

Washington University School of Medicine
Master of Population Health Sciences (M19-5656)
Master of Public Health (S55-4003)

Fall 2015 Global Burden of Disease: Methods and Applications

DRAFT SYLLABUS¹

Instructors: Rumi Kato Price, PhD, MPE (pricer@psychiatry.wustl.edu) Course Master
Manan V. Shroff, MBBS, MPH (shroffma@wusm.wustl.edu)

Guest Lectures (alphabetical listing):

Peter Benson, PhD, Department of Anthropology, College of Arts and Science
Graham Colditz, MD DrPH, Division of Public Health Sciences, Department of Surgery,
School of Medicine

Amanda Colegrove, MA, Coalition against Human Trafficking and Exploitation,
Anne Glowinski MD MPE, Department of Psychiatry, School of Medicine

Steve J. Lawrence, MD, Division of Infectious Diseases, Internal Medicine, School of
Medicine

Carolyn Lesorogol PhD, School of Social Work

Rebecca Lester, PhD, MSW, Department of Anthropology, College of Arts and Science

Daniel Mamah, MD MPE, Department of Psychiatry, School of Medicine

Mark J. Manary MD, Department of Pediatrics, School of Medicine

Bradley Stoner MD PhD, Department of Anthropology, College of Arts and Science

Adetunji Toriola, MD PhD, Division of Public Health Sciences, Department of Surgery,
School of Medicine

Course Duration: Fall 2015, August 27 to December 10, 2015

Date and Time: Thursdays, 1 pm – 4 pm

Classroom: Institute for Public Health, Medical Campus TAB Bldg. (Scott & Taylor), Richmond
Room (subject to change)

Course Credit: 3 credits

Course Description and Objectives: This transdisciplinary course provides an overview of quantitative and narrative methods and their applications for studying the global burden of diseases. The area topics include infectious diseases, non-communicable chronic medical illnesses and behavioral disorders. Students will learn basic methods used for global health research and major trends in the global burden of diseases; they will be able to apply the knowledge of measurements to forecast the future of the global burden of specific diseases and develop needed policy recommendations. Students will also be able to address prevention and intervention strategies targeted to specific nations or regions using a transdisciplinary approach. Students will learn dimensions of sociocultural and economic factors that affect global and regional distributions of major disease categories and how disease burdens are linked to global economy. The transdisciplinary knowledge and hands-on skills learned from this course will assist students with an interest in health research and practice in the international as well as local arena.

Competencies:

1. Final syllabus will be distributed on the first day of the course.

1. Develop a critical understanding of the concepts and measures used in studies of global burden of infectious, chronic medical, psychiatric, and behavioral diseases.
2. Understand regional and national patterns of global burden of major infectious and chronic medical diseases and their risk factors including major differences in demographic, economic, and sociocultural factors such as cultural practices and national and regional policies.
3. Apply measures used in global burden studies to empirical data, field work, or interpretation of results in literature.
4. Apply critical knowledge in global burden studies to disease monitoring, intervention, and health promotion in topical areas.
5. Identify and pursue a future global health research topic based on empirical evidence derived from global burden of disease data analysis and topical discourse.
6. Acquire a deeper understanding of transdisciplinary thinking toward illness experiences and global health research.

Prerequisites: This course is open to postgraduate scholars, fellows, and graduate students. This course assumes knowledge of basic medical or behavioral science study design and statistics. An equivalent to an introductory epidemiology, a behavioral/social science quantitative method, or a biostatistics course is very helpful; otherwise obtain course master approval.

Course activities and student products: Lectures, class exercises, discussion and other in-class participation, homework, short reports, final group presentations, and a short term paper. Additional analysis of an empirical dataset can be arranged individually.

Note: Use of cell phones, texting and email communications, and web surfing are prohibited during lectures and student presentations, except for emergencies. This course may be audiotaped for educational purposes.

Course evaluation: letter grade or pass/fail with Course Master's permission

- 20% Attendance
- 20% In-class discussion and participation
- 20% Homework, in-class exercises, and short reports
- 20% Class presentation
- 20% Term paper based on the class presentation

1. The total point of 100 will be converted to letter grades according to an established norm; grades will not be normalized. Pass/Fail is optional but requires advance permission from course master.
2. Attendance is required for all classes. Planned absences for reasons other than acute illness need to be excused in advance by course master. Absences will typically be excused for reasons such as religious holidays, career development activities, or illness. Students who miss more than four classes may be expected to withdraw from the class.
3. Required readings should be completed prior to appropriate sessions.
4. Homework and in-class exercise products and short reports will be due upon specified date, but no later than one week after when assigned.
5. Final class presentation will be planned and carried out by student groups. The final presentation should be of professional quality, similar to a short presentation at a national or regional professional meeting. Use of power point or similar media is highly recommended. The quality of the presentation will be judged based on how well it meets a majority of the six competency criteria.

6. Term paper should be of professional quality to serve as a first draft of subsequent manuscript submission to a professional peer-review journal. Students should aim for a brief empirical report, review paper, or perspective opinion paper based on empirical knowledge. Students should choose to complete a paper by each group with specific individual roles specified. Individual student may opt to write his/her own paper with permission from course master.

Course Reading Materials:

Required:

Kleinman A. *The Illness Narratives: Suffering, Healing, and the Human Condition*. Basic Books, 1989.

Hyder, AA, Puvanachandra P, Morrow RH. Measures of health and disease in populations. In Merson MH, Black, RE, Mills AJ (Eds.) *Global Health. Diseases, Programs, Systems, and Policies*. Third Edition. Jones & Bartlett Learning, 2012 (Chap 1).

Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL (Eds.). *Global Burden of Disease and Risk Factors*. Washington, DC: Oxford University Press and Word Bank, 2006; Chap 1.

Murray CJL, Lopez, AD. Measuring the Global Burden of Disease. *New England Journal of Medicine* 2013; 369: 448-57.

World Health Organization. The Global Burden of Disease concept (Chap 3). Available at: http://www.who.int/quantifying_ehimpacts/publications/en/9241546204chap3.pdf.

Recommended:

Helman CG (Ed.) *Culture, Health, and Illness*. Hodder Arnold Press, 2007.

Mathers CD, Vos T, Lopez AD, Salomon J, Ezzati M (Ed.) 2001. *National Burden of Disease Studies: A Practical Guide*. Edition 2.0. Global Program on Evidence for Health Policy. Geneva: World Health Organization; Chapters 1-8, 10-13.

Merson MH, Black, RE, Mills AJ (Eds.) *Global Health. Diseases, Programs, Systems, and Policies*. Third Edition. Jones & Bartlett Learning, 2012. (Introduction, Chapter 18 and other selected chapters, TBA)

Schensul, Stephen L, Schensul JJ, Margaret D, LeCompte. *Essential Ethnographic Methods: Observations, Interviews, and Questionnaires*. AltaMira Press, 1999.

Barendregt JJ, van Oortmarssen GJ, Vos T, Murray CJL. A generic model for the assessment of disease epidemiology: the computational basis of DisMod II. *Population Health Metrics* 2003; 1:4; 1-8.

WHO, *Global Status Report on Noncommunicable Diseases 2010*, Reprint 2011.

The Lancet 2012: 380 (December 15) Issue, also available: <http://www.rkp.wustl.edu/GlobalBurdenofDisease/TheLancet.pdf>

1. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010 (pp. 2095-2128).
2. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010 (pp. 2163-2196).
3. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010 (pp. 2197-2223).
4. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010 (pp. 2224-2260).

Note: Required reading pdf copies are uploaded to BlackBoard (BB), or available with URLs. Weekly lectures will be listed and made available in BB. The required and recommended books can be purchased at the campus bookstore on the medical school campus; a copy of each book will be available from the Price Lab.

Course Organization: The didactic component of this course is organized to conceptually progress in six segments.

- (1) Introduction to global health and global burden of disease and quantitative and qualitative methodologies of GBD. This segment will be led by Drs. Colditz, Price, Benson, and Toriola.
- (2) Practicing GBD measures and learning global, regional and local GBD trends, both disease specific and combined disease groups. This segment will be led by Drs. Price and Shroff.
- (3) Introduction to global, national and local trends and sociocultural factors in the infectious diseases and GBD. This segment will be led by Dr. Powderly, Stoner, and Price.
- (4) Introduction to non-communicable chronic medical diseases, trends, risk factors, and prevention. This segment will be led by Drs. Colditz, Toriola, and Manary.
- (5) Introduction to global psychiatric and addiction diseases and trends in burden of diseases, risk factors, and prevention. This segment will be led by Drs. Price, Glowinski, Mamah, and Lester.
- (6) The last segment focuses on research practice in global health. Dr. Lesorogol takes the lead on community-based research; Dr. Price will take the lead on ethical issues in global health research.

Week 1: Thursday, August 27, 2015

Lecturers: Graham Colditz MD DrPH; Rumi Kato Price PhD MPE; Manan Shroff, MBBS, MPH

Introduction to Studies of Global Burden of Disease

- Washington University perspective on global health research
- Historical background for global health and global burden of diseases
- Epidemiologic concepts
- Examples of medical and psychiatric disease burden
- Millennium development goals
- Transdisciplinary perspective on global health research and practice
- Discussion: Why global health, why global burden of disease?

Recommended readings:

- Lopez et al., Global Burden of Diseases and Risk Factors, 2006, Chap 1.
- Bonita, Beaglehole & Tjellstrom. Basic Epidemiology, 2nd Edition. WHO: 2006, Chap.1 & 2.

- Merson, MH, Black RE, Mills AJ. Introduction (pp. xvii-xxiv). In: Merson MH, Black, RE, Mills AJ (Eds.) Global Health. Diseases, Programs, Systems, and Policies. Third Edition. Jones & Bartlett Learning, 2012.
- Lee K, Yach D, Kamaradt-Scott, A. Globalization and health. In: Merson MH, Black, RE, Mills AJ (Eds.) Global Health. Diseases, Programs, Systems, and Policies. Third Edition. Jones & Bartlett Learning, 2012.

Week 2: Thursday, September 3, 2015

Lecturer: Peter Benson, PhD

Qualitative Considerations for Global Health Research

- Illness experiences
- Overview of qualitative methods and measures
- Anthropological methods and ethnography
- Core concepts in medical anthropology
- Discussion: contrasting biomedical and humanistic approach to global burden of disease

Recommended readings:

- Kleinman A. The Illness Narratives: Suffering, Healing, and the Human Condition. Basic Books, 1989.
- Selection: Helman CG (Ed.) Culture, Health, and Illness. Hodder Arnold Press, 2007.

Week 3: Thursday, September 10, 2015

Lecturers: Rumi Kato Price PhD MPE; Adetunji Toriola, MD PhD

Examples of Global Health Related Studies

- Major WHO-initiated studies
- The global burden of disease, injuries and risk factors 2010, introduction
- Basic model of global burden of disease
- Examples of medical and psychiatric disease burden (dynamic presentation, Institute for Health Metrics and Evaluation (IHME))
- Gapminder introduction
- Group practice and report: IHME tools and Gapminder

Recommended readings:

- Lopez et al., Global Burden of Diseases and Risk Factors, 2006, Chap 1.
- World Health Organization. The Global Burden of Disease concept (Chap 3). Available at: http://www.who.int/quantifying_ehimpacts/publications/en/9241546204chap3.pdf.
- Murray CJL, Lopez AD. Measuring the global burden of disease. N Engl J Med 2013;369:448-57.
- Rosling H. Feb 2009 TED talk (video). Available at: <http://www.gapminder.org/videos/ted-talk-2009-hans-rosling-hiv-facts/>.
- Dieleman JL, Graves C, Johnson E, Templin T, Birger M, Hamavid H, Freeman M, Leach-Kemon, K, Singh L, Haakenstad A, Murray CL. Sources and focus of health development assistance, 1990-2014. JAMA 2015; 313(23):2359-2368.

Week 4: Thursday, September 17, 2015

Lecturer: Rumi Kato Price PhD MPE

Basic Epidemiologic Measures of Global Burden of Disease

- International disease classification systems

- Review of basic epidemiological measures (incidence, prevalence, mortality, life expectancy, risk ratio, population attributable risk and fraction)
- GBD basic measures: years of life lost (YLL); disability weights; years of life lost due to disability (YLD); disability-adjusted life years (DALY)
- Other commonly used health metrics: Healthy life years (HeaLY); quality-adjusted life years (QUALY)
- DisMod-II to DisMod-MR
- Discussion & homework assignment (DisMod-II instructions)

Recommended readings:

- World Health Organization. The Global Burden of Disease concept (Chap 3). Available at: http://www.who.int/quantifying_ehimpacts/publications/en/9241546204chap3.pdf.
- Barendregt JJ, van Oortmarssen GJ, Vos T, Murray CJL. A generic model for the assessment of disease epidemiology: the computational basis of DisMod II. *Population Health Metrics* 2003; 1:4; 1-8.
- Hyder, AA, Puvanachandra P, Morrow RH. Measures of health and disease in populations. In Merson MH, Black, RE, Mills AJ (Eds.) *Global Health. Diseases, Programs, Systems, and Policies*. Third Edition. Jones & Bartlett Learning, 2012 (Chap 1).
- *Lancet* 2012, #1, #2, #3.
- (Optional and advanced): Supplement to: Vos T, Flaxman AD, Naghavi M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; 380: 2163–96.

Week 5: Thursday, September 24, 2015

Lecturer: Manan Shroff MBBS MPH

Measures Used in the Studies of Global Burden of Disease. Practice Session

- Class exercise using DisMoD II, chronic disease examples
- Computations of YLL, YLD and DALY
- Group presentation, YLL, YLD, DALY

Recommended readings:

- Barendregt JJ, et al., 2003.
- DisMoD II Tutorial.
- Namwat C., DISMOD II (ppt presentation).

Week 6: Thursday, October 1, 2015

Lecturers: Rumi Kato Price PhD MPE; Manan Shroff MBBS MPH

Comparative Risk Assessment and Bayesian Estimation Basics

- Comparative risk assessment (CRA) concepts and model
- Computation of CRA
- Group presentation, CRA
- Bayesian regression basics

Recommended readings:

- Barendregt JJ, van Oortmarssen GJ, Vos T, Murray CJL. A generic model for the assessment of disease epidemiology: the computational basis of DisMod II. *Population Health Metrics* 2003; 1:4; 1-8.
- *Lancet* 2012, #4.

- van de Schoot R, Kaplan D, Denissen J, Asendorpf JB, Neyer FJ, van Aken MAG. A Gentle introduction to Bayesian analysis: applications to developmental research. *Child Development*, 2014; 85: 842–860. doi: 10.1111/cdev.12169
- (Optional and advanced) Supplement to: Vos T, Flaxman AD, Naghavi M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; 380: 2163–96.

Week 7: Thursday, October 8, 2015

Lecturers: Bradley Stoner MD PhD; Manan Shroff MBBS MPH; Rumi Kato Price PhD MPE
Studies of Global Burden of Infectious Diseases (1)

- Sexually transmitted infections
- Malaria and other mosquito-borne diseases
- Pandemic influenza
- Global warming and infectious diseases
- Class discussion – environmental intervention pros and cons for whom?
- Discussion: group presentation topics

Recommended readings:

- Lewis, DA, Latif AS, Ndowa F. WHO global strategy for the prevention and control of sexually transmitted infections: time for action. *Sexually Transmitted Infections* 2007; 83:508–509.
- Ros D, Carlos T, da Silva Schmitt C. Global epidemiology of sexually transmitted diseases. *Asian Journal of Andrology* 2008; 10(1): 110-114.
- TBA: global warming and mosquito-borne disease prevention
- TBA: global travel patterns and H1N1 and evolution of flu shots

Week 8: Thursday, October 15, 2015

Lecturers: Bradley Stoner MD PhD; Steve J. Lawrence, MD
Studies of Global Burden of Infectious Diseases (2)

- Biomedicine as a cultural system
- Heterodox medical system
- Ethnographic fieldwork – cross-cultural perspective
- Global examples and emerging infectious diseases
- Tuberculosis (TB)
- Ebola
- Prevention and control
- Instruction and Q&A: short report #1

Recommended readings:

- HIV/STIs in Peru- TBA
- Sidibe M, Piot P, Dybul M. AIDS is not over. *Lancet* 2012; 380: 2058-2060.
- Ortblad KF, Lozano R, Murray CJL. The burden of HIV: insights from the Global Burden of Disease Study 2010. *AIDS* 2013, 27:2003–2017.
- Fauci AS. Infectious diseases: consideration for the 21st Century. *Clinical Infectious Diseases*, 2001.
- Ebola - TBA

Week 9: Thursday, October 22, 2015

Lecturers: Graham Colditz MD DrPH; Adetunji Toriola, MD PhD

Studies of Global Burden of Non-communicable Chronic Diseases (1)

- Major chronic diseases in developed countries: adult and geriatric diseases (cancer, obesity, cardiovascular diseases)
- Prevention and intervention studies of major diseases and eradicating underlying conditions
- Health promotion in developed countries
- Integrating biomarkers in chronic disease identification and prevention
- Best buys and obstacles for prevention
- Infant and maternal mortality and morbidity measures
- Maternal and child health in developing countries

Recommended readings:

- WHO, Global Status Report on Noncommunicable Diseases 2010, Chapter 4.
- Global Burden of Disease Cancer Collaboration. The global burden of cancer 2013. *JAMA Oncol* 2015;1(4):505-527.
- Colditz GA, Wolin KY, & Gehlert S. Applying what we know to accelerate cancer prevention. *Science Translational Medicine* 2012; 4: 1-9.
- Geneau R, Stuckler D, et al. Chronic diseases: Chronic diseases and development 1. Raising the priority of preventing chronic disease: a political process. *Lancet* 2010; 376:1689-98.
- Beaglehole R, Alleyne G, et al., for the Lance NCD Action Group. UN high-level meeting on non-communicable diseases: addressing four questions. *Lancet* 2011; 378:449-55.
- Say L, Chou D, Gemmill A, Tunçalp Ö, Moller A-B, Daniels J, Gülmezoglu AM, Temmerman M, Alkema L. Global causes of maternal death: a WHO systematic analysis. *Lancet* 2014; 2: e323–33.

Week 10: Thursday, October 29, 2015

Lecturers: Mark Manary MD; Rumi Kato Price PhD MPE

Studies of Global Burden of Non-communicable Chronic Diseases (2)

- Eliminating child malnutrition – a success story
- Health care and cultural practices of reproductive systems in developing countries
- Discussion on chronic medical diseases
- Instruction and Q&A: short report #2
- Discussion on paired presentation topics and format

Recommended readings:

- Trehan I, Goldbach HS, LaGrone LN, Meuli GJ, Wang RD, Maleta KM, Manary MJ. Antibiotics as part of the management of severe acute malnutrition, *N Engl J Med* 2013; 368:425-43
- Ross GS, Mark J. Manary: Saving starving African children a few thousand at a time. https://www.stlbeacon.org/#!/content/29584/mark_manary_profile?coverpage=2838

Week 11: Thursday, November 5, 2015

Lecturer: Rumi Kato Price PhD, MPE

Studies of Global Burden of Psychiatric and Addiction Diseases (1)

- Global trends in major psychiatric disorders
- Selected addiction and substance abuse global trends
- Impact of psychiatric and addiction disorders on infectious and chronic medical illnesses

- Global monitoring, prevention, intervention, and health promotion
- Consultation for final presentation
- Instruction and Q & A: short report #3

Recommended readings used:

- Lancet 2012, #2, #3, #4.
- Degenhardt L, Whiteford HA, Ferrari AJ, et al. Global burden of disease attributable to illicit drug use and dependence: findings from the Global Burden of Disease Study 2010. *Lancet* 2013; 382: 1564–74.
- Ferrari AJ, Charlson FJ, Norman RE, et al. Burden of depressive disorders by country, sex, age, and year: findings from the Global Burden of Disease Study 2010. *PLoS Med* 10(11): e1001547.
- Mokdad AH, Marks JS, Stroup DF, & Gerberding JL. Actual cause of death in the United States, *JAMA*, 2004; 291:1238-1245.
- Brookmeyer R, Johnson E, Ziegler-Graham K, Arrighi HM. Forecasting the global burden of Alzheimer’s disease, 2007. Berkeley Electronic Press.

Week 12: Thursday, November 12, 2015

**Lecturers: Anne Glowinski MD MPE; Daniel Mamah, MD MPE; Rebecca Lester PhD MSW
Studies of Global Burden of Psychiatric and Addiction Diseases (2)**

- Suicide, injury and violence
- Cross-cultural psychiatry – Kenyan experience
- Eating disorder – cultural notion of gender, agency and moral personhood
- Discussion

Recommended readings

- Hagopian A, Flaxman AD, Takaro TK, et al. Mortality in Iraq Associated with the 2003–2011 War and Occupation: findings from a National Cluster Sample Survey by the University Collaborative Iraq Mortality Study. *PLoS Med* 10(10): e1001533.
- WHO. Global Status Report on Violence Prevention, 2014. WHO Press.
- Mamah D, Owoso A, Mwayo AW, et al. Classes of psychotic experiences in Kenyan children and adolescents. *Child Psychiatry Hum Dev*. 2013, 44:452-9.
- Eating disorder - TBA

Week 13: Thursday, November 19, 2015

**Lecturers: Carolyn Lesorogol PhD; Amanda Colegrove MA; Rumi Kato Price PhD MPE
Ethical Considerations in Global Health Research**

- Community-based participatory research
- Capacity building community programs in developing countries
- Cultural competency
- Informed consent in international research
- Ethical issues in genetics research
- Placebo controlled trials in underserved and vulnerable populations
- Responsible conduct as a global citizen
- Discussion
- Instruction and Q &A: paired presentation for Weeks 15 & 16

Recommended reading:

- Lesorogol, CK. Asset building through community participation: restocking pastoralists following drought in Northern Kenya. *Social Work in Public Health*, 2009; 24:1-2, 178-186.
- Stapleton G, Schroder-Back P, Laaser U, Meershoek A, Popa D. Global health ethics: an introduction to prominent theories and relevant topics. *Global Health Action* 2014, 7: 23569
- WHO, Ethical considerations for use of unregistered interventions for Ebola viral disease. WHO, 2014.
- Kiss L, Pocock NS, Naisanguansri V, Suos S, Dickson B, et al. Health of men, women, and children in post-trafficking services in Cambodia, Thailand, and Vietnam: an observational cross-sectional study. *Lancet Global Health* 2015; 3: e154–61.
- The Global Slavery Index 2014. Hope for Children Organization Australia, 2014.

Week 14: Thursday, November 26, 2015 – NO CLASS, Thanksgiving

Week 15: Thursday, December 3, 2015

Final Class Presentation (1)

- Final presentation
- Term paper – final reminder and Q&A

Week 16: Thursday, December 10, 2015

Final Class Presentation (2)

- Final presentation
- Warp-up
- Course evaluation

Term paper due: December 13, 2015, 11:59 pm CDT

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