



ENV 538 (PPS 582, GLHLTH 538) Fall 2015
Global Environmental Health: Economics & Policy
Tuesday, Thursday 11:45 AM – 1:00 PM
SAN 03 Sanford School of Public Policy



This survey course provides a social science perspective on global environmental health. We will take a population health perspective by considering health outcomes and health behaviors of groups of individuals (including distribution within groups – e.g., disparities), patterns of health determinants (mainly non-medical) and policies and interventions that link the two. Students will (a) identify primary environmental causes of high burden diseases such as malaria, diarrhea, and respiratory infections; (b) examine how disease prevention behaviors reveal values for environmental quality for use in cost-benefit analyses; (c) review frameworks to empirically evaluate interventions & incentives that promote preventive behaviors; and (d) discuss key policies to control global environmental health problems based on incentives of key stakeholders. Class exercises and research project will focus on empirical aspects of course readings and use statistics (Stata).

Pre-requisite: Introductory Statistics (*i.e.*, you understand central tendencies, can estimate descriptive statistics, and can test simple hypotheses and conduct regression analysis). We will use STATA for homework assignments.

Keywords: survey, multi-disciplinary, inter-sectoral, incentives, population health, empirical, policy.

Complementary courses: Environmental Toxicology – Meyer; Population-Environment Dynamics & Health - Pan; Population, Health, & Policy – Merli; Global Health – Whetten; Economic Analysis & Evaluation for Public Health and Environment - Jeuland

Course Instructor

Subhrendu K. Pattanayak

Professor of Public Policy & Environment

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Office hours: Tuesdays 1:30 – 3:30 | by appointment **

(I will generally NOT be available during the morning before class or on Mon and Wed afternoons).

Teaching Assistant

Alisha Pinto

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Office hours: Wednesdays, 11:30-1:30 |by appointment

She will lead reviews and recitation sessions on Statistics (STATA, during week 1) and micro-economics, grade homeworks, and serve as trouble-shooter-in-chief.

READING

There is no required text book for this course. This is a new field of work, and therefore there is no one text book that does justice to the economics and policy aspects of global environmental health. To learn, we will draw on numerous academic papers, reports published by various organizations, and interactions with scholars in this field. All readings will be available through the Sakai site.

However, I strongly recommend that you consider buying and using a copy of the following thin and cheap book. We will use portions of this in the class, and it might be the one thing that you might remember about the course long after you lose access to the electronic materials.

World Bank. 2008. *Environmental health and child survival: epidemiology, economics, experiences*.

Whitmee, S, et al. 2015. *Safeguarding human health in the Anthropocene epoch*. Lancet. 60901-1
[http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(15\)60901-1/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)60901-1/fulltext)

COURSE OBJECTIVES

By the end of the course, students should be able to ...

1. define environmental health in the context of public health, conservation & development policy,
2. develop an annotated bibliography of 50 or more key papers, books and reports in this field
3. clarify the role of economics for identifying the key actors and for evaluating and designing policy solutions,
4. apply statistical methods to examine the empirical bases of environmental health puzzles, particularly so you can value environmental quality and evaluate health behavior interventions
5. write a paper that draws on 1-4 to describe a concrete empirical application.

COURSE REQUIREMENTS

Class Participation

Class participation is encouraged. Participation will affect your final grade: outstanding classroom participation may raise your final grade by a notch and failure to attend and participate in class discussions may lower your grade a notch. Generally, participation entails:

- ✓ Preparing for class – carefully review suggested reading materials
- ✓ Contributing to class discussions - state your opinion, reference & support it. Note, your participation should help move discussion to greater depth, crystallize an idea, show original thinking and/or motivate others to think differently.
- ✓ Blog and comment on other blogs

Problem Sets

Three problem sets will be assigned throughout the term (see schedule below). These problem sets will provide practice with the empirical methods used for evaluations in global environmental health analysis. *You may work with other students on the early stages of the problem sets, but the work you hand in must be your own.*

One of the problem sets will involve extensive group work so that you can conduct a **meta-analysis**. As a group, you will conduct a meta-analysis on adoption of averting behaviors to reduce environmental health risks – e.g., use of toilets, taps, bed nets, and improved cook stoves. The class will be divided into groups, whose size and number will depend of final class size (after drop/add). Each group will identify and study at least 15 empirical studies on adoption of environmental health interventions that use household level data and statistical analysis of adoption behavior as a function of 10 or more variables. The group will then jointly code the data so that you can (a) summarize the key determinants of behavior change, (b) identify important knowledge gaps, and (c) comment on potential research topics and policy solutions. You will be given an example meta-analysis from a related field. To the extent possible, each group is expected to work using the wiki-tool in Sakai.

Blog entries and Comments

Once (or twice, depending on the final class size) during the semester, you will submit a 500 word blog entry on the readings for the class ONE day (11AM) prior to the class. A blog entry should include a brief summary of key points, things you didn't know or agree with, empirical quality etc. Each participant is expected to use the blog-tool in Sakai. No more than 2 people can submit a blog per class. Your classmates will have access to the material and can offer further reactions. If you are not a designated blogger, you are strongly encouraged to offer a 100 word commentary on the blogs or the articles for each class. The bloggers and the commentators should draw on popular media – podcasts, blogs, op-eds – to offer additional insights. I am prepared to assign dates to people, unless someone really cares about the specific topic they wish to write on. If so, please scan the reading schedule to identify the topic as soon as possible and email Alisha. If it becomes too hard to match bloggers and topics, I will assign to solve the coordination problem.

Term Paper

This is the most significant diagnostic for the course. It is a capstone in the sense that it draws on all the course material (including 3 problem sets) and comes at the end of the course so that you can synthesize what you have learnt. The topic can be either one that is already on the syllabus or a different one, as long as it pertains to global environmental health. You should plan to conduct an empirical investigation using primary or secondary data and the methods employed in class assignments. Suggestions for data will be provided on Sakai.

1. Select a topic that you would like to research in more depth. Read a minimum of 5 refereed publications on the topic. You can also read non-refereed publications, but you must read at least 5 refereed publications. Develop an annotated bibliography of these publications, which includes an abstract and summary of the knowledge gaps that can be addressed with data analysis. Explain in 1 page what aspect of environmental health you wish to study, why this is an important issue, what data might you use, and what you will be able to say about policy and program design.
 - a. **Draft with annotated bibliography of 2 publications + preliminary ideas: Sep 19 (Thurs)**
 - b. **Revised draft with annotated bibliography of 2 publications + preliminary ideas: Oct 3 (Thurs)**
2. Describe any data, analysis methods and empirical model (outcome [Y] and explanatory [X] variables) you can use to address this knowledge gap. **Deadline for data description: Nov 7 (Thurs)**

3. Present your review, data, and analysis and conclusions to the class: **Nov 12, 17, & 19**. The presentation slide deck must address the following questions. (a) Why is your topic important? (b) What has already been done? (c) What data did you bring to the topic? (d) What were your main findings and (e) Do these findings lead you to recommend any policies & programs? You are strongly encouraged to draw on your problem sets to include maps, figures, literature syntheses, and regressions in your paper.
4. Submit a written term paper by **Dec 2 (Mon)**.

GRADING WEIGHTS & DUE DATES

The following weights will be used as the starting point for determining each student's final grade in the course:

Weights	Diagnostic	Dates
10	Participation	...everyday
30	Problem sets	Sep 8 – graphics & simple regressions Sep 24 – meta-analyses & meta-regressions Oct 15 – Evaluation & more graphics
10	Blogs	...schedule determined during week1
25	Term paper	Sep 17 – topic + biblio draft I Oct 6 - topic + biblio draft II Nov 5 – data & model description Nov 12, Nov 17, Nov 19 - oral presentation
25	Final Exam?	Graduate reading period (take home)
100	Total	

HONOR CODE

All student activities, including those in this course, are governed by the Duke Community Standard, which states:

Duke University is a community dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Citizens of this community commit to reflect upon and uphold these principles in all academic and nonacademic endeavors, and to protect and promote a culture of integrity. Students affirm their commitment to uphold the values of the Duke University community by pledging to uphold the Duke Community Standard:

- *I will not lie, cheat, or steal in my academic endeavors;*
- *I will conduct myself honorably in all my endeavors; and*
- *I will act if the Standard is compromised.*

Please note: although students are allowed to collaborate on problem sets with other students who are currently enrolled in the course, obtaining solutions from students who took the course previously or passing on solutions to other students who are not currently enrolled in the course are both considered violations of the Duke Community Standard.

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(please read the fine print: readings highlighted in yellow or gray are v. likely to change; guest lectures will also likely move around on the schedule)

DETAILED READING LIST

Tue, Aug 25. Introduction: Course Logistics, Philosophy & Examples

- 📖 Pattanayak, S.K., J-C. Yang, K. L. Dickinson, C. Poulos, S.R. Patil, R. Mallick, J. Blitstein and P. Praharaj. 2009. Shame or subsidy revisited: Social mobilization for sanitation in Orissa, India. *Bulletin of the World Health Organization*. 87(8): 580-587.

Thu, Aug 27. Environmental Health: Burden of Disease

- 📖 Smith KR, Corvalán CF, Kjellstrom T. 1999. How much global ill health is attributable to environmental factors? *Epidemiology* 10:573-84
- 📖 Prüss-Üstün A, Corvalan C. 2006. *Preventing disease through healthy environments. Towards an estimate of the environmental burden of disease*. Geneva: World Health Organization. Pages 8-14, 18-25, and 58-71.
- 📖 http://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen.html

Tue, Sep 1. Environmental Health: Epidemiological Transitions

- 📖 **Smith KR, Ezzati M. 2005.** How environmental health risks change with development: the epidemiologic and environmental risk transitions revisited. *Annual Review of Environment and Resources*. 30:291-33
- 📖 Myers, SS, L Gaffikin, CD Golden, SA Osofsky, RS Ostfeld, KH Redford, T Ricketts, and WR Turner. 2013. Human health impacts of ecosystem alteration. *PNAS*
- 📖 Cutler, D, A Deaton and A Lleras-Muney. 2006. The determinants of mortality. *Journal of Economic Perspectives*. 20 (3): 97-120
- 📖 World Bank. 2008. *Environmental health and child survival: epidemiology, economics, experiences*. Washington, DC. Pages 85-89 (short introduction to history of environmental health).

Thu, Sep 3. Diarrhea ...

- 📖 Keusch, GT, O Fontaine, A Bhargava, C Boschi-Pinto, ZA Bhutta, E Gotuzzo, JA Rivera, J Chow, SA Shahid-Salles, and R Laxminarayan, "Diarrheal Diseases." 2006. Chapter 19 in the *Disease Control Priorities in Developing Countries II* 371-388. New York: Oxford University Press. DOI: 10.1596/978-0-821-36179-5/Chpt-19.
- 📖 Fewtrell L, Kaufmann R B, Kay D, Enanoria W, Haller L and Colford J M. Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. *Lancet Infectious Diseases* 2005; 5(1); 42-52.
- 📖 Waddington, H and Birte Snilstveit. Water, sanitation and hygiene interventions to combat childhood diarrhoea in developing countries. *Journal of Development Effectiveness* 2009; Vol. 1, issue 3:295-335.

Tue, Sep 8 Respiratory Infections

- 📖 Simoes, EAF, T Cherian, J Chow, SA Shahid-Salles, R Laxminarayan, and TJ John. "Acute Respiratory Infections in Children." 2006. *Disease Control Priorities in Developing Countries II*, 483-498. New York: Oxford University Press. DOI: 10.1596/978-0-821-36179-5/Chpt-25.

- 📖 Bruce, N, E Rehfuss, S Mehta, G Hutton, and K Smith, "Indoor Air Pollution." 2006. *Disease Control Priorities in Developing Countries II*, 793-816. New York: Oxford University Press. DOI: 10.1596/978-0-821-36179-5/Chpt-42.
- 📖 Dherani, M. D. Pope, M. Mascarenhas, KR Smith, M Weber & N. Bruce. 2008. Indoor air pollution from unprocessed solid fuel use and pneumonia risk in children aged under 5 years: A systematic review and meta-analysis. *Bulletin of the World Health Organization* 86(5): 390-398.
- 📖 Speizer, FE, S Horton, J Batt, and AS Slutsky, "Respiratory Diseases of Adults." 2006. *Disease Control Priorities in Developing Countries II*, 681-694. New York: Oxford University Press. DOI: 10.1596/978-0-821-36179-5/Chpt-35.

Thu, Sep 10. Malaria

- 📖 Breman, JG, A Mills, RW Snow, JA Mulligan, C Lengeler, K Mendis, B Sharp, C Morel, P Marchesini, NJ White, RW Steketee, and OK Doumbo, "Conquering Malaria." 2006. *Disease Control Priorities in Developing Countries II* 413-432. New York: Oxford University Press. DOI: 10.1596/978-0-821-36179-5/Chpt-21.
- 📖 Keiser, J., B.H. Singer, and J. Utzinger. 2005. Reducing the burden of malaria in different eco-epidemiological settings with environmental management: a systematic review. *Lancet Infectious Diseases* 5: 695-708.
- 📖 Yasuoka, J. and Levins, R. (2007) 'Impact of deforestation and agricultural development on anopheline ecology and malaria epidemiology'. *American Journal of Tropical Medicine and Hygiene* 76(3): 450-460.

Tue, Sep 15 Nutrition ...

- 📖 World Bank. 2008. *Environmental health and child survival: epidemiology, economics, experiences*. Washington, DC. Pages 17-44 (Chapter 2 & 3 on Environmental Health, Malnutrition, Other Child Welfare strategies).
- 📖 Currie, J and T. Vogl., 2013. Early-Life Health and Adult Circumstance in Developing Countries. *Annual Review of Economics* 5: 1-36
- 📖 Shulevitz, J. 2012. Why fathers really matter. New York Times Magazine. Sep 9, 2012
- 📖 Cebu StudyTeam. 1992. A child health production function estimated from longitudinal data. *Journal of Development Economics* 38: 323-51.

Thu, Sep 17. Climate Change & Migration

- 📖 McMichael, A.J., R.E. Woodruff and S. Hales, 2006: Climate change and human health: present and future risks. *Lancet* 367, 859-869.
- 📖 Maystadt, JF and V Mueller. 2012. Environmental Migrants: A Myth? IFPRI Research Brief 18.
- 📖 Hsiang, Solomon M., Marshall Burke, and Edward Miguel. "Quantifying the influence of climate on human conflict." *Science* 341.6151 (2013): 1235367.
- 📖 Bohra-Mishra, P., M. Oppenheimer, S.M. Hsiang. (2014). Nonlinear permanent migration response to climatic variations but minimal response to disasters. *Proceedings of the National Academy of Sciences*

Tue, Sep 22. Planetary Health & Implementation Science

- 📖 Whitmee, S, et al. 2015. Safeguarding human health in the Anthropocene epoch. *Lancet*. 60901-1 [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(15\)60901-1/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)60901-1/fulltext) {**read pages 1-6 and 24-46**}.
- 📖 Madon, T., KJ Hofman, L Kupfer, RI Glass. Implementation Science. *Science*. 318 (5857): 1728 – 1729.
- 📖 Eisenberg, J.N.S., Desai, M.A., Levy, K., Bates, S.J., Liang, S., Naumoff, K., Scott, J.C. 2007. Environmental determinants of infectious disease: A framework for tracking causal links & guiding public health research. *Environmental Health Perspectives* 115(8), 1216-1223.
- 📖 Krieger, N., 1999. Sticky webs, hungry spiders, buzzing flies, and fractal metaphors: on the misleading juxtaposition of "risk factor" versus "social" epidemiology. *Journal of Epidemiology and Community Health* 53: 678-680.

Thu, Sep 24 Behavior, Health & the Environment

- 📖 Pattanayak, S.K. and A. Pfaff. 2009. Behavior, environment and health in developing countries: Evaluation and valuation. *Annual Review of Resource Economics*. 1: 27.1 – 27.35.
- 📖 Glanz, K, and Bishop. The Role of Behavioral Science Theory in Development and Implementation of Public Health Interventions. *Annual Review of Public Health*. 31:399-418

Tue, Sep 29 HPF applications: Sociology & Psychology

- 📖 Dickinson, K. and S.K. Pattanayak. 2012. "Open sky latrines: Social reinforcing in the case of a (very) impure public good." Duke University Working Paper.
- 📖 Atmadja, S., E. Sills, SK Pattanayak. SR Patil, and J-C Yang. 2012. Do discount rates affect environmental health behaviors? Evidence from India. Unpublished Working Paper.

Thu, Oct 1. Communities

- 📖 deWilde, CK, A Milman, Y Flores, J Salmeron & I Ray. 2008. An integrated method for evaluating community-based safe water programs and an application in rural Mexico. *Health Policy and Planning* 23(6):452-464.
- 📖 Isham, J. & Kahkonen, S. 2002. Institutional Determinants of the Impact of Community-Based Water Services: Evidence from Sri Lanka and India. *Economic Development and Cultural Change* 50(3): 667-91.
- 📖 Pritchett, L. & Woolcock, M. 2004. Solutions When the Solution is the Problem: Arraying the Disarray in Development. *World Development* 32(2): 191-212.

Tue, Oct 6: Markets

- 📖 Bustero, F, A Harding, and H. Axelsson. 2003. Can developing countries achieve adequate improvements in child health outcomes without engaging the private sector? *Bulletin of the World Health Organization*. 81(12): 886-895.
- 📖 Gassner, K., A. Popov, and N. Pushak. 2008. Does the private sector deliver on its promises? Evidence from a global study in water and electricity. *Gridlines Note 36. Public-Private Infrastructure Advisory Facility*, World Bank.
- 📖 Davis, J. 2005. Private Sector Participation in Water and Sanitation. *Annual Review of Environment and Resources*. 30:145-83.

Thu, Oct 8: Donors

- 📖 http://www.ted.com/talks/lang/eng/bill_gates_unplugged.html
- 📖 Radelet, S., & R. Levine. 2008. Can we build a better mousetrap? Three institutions designed to improve aid effectiveness. Chapter 16 in W. Easterly (ed.), *Reinventing Foreign Aid*. MIT Press. Pages 431-460.
- 📖 Birdsall, N. 2008. Seven deadly sins: Reflections on donor failings. Chapter 20 in W. Easterly (ed.), *Reinventing Foreign Aid*. MIT Press. Pages 515-551.
- 📖 Papers on EBA

Tue, Oct 15: NGOs

- 📖 Edwards, M. and D. Hulme. 1996. "Too close for comfort? The Impact of official aid on non-governmental organizations". *World Development* 24(6): 961-73.
- 📖 Townsend J, Porter G and Mawdsley E (2004) Creating spaces of resistance: Development NGOs and their clients in Ghana, India and Mexico. *Antipode* 36(5):871-889.
- 📖 Troncoso, K, A Castillo, L Merino, E Lazos, OR Masera. 2011. Understanding an improved cookstove program in rural Mexico: An analysis from the implementers' perspective. ? *Energy Policy* 39(12): 7600-7608



Thu, Oct 31. Politicians & Bureaucrats

- 📖 Chattopadhyay, R. & E. Duflo, 2004. Impact of Reservation in Panchayati Raj: Evidence from a Nationwide Randomized Experiment. *Economic & Political Weekly*. 39 (9): 979-986.
- 📖 Rauch, JE and PB Evans. 2000. Bureaucratic Structure and Bureaucratic Performance in Less Developed Countries. *Journal of Public Economics* 75: 49-71.

Tue, Nov 03. Re-inventing the Toilet: Laura Morrison (RTI International)



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Thu, Nov 5. Non-market valuation 1.0 – Professor Marc Jeuland

- 📖 Yang, J-C, S.K. Pattanayak, C. Mansfield, F. R. Johnson, C. van den Berg, H. Gunatilake and K. Wendland. 2007. "Un-packaging Demand for Urban Water Supply: Evidence from Conjoint Surveys in Sri Lanka". World Bank Policy Research Working Paper 3817.
- 📖 Jeuland, M; M. Lucas; J. Clemens; D. Whittington. Estimating the private benefits of vaccination against cholera in Beira, Mozambique: a travel cost approach. *Journal of Development Economics* 91 (2009): 310-322.
- 📖 Nauges, C., Strand, J & Walker, I. 2009. "The value of water connections in Central American cities: a revealed preference study. *Environment and Development Economics*. 14(03), pages 349-370

- 📖 Pattanayak, SK, J.C. Yang, D. Whittington, and Bal Kumar K.C, 2005. "Coping with Unreliable Public Water Supplies: Averting Expenditures by Households in Kathmandu, Nepal." **Water Resources Research** 41(2)

Tue, Nov 10. Economics of Malaria: Prof Zac Brown (NCSU)

- 📖 Althouse, B. M., Bergstrom, T. C., & Bergstrom, C. T. (2010). A public choice framework for controlling transmissible and evolving diseases. *Proceedings of the National Academies of Science*, 107(Suppl 1), 1696–1701.
- 📖 Chitnis, N., Schapira, A., Smith, T., & Steketee, R. (2010). Comparing the effectiveness of malaria vector-control interventions through a mathematical model. *The American Journal of Tropical Medicine and Hygiene*, 83(2), 230–240.
- 📖 Cook, J., Jeuland, M., Maskery, B., Lauria, D., Sur, D., Clemens, J., & Whittington, D. (2009). Using private demand studies to calculate socially optimal vaccine subsidies in developing countries. *Journal of Policy Analysis and Management*, 28(1), 6–28. <http://doi.org/10.1002/pam.20401>
- 📖 Mangham, L. J., Hanson, K., & McPake, B. (2009). How to do (or not to do)...Designing a discrete choice experiment for application in a low-income country. *Health Policy and Planning*, 24(2), 151–158. <http://doi.org/10.1093/heapol/czn047>

Tue, Nov 12. Student presentations

Thu, Nov 14: Student presentations

Tue, Nov 19: Student presentations

Thu, Nov 21: Donors

Tue, Nov 26: Scaling Up, Sustainability & Evaluations

- 📖 Piot, P. GLOBAL HEALTH 4.0 http://youtu.be/Ysm_konUqnM
- 📖 Mangham, LJ & K Hanson, 2010. Scaling up in international health: what are they issues? *Health Policy & Planning*. 25: 85-96
- 📖 White, H., 2009. Theory based evaluations: Principles & practice 3ie.
- 📖 World Bank. 2008. *Environmental health and child survival: epidemiology, economics, experiences*. Washington, DC. Pages 85-110 (Chapter 6 on Approaches to Environmental Health).