientists do not communicate and share their findings with each other and with the world. The mode of communicating in the scientific world is by the means of scientific articles, dissertations, grant proposal, program evaluation reports, and presentations. All these need to be written in a well-defined and specified style known as scientific writing. Conceiving great research questions and undertaking research is only a three-quarters of the complete picture. If the results of your experiment no matter how outstanding they are, if presented in a poor manner or not presented at all then they might undermine the efforts put in conducting the research. In many instances, words written by you are the only means by which you can communicate to other scientists, student, and government. Thus it is essential that language used in all scientific publication should fulfil a minimum technical standard to enable anyone to understand results and reproduce the experiments, but it should be casual enough to permit other scientists who are not in the same exact field of research to understand the impact of your

research. Thus you need to make yourself familiar with scientific writing in order to be a competent community physician. Mastering scientific writing along with academic English writing will help you advance your career as a researcher in the field of community medicine. Lots of books, presentations, and online courses are available which teaches the basics of scientific writing. But scientific writing in a true sense is an art, with consistent practice, everyone can acquire the basic skills for scientific writing and like many forms of arts, some people acquire it easily and quickly as compared to others. I recommend that you read as many as the scientific article as possible from prestigious journals and try to re-write or paraphrase them on regular basis to improve your scientific writing skills. Acquiring competencies in scientific and academic English writing can also be a means of additional income as you can earn by assisting others in publishing their scientific articles.

Suggested reading:

1. Mimi Zeiger. *Essential of writing bio-medical research paper.*
2. Publication Manual of the American Psychological Associations, 6th edition

3. Online course '*writing in science*'. Freely available at *http://online.stanford.edu/course/writing-in-the-sciences*
4. Online course how to write and publish scientific papers; freely available at https://www.coursera.org/learn/how-to-write-a-scientific-paper

----------*****----------

11. THESIS/DISSERTATIONS

Not just PGs of community medicine but every MD/MS candidate from all departments are required to submit a thesis in order to qualify for examination of MD/MS degree. A thesis or dissertation is defined as a "*long essay about original research conducted and written by candidates themselves for awarding university degree*." For PGs of community medicine; the thesis is a single practical learning exercise during which you will apply acquired theoretical knowledge of epidemiology, critical appraisal, biostatistics, survey design, questionnaire design, data collection, scientific writing, statistical applications, and public health skills. We recommended that in addition to conducting your thesis you must support PGs from another department in their thesis. This will give you exposure to different study design as well as different healthcare setting in which research can be conducted. You need to be proactive in grabbing all the opportunities and make yourself available in assisting other PGs in completing their thesis and publishing their results. Your thesis topic need not be sophisticated or advanced; a well-researched simple idea is much useful to the country and society than a poorly researched

complicated idea. Having said that, it is my advice that you should avoid undertaking a thesis simply to determine the prevalence rate of a health condition/s. Instead, go for more advanced epidemiological study designs. But you should undertake only those research projects as your thesis which you can be completed within stipulated time and the resources available to you. ICMR and other research institute provide funds for conducting MD/MS thesis every year. Look for local NGOs and ongoing project at your institute which can support your thesis project.

Objectives of Thesis: The overall objective of undertaking a thesis is to enable each student to develop as independent researchers, i.e. each student acquire skills necessary to conceive a naïve research idea, plan the research project effectively, interpret the results and provide a recommendation based on their results. Its specific objectives are:

i. Acquisition of skills in identifying, asking and framing the critical research questions.
ii. Critically evaluate the research conducted earlier in a chosen field in terms of concepts, methods, and results.
iii. Acquisition of skills in developing an appropriate methodology for finding the answer to a research question.

iv. Acquisitions of skills in collecting and analysing data.

v. Acquisitions of skills in interpreting results and sharing the findings with his/her peer, faculty members and another researcher of the world.

Suggested reading:

1. Swetnam, D. *Writing your dissertation*.
2. Murray, R. *How to Write A Thesis*. 2nd edition.
3. Winstanley, C. *Writing a Dissertation for Dummies*.
4. Writing Dissertation and Grant Proposals: Epidemiology, Preventive Medicine and Biostatistics By: Lisa Chasan-Taber

----------*****----------

12. POSTING AT RURAL HEALTH TRAINING CENTRE

Posting at RHTC will be your *window* to catch a glimpse of the manner in which Indian health system works. Implementation of health programs has always been a great challenge for India government. Posting at RHTC will give you the opportunity to assess the ground realities of all national health programs. It is my advice that either before or during your posting at RHTC read the operational guidelines for important national health programs and then evaluate the functioning of these programs at your RHTC. Every health program has inbuilt indicators for monitoring a given program, use these indicators to assess the current status of health program of your choice at your RHTC. In addition evaluate the sub-centers, aganwadi centre, PHC, CHC as per the established norms and find out the difference if any existing between the established norms and the prevailing conditions. Try to assess the reason for existing deficiencies and think of the ways how these gap(s) can be minimised.

Posting at RHTC is the most critical period of post-graduation. Do not devote your whole time just treating patients; instead, learn how a primary health centre is managed. While posted at RHTC figure out what is the annual budget allotted to the PHC, how and in what all activities the

budget is spent, how the drugs are procured, how annual health activities are planned. In sort be an administrator of the RHTC and not just any other physician. List of activities to be undertaken while posted at RHTC:

- Attend the weekly/ monthly ANM meeting which takes place at the PHC. Preside over these meeting to learn what kind of data they collect and share with the PHC.
- Similar to ANM meeting attend the monthly ASHA meeting which takes place at the PHC. Preside over these meeting to learn how the instructions flow from what kind of data they collect and share with the PHC.
- Celebrate different health days related to public health at your RHTC such as world TB day, Malaria week, breastfeeding fortnight, etc.
- Draft the annual program implementation plan for the PHC and review the RoP for the given year. Assess how much of the proposed activities in the RoP have been completed.
- Learn about the indenting procedure for drugs and other logistics for PHC.

----------*****----------

13. CLINICAL SKILLS

The duty of community medicine practitioners is not only to diagnose and treat diseases in their health centre/clinics but their practices also include prevention of diseases and disabilities and promotion of health in the community served by their health centres. Thus, they are supposed to be “doctor +”; the plus sign denotes focus on disease prevention and health promotion in addition to the traditional role of curative care performed by other doctors [from Dr Rajesh, PGI, Chandigarh]. Is it suggested that community medicine specialists are supposed to provide primary health care to the entire community through the health centre/ clinic/ dispensary; the specturum of primary health care includes the diagnosis and treatment of acute and chronic illnesses for children, adults and elderly, preventive check-ups, routine maternity and new born care, immunizations, certain minor surgeries and mental health care in consultation with other specialists when needed. [from Dr Rajesh, PGI, Chandigarh].

Before you opted Community Medicine, you all were a doctor and you will always be a doctor first for the rest of your life. During PG you should master basic sets of clinical skills. These skills will compliment your public health related skills and will help you become a competent community physician. I believe a post-graduate student of

community medicine should possess clinical skills which are better and sharper than an MBBS student and equal or less than the specialist of the field. Given the chief morbidities faced by Indian population, I would suggest that you should get exposure to Obstetrics & Gynecology, Pediatric and General Medicine, beyond that it is up to you to master other skills. Primary health care forms an important pillar of the Community Medicine. The eight elements of primary health care concept will further guide you about the array of clinical skills that you must possess as a community medicine specialist. Some departments of community medicine such as PGI, Chandigarh and CMC Vellore provides good clinical exposure to post-graduate students. Try to find out their pattern and request the Head of Department to allow you get the clinical exposure. I would suggest that you should at least spend the evening hours in the wards of Obstetrics, Pediatric and Medicine. Also, spend time in the TB ward of your college. If the paediatrics department of your college has a nutritional rehabilitation centre (NRC) then try to spend about two weeks in NRC to get the first-hand exposure of the facility based management of severe acute malnutrition. Furthermore, PHFI, runs some short term courses on Diabetes, Hypertension, Thyroid and Gestational Diabetes disorders. CMC Vellore conducts a distance learning course on Family Medicine. There is

an array of courses which government routinely conducts to improve the skills of government employee such as IMNCI, BEmOC, CEmOC, etc. If such courses are organised during your tenure then please make sure to be part of it. Make a list of the diseases/health conditions which are of public health importance and read the treatment guidelines of all these diseases.

OBJECTIVES: Following are the basic competencies related to clinical skills which a community medicine postgraduate should possess:

I. Effective management of common diseases within the limited resources.
II. Identification of complex health problems and their appropriate referral.
III. Clinical skill related to supporting important national health programmes (viz. vector control, TB, filarial, noncommunicable diseases, family planning, reproductive & child health).
IV. Taking care of disadvantaged groups in the community such as the elderly, mentally and physically handicapped persons.
V. Effective communication with patients, family, colleagues and other health care workers, and community.

VI. Management of a wide range of common medical emergencies in the context of evidence-based first aid medicine.

VII. Decision making regarding the need for, and the appropriate and cost-effective use of, modern technological investigations and ability to interpret the results of these investigations.

VIII. To organise and actively engage in community care by means of health camps.

Suggestive books and resource:

1. *100 CASES in General Practice:* Anne Stephenson, Martin Mueller, John Grabinar, P John Rees
2. *The Rational Clinical Examination: Evidence-Based Clinical Diagnosis* **by David L Simel, Drummond Rennie.**
3. National Institute for Clinical Excellence: A useful website for a range of treatment guidelines https://www.nice.org.uk/guidance
4. *Washington Manual of Outpatient Internal Medicine.*
5. *Primary Care Medicine: Office Evaluation and Management of the Adult Patient* by Allan H. Goroll, Albert G. Mulley

----------*****----------

14. NONPHARMACOLOGICAL HEALTH INTERVENTION

Medicines are not the only thing that cures patients, sometimes a simple verbal advice about the correct or desired health behaviour can also improve the health of an individual. There are a range of diseases/health conditions which do not always require administration of a drug and then there are some circumstances where nothing other than a change in health behaviour is only effective remedy e.g. exclusive breastfeeding, complementary feeding, washing hand, increasing physical activity in obese, prevention of HIV/RTI etc. Nonpharmacological interventions represent a wide range of treatments/intervention directed at patients/individual. For the theoretical purpose, these nonpharmacological interventions involve surgical procedures, implantable devices, ultrasound & laser treatments and participative interventions such as rehabilitation, education, behavioural interventions, and psychotherapy. The number of published randomised controlled trials assessing nonpharmacological treatments is increasing with time with each passing year.

Lately, a lot of stress is given to intervention which successfully changes an individual/ caretaker/ couple/ family/

community member's behaviour towards adopting a healthy habit/behaviour. These habits vary from disease to disease and from one health condition to other viz. increasing fruit consumption, reducing salt consumption, increasing physical activity, avoiding self-medication, adoption of family planning methods and increasing the use of various types of counselling services. Now a day, health centres (PHC/CHC/DH) have a number of counsellors related to the different national health programs (e.g. family planning, HIV/AIDS, noncommunicable diseases, TB). This highlights the growing importance of behaviour change communication in today's complex world. Thus I would advise that you must undertake an interventional research project either individually or along with your colleague. This intervention can be as simple as sending an SMS or a phone call to pregnant women for availing antenatal care or to a woman who have delivered a child to exclusively breastfeed her baby.

Conducting and evaluating nonpharmacological interventions have some specific methodological issues. Nevertheless, it is essential for you to overcome these barriers and appropriately design and adequately evaluate nonpharmacological interventions to improve the health status of population. In the next version of the

book, I will collect and incorporate different publications related to such non-pharmacological intervention, by that time you are on your own.

Suggestive reading:

1. **Boutron I, Ravaud P, Moher D**; *Randomized Clinical Trials of Nonpharmacological Treatments*

15. CRITICAL APPRAISAL OF RESEARCH ARTICLE

Where and when an article is published, or who wrote it should not be an indication of its trustworthiness and relevance. During your post-graduation and for the rest of your life you will read numerous scientific articles. You may come across a variety of epidemiological design in these scientific articles viz. ecological, cross-sectional, case-control, cohort, clinical trials or systematic review. Also before undertaking any research project including your thesis, you are required to undertake a review of already published articles so as you gather evidence for conducting research projects. And before you can think of adopting/utilising results from a published article into your practice, you need to make a decision for yourself whether the methodology adopted by the article is valid, can the study claims the result it has presented and can it be applicable under condition/population you desired. To answer these and many more questions you need to assess the article for its quality, validity and generalizability. This process is called critical appraisal. "Critical appraisal is the process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision". Critical appraisal is an essential step in the process of putting research into practice. Asking questions about an article's research

methodology, scrutinising its data collection and analysis methods, and evaluating how its findings are presented will help you to determine whether that article's conclusions should influence practical decision-making. I would recommend that you should learn the basics of critical appraisal before the end of first-year life.

An oversimplified approach to critical appraisal is presented below:

1. Is the study valid?

The first step is to decide whether the study was unbiased by evaluating its methodological quality. Different criteria for validity of articles are used for different types of questions on treatment, diagnosis, prognosis and economic evaluation. Depending on the validity of an article we can classify it within a scale of levels of evidence and degrees of recommendation.

2. What are the results?

If we decide that the study is valid, we can go on to look at the results. At this step, we consider whether the study's results are important for us. For example, did the experimental group show a significantly better outcome compared with the control group? We also consider how much uncertainty there is about the results, as expressed in the form of p values, confidence intervals and sensitivity analysis.

3. Are the results useful?

Once you have decided that your evidence is valid and important, you need to think about how it applies to your question. It is likely, for example, that your patient or population may have different characteristics to those in the study.

Critical appraisal skills provide a framework within which to consider these issues in an explicit, transparent way.

Suggestive reading and resources:

1. Critical Appraisal Skills Programme: this website provides a list of resources and checklists for critical appraisal of a variety of epidemiological study design. Available at http://www.casp-uk.net/
2. How to Read a Paper: The Basics of Evidence–Based Medicine by Trisha Greenhalgh
3. Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice: by Gordon Guyatt
4. Centre for Evidence Based Medicine: another very important website. Available at http://www.cebm.net/
5. Online course of critical appraisal of research article: http://eyes.cochrane.org/free-online-course-journal-peer-review

6. Online free short course on Critical appraisal of randomised control trials in dermatology: https://www.nottingham.ac.uk/research/groups/cebd/news-updates/news/2016/free-online-course-critical-appraisal.aspx
7. A Compendium of Critical Appraisal Tools for Public Health Practice: http://www.nccmt.ca/uploads/media/media/0001/01/5aad550fc93cb202f01048e98b174b5e70233359.pdf

----------*****----------

16.PEER REVIEW

Consider a scenario in which researchers researched what they liked and authors published what they liked. Such a world did existed until some decades ago. No matter how much efforts you have given in undertaking a research, it will be up to the person who reviews your article to decide whether or not your research will appropriate for publication in the journal. Peer review – the use of experts, or peers, to help judge the value of submitted work – is now ubiquitous. Peer review is a type of exercise wherein your work is subjected to a constructive criticism so as to evaluate its usefulness. Peer review normally involves one or more expert judging the work undertaken by another expert, the first provides inputs to help improve the original work. It is a type of critical appraisal taken from the view of editors or granting agencies. The comments might be more or less formal; they might correspond to set topics or areas, or might be general and unstructured. Peer review helps us (editors, granting agencies) decide who receives funding for research, and which research projects see the light and which don't. It is used to help decide which manuscripts should be published in journals and how they should be changed before publication. It has, therefore, become the arbiter of scientific careers and a major

influence on what gets into the public domain. In the health sciences, this means that it probably affects what happens to patients. As science has become more complex and competitive, so the role of peer review has become more prominent. When difficult decisions are at stake, the phrase "peer review" is used by many to reassure and impress. It has become a short hand for fairness and objectivity.

Suggestive reading and resources:

1. Peer Review in Health Sciences by Fiona Godlee and Tom Jefferson
2. Scientific Peer Reviewing Practical Hints and Best Practices by Peter Spyns and Marı´a-Esther Vidal
3. Peer Review Presentation: available from https://owl.english.purdue.edu/owl/resource/712/01/

----------*****----------

17. PLAGIARISM

Most of us have either copied the answer from our friends/colleagues or have helped others copy our answers during under-graduation examination. We all should thank god that our answer copies were checked by a human and not by any plagiarism detecting kinky software(s) else both the smart and not so smart students would have scored a big ***Zero*** because (as each student would be labelled as having committed plagiarism) both had copied their response from a published text without acknowledging or citing the original source. Having said that **'Plagiarism'** is the "wrongful appropriation" and "stealing and publication" of another author's "work" (language, thoughts, ideas, or expressions) and the representation of them as one's own original work. We all are very eager to publish scientific articles from our research projects especially from our thesis; in the due process, we must be cautious of that fact we might directly or indirectly committing plagiarism. No matter how smart you think you are? Nowadays such powerful software is employed by publishing industry (journals& books) which can detect plagiarism to the minuscule extent. There is no shame whatsoever in citing or crediting someone else for their own work. At present, every type of work related to academic writing (both

educational and corporate) is regulated by rules that writers, particularly beginners, aren't aware of or don't know how to follow. This is especially true for young Indian including me at the time of my post-graduation. Many of these rules have to do with research and proper citation. Gaining familiarity with these rules, however, is critically important, as inadvertent mistakes can lead to charges of **plagiarism**, which is the uncredited use (both intentional and unintentional) of somebody else's words or ideas. Many research institutes do not consider 'Plagiarism' as a crime in itself but they believe plagiarism as a copyright infringement, but for many others in academia and industry, it is a serious ethical offence. In many countries, plagiarism is not defined or punished by law, but rather by institutions (including professional associations, educational institutions, and commercial entities, such as publishing companies). In very simple words, plagiarism is an act of fraud. It is considered by most academic fraternity as stealing someone else's work and lying about it.

According to some laws all of the following acts mentioned below are considered as an act of plagiarism:

- turning in someone else's work as your own
- copying words or ideas from someone else without giving credit

- failing to put a quotation in quotation marks
- giving incorrect information about the source of a quotation
- changing words but copying the sentence structure of a source without giving credit
- copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not.

May be some of the work produced in this handbook can be labelled as plagiarised. Thus I will advise you to learn the basics of plagiarism and avoid it to the every extent possible. It is should be the sole responsibility of the each and every student to learn the proper form of citation. This is essential for your metamorphosis into an able academician and a competent community physician. If you are unclear about plagiarism and/or need assistance never hesitate to ask or look on the internet about the most commonly accepted definition of plagiarism.

Please find below some resources which you find useful:

18.SUGGESTIVE ACTIVITIES TO TAKE PART-IN DURING POST-GRADUATION

There are some activities which every post-graduate student of community medicine should be part of. Unfortunately, I came to know about most of these activities after completing my post-graduation. Following are the list of activities which will give you the insight into the working of Indian health system:

I. Select/adopt a village or more appropriately a health sub-center in the catchment area of the RHTC or any other block of the district and work closely with village ASHA, ANM and residents of the village for the complete duration of your post- graduation. The health sub-centre is the first contact between the health system and the citizens of this country. They are the most peripheral health out post. Health planning of the whole block, district, state, and in fact for the whole country starts from tens of thousands of existing health sub-centres. This sub-center can act as a field laboratory for your future learning and experimentation. Use the Indian public health standards for health sub-centre.

II. **Sansad Adarsh gram yojana: SAGY** has a health component in its scheme. I need not to tell you that if you can assist or support a member of parliament in achieving health related objective of his/her adopted village

how useful this contribution can mean to your future. Log on to its website to contribute.

III. **At the beginning of your post-graduation;** visit the CMO office and try to establish a working relationship with District Program Manager, RMNCHA consultant and other officials of district health administration. Every year every district conducts a variety of training for different cadres of health workers; in addition, a lot of surveys related to different health program are conducted annually in a given district. Keep regular track of any such training(s) and survey(s) that might interest you.

IV. **Annual Pulse Polio rounds:** Every year health department conducts annual rounds of pulse polio wherein every child under five years of age is given oral Polio vaccine. Don't miss this opportunity: it will give you the insight into what goes in for planning of mass immunisation campaign.

V. **Annual national deworming days:** Every year health department in most states conducts two round of the annual deworming day. Make sure you are part of the planning to undertake this annual exercise.

VI. **Monthly ASHA and ANM meeting at RHTC:** During the time you are posted at RHTC and if possible during your complete post-graduation make a habit of attending ASHA meeting at nearest PHC/CHC. This will give you an exact idea about the ground realities of various health related

programs. Assess their knowledge on common health issues and think of a way in which you can build their capacity. Observe how they micro-plan health activities in a village. Try to learn from them how they plan and organise VHND.

VII. **Block and district level-Annual PIP preparation meetings:** Every year each block and district conduct a series of meetings to formulate Program Implementation Plan (PIP) for next financial year. PIP is the blueprint of activities to be conducted in a given year and how much all the listed activities will cost. Becoming part of this exercise will give you an insight about the planning machinery for different health programs at block and district level. This is an immensely important exposure which you should be part of to gain practical planning skills; you can learn how to plan, how to execute a plan and how to evaluate that plan. Before taking part in any planning activities, download and study guidelines for the formulation of PIPs and arrange a copy of last few years PIPs. Following submission of PIP, there will be an ROP meeting, make sure you don't miss that. Make a comparison between ROP v/s PIP and present in the department as a part of the seminar.

VIII. **Female and male sterilisation and eye camp at any of the PHC/CHCs:** Study the mechanism of client/patients inflow at these

camps and observe whether these camps are conducted as per guidelines. Observe what all it takes in terms of logistics, manpower, management and administration for successful conduction of such camp. Try to identify gaps in the organisation of such camps against prescribed norms and try to work out how these gaps can be filled.

IX. **Annual national and state level conferences of IAPSM and IAPH:** State and National level conference are a good platform to share your experience and research work with students and faculty of other colleges, discuss thesis work, ongoing research project, future endeavour, and research collaborations.

X. Monthly meeting of Anganwadi worker and their supervisors at the block level: This is an important activity related to maternal and child health.

XI. Monthly meeting of district TB officer and TB coordinator from all blocks in a given district, observe how they plan for logistics, provide treatment, counsel patients and other program related activities. In addition, through the network of ASHA, ANM and TB coordinators in your area; try to get information about any patients currently on Cat-I or II DOTS medications who begin to default from their regime. Try to pursue all such patients to re-start their medications and prevent them from defaulting. This exercise will help test and improve your health education skills.

XII. **Outbreak Investigations:** Be in touch with district epidemiologist; if there is an epidemic or focal outbreak then accompany them in outbreak investigations.

XIII. Try to attend review meeting of all important health program at district and block level.

XIV. Although institutional deliveries have tremendously increased, women do deliver babies at home. If you notice a home delivery in your area then try to investigate its cause and try to analyse how could such events can be prevented in future. Also, try to assess the home based newborn care provided to the neonate and has he/she received *zero* doses of vaccines.

XV. **Verbal autopsy:** Standard assessment format for conducting a verbal autopsy for maternal and child death is available on the internet. In many districts such verbal autopsy is regularly conducted, if there is such a trend in your district then try to be part of as many verbal autopsies as possible and if not, then try to conduct a verbal autopsy yourself.

XVI. Every PHC/CHC has fixed days for providing Antenatal care to pregnant women and immunisation to infants. Utilise this opportunity to provide health education to mothers (about nutrition, childbirth, child feeding, family planning etc.) by organising group counselling sessions. This

exercise can be conducted as a health education intervention trial [see an example http://dx.doi.org/10.1017/S1368980009991364].

XVII. Train ANM and ASHA workers for imparting nutritional health education to pregnant and lactating mothers at their home. WHO and UNICEF have designed course for training health workers in providing education about complementary feeding to women. Read it and train health workers in your area. [available from http://www.who.int/nutrition/publications/infantfeeding/9241546522/en/]

XVIII. **NITI Ayog** offers internship opportunity for post graduates students in health sector. It is the apex think tank of the country and any experience of working there would look better than anything else on your CV. For more information log on to its website.

XIX. Many women will deliver children at the RHTC. Make a due list of the dates of immunization for all these children. Chhattisgarh organizes a program known as *Sishu Suraksha Maah*. Please log on to internet to know more about the program.

----------*****----------

19. USEFUL RESOURCES

1. Purdue online writing lab (https://owl.english.purdue.edu/owl/)
2. Online courses website:

a. Coursera (https://www.coursera.org/)

b. Edx.org

3. Epidemiology: http://www.epidemiolog.net/
4. Good source for a variety of public health resources:

   http://www.jhsph.edu/offices-and-services/institutional-review-board/
5. http://www.authoraid.info/en/
6. Centre for Evidence Based Medicine: another very important website. Available at http://www.cebm.net/
7. https://www.tripdatabase.com/
8. Guide for Writing and Designing the Oral Presentation This guide can be found at

   http://www.jhsph.edu/academics/degreeprograms/mph/Forms_MPH/Designing%20and%20Writing%20a n%20Effective%20Presentation.pdf.
9. Student 4 best evidence: A very useful website, you will find lots of interesting blogs written by experts

   http://www.students4bestevidence.net/

10. The **Committee on Publication Ethics** (COPE)

https://publicationethics.org/about

----------*****----------

20. LIST OF SUGGESTED READINGS

1. **Studying skills from London School of Economics: http://www.lse.ac.uk/socialPolicy/InformationForCurrentStudents/basicStudySkills.aspx**
2. **Testing treatments** available from http://www.testingtreatments.org/book/?nabm=0
3. **Searching Skills Toolkit: Finding The Evidence** by Caroline De Brun and Nicola Pearce-Smith
4. **Evidence-Based Medicine Toolkit** (2nd Ed) by Carl Heneghan and Douglas Badenoch
5. **Bad science by** Ben Goldacre
6. **Oxford handbook of public health practice**
7. **Evidence-Based Medicine: How to Practice and Teach EBM** by Straus SE et al. (2010).
8. **Teaching Evidence-Based Practice** – CEBM videos http://www.cebm.net/teaching-evidence-based-practice/
9. **Handbook of Epidemiology;** by Wolfgang Ahrens , Iris Pigeot
10. **Where There is no Doctor - A Health Care Handbook** by for Voluntary Health Association of India.

11. **Health policy planning for developing health system** by Andrew Green
12. **Outbreak Investigations Around the World: Case Studies in Infectious Disease** by Mark S. Dworkin
13. **Field epidemiology** by Michael Gregg
14. Oxford advanced learner's dictionary
15. **Chronic Disease Epidemiology, Prevention, and Control:** Edited by Patrick L. Remington, MD, MPH; Ross C. Brownson, PhD and Mark V. Wegner, MD, MPH **Publisher:** APHA Press
16. **Control of Communicable Diseases Manual, 20th Edition; Author:** Edited by David L. Heymann, MD **Publisher:** APHA Press
17. **Primary Health Care** THEORY AND PRACTICE by **Trisha Greenhalgh**
18. **Health system performance comparison An agenda for policy, information and research**
19. **High level expert group; report- Planning commission of India**
20. **David Moher, Douglas Altman, Kenneth Schulz, Iveta Simera, Elizabeth Wager** *Guidelines for Reporting Health Research: A User's Manual*

----------*****----------