GLHLTH 641K

Non-Communicable Diseases in Low- and Middle-Income Countries: Trends, Causes, and Prevention Strategies

Dates / contact hours: Seven-week session, 300 minutes per week contact time
Academic Credit: 3-credit course
Tags for the Duke Undergraduate System:
Areas of Knowledge: Recommended NS, SS (Natural Sciences, Social Sciences)
Modes of Inquiry: Recommended STS (science technology)
This course is designed for the Master of Science in Global Health (DKU) program but is also open to undergraduate students who are juniors or seniors. Readings and gradings will be differentiated between graduate and undergraduate students so that the course will be suitable for both groups.

Instructor's Information and Office Hour

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Prerequisite(s), if applicable

None.

Course Description

Global health attention has historically been focused on acute and infectious diseases. With economic development and shifts in population, environments, and lifestyles, infections and diseases of under-nutrition no longer account for most of the disease burden in high-income countries. The same patterns are starting to emerge in many low- and middle-income countries (LMICs), at a much faster rate, however, than ever seen before in history. This course provides a global overview of the recent trends in non-communicable disease (NCD) epidemiology and strategies for prevention and control of these diseases with a particular emphasis on China and comparisons between China and other countries.

The course focuses on four major NCD categories: cardiovascular, diabetic, oncologic, and pulmonary diseases. Case studies are used to highlight selected geographic differences. Regional differences within China will be considered, in addition to the comparison of China to other countries. By using lectures,

videos, assigned readings, and classroom discussions as well as various assignments, the course aims to provide the students with a firm understanding of the shifting disease burden, stakeholders, and interventions to address NCDs in LMICs.

Course Goals / Objectives

At the end of the course, each student will be able to:

1. Define and articulate the concept of NCDs in the context of global public health.
2. Compare and contrast trends among regions of China as well as between China and other countries.
3. Describe recent trends in NCD epidemiology with special attention to differences between high-income and LMICs.
4. Analyze and articulate the upstream determinants and burden of NCDs in economic, social, environmental, and political terms.
5. Identify key risk factors for NCDs and main stakeholders in NCD prevention and management, and review various strategies to address NCDs by these stakeholders.
6. Apply the above objectives to the case of cardiovascular, diabetic, oncologic, and pulmonary diseases.

*In this course – an adventurous journey we embark on **together**, I hope that we (re)-discover the real, large, and rising threat of NCDs to personal, national, and global health; (re)-ignite the passion to do something about it; and to cultivate learning, critical thinking, creative skills that will enable us to do so.*

Required Text(s)/Resources

No required textbook. Required readings (mostly in electronic formats) will provided by the instructor or available through Duke on-line library resources and the course Sakai site.

Recommended Text(s)/Resources

Stuckler D and Siegel K (eds.). Sick societies: Responding to the global challenge of chronic disease. Oxford University Press. 2011.

A limited number of relevant books will be available in the DKU library. The library website also contains a course page for online resources.

Students will be encouraged to take advantage of the DKU Writing Studio and/or the Duke Writing Studio (http://twp.duke.edu/writing-studio/resources).

Course Requirements / Key Assignments

Grading for this course is based on four requirements with differentiation for undergraduate and graduate students when appropriate: Student Evaluations will be based:

1. Attendance and Participation (25%, including 5% for a presentation on the field trip)
2. Student teaching (presentation) (10%)

3. Academic debate (25%, 10% group rating, 5% individual rating, 10% individual paper)
4. Manuscript Development Participation (40%, 10% literature search and review, 20% writing, 10% presentation on literature and interviews)

Attendance and Participation (25%): Students will be expected to participate in class discussions. This participation may be in the form of question and answers, open discussions, role-playing, mock debates, or sharing of class summaries or opinions. Students should come to class having read the assigned materials so that they are well prepared to participate. Particular attention will be paid to any difficulties the EFL students may have with oral communication in English or with the US-style of classroom discussions. The instructor will also communicate with the DKU professors who will be teaching the writing and oral communications classes and helping students through the DKU Writing Studio. The instructor will clearly explain the expectations for classroom engagement during the first class meeting and will provide feedback to the students on subsequent class meetings. The students have the opportunity to go on two field trips (co-organized with other courses) with one field trip being required. Grading for this part will be based on attendance (10%) and participation (rating based on level of engagement and relevance of comments, 10%) and a field trip presentation (5%).

Student teaching (presentation) (10%): Each student will choose or be assigned a session in the syllabus to present the main content of one key required reading to the whole class as a basis for further discussion. The presentation will be 10 minutes long. Graduate students are expected to include other relevant materials in this presentation beyond the one reading and can make the presentation up to 15 minutes long. Each presentation will be graded using the following five categories:

- *Organization* (15%) – Assessment of physical organization (Does the presentation flow? Is it coordinated, matched with visual aids? Does it keep on time?)
- *Content* (40%) – Assessment of whether contents are relevant and scientifically presented? Does it pose meaningful questions on population health improvements?
- *Clarity* (15%) – Assessment of whether the presentation is understandable with appropriate language?
- *Use of audio visual materials* (10%) – Assessment of suitability of the audiovisual media used; are visual aids addressed, used well?
- *Overall quality of the presentation* (20%) – It would look for good language, eye contact, style, structure, use of tone and volume, impact of the message and overall standard of the presentation.

Academic Debates (25%): Students will form two groups with each group divided into the affirmative vs. the negative party. Each group will choose or be assigned a controversial topic related to NCD prevention and control. Each party in the group will prepare for the debate ahead of time and engage in an hour-long Lincoln-Douglas style debate later in the course (to be explained during the first session). Each student will speak between 5-15 minutes in each debate. Each party will receive a group rating (10 points) and an individual rating (5 points). In addition, each student will turn in a short paper (<500 words) on their proposition before the debate (up to 10 points). The two resolutions are:

- Universal sodium reduction is a beneficial global health policy.
- Polypill is useful for primary prevention of cardiovascular diseases.

Manuscript Development Participation (40%): The course will produce a manuscript to be submitted by the end of the semester. Participation in the development of the manuscript will be graded based upon: 1) eagerness to participate 2) finishing assigned portion of work by the deadlines 3) quality of work performed 4) ability to work as a team. The portions of the manuscript will be split into four different parts on the first day of class and we will come up with a manuscript idea and methodology as a group. The instructor will discuss methods and tips for writing the manuscript throughout the course. After the class, the manuscript will be submitted with all class members as authors and Dr. Yan as the corresponding author. Students will also conduct interviews and make a presentation on their section and interviews.

Technology Considerations, if applicable

Students should have laptop computers. Students will need internet access for library resources and for the course Sakai site.

Assessment Information / Grading Procedures

The **grading scale** for the course is as follows:

A+	98-100	C+	77-79
A	93-97	C	76-73
A-	90-92	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
B-	80-82	D-	60-62
		F	<=59

Diversity and Intercultural Learning (see Principles of DKU Liberal Arts Education)

Readings and cases will be drawn from thinkers and situations spanning the globe. Attention in readings and class time will be devoted to the challenges and principles of creating a productive learning environment for all participants. Grades for the students' assignments and classroom participation will reflect their effort and ability to work successfully in an intercultural setting. Guidance on group work and class participation will be provided for students not accustomed to open discussion style of pedagogy.

Course Policies and Guidelines

- Community Standards: Students are expected to abide by the DKU community standards of **respect, excellence, and integrity**, which are based on the Duke University standards (http://

studentaffairs.duke.edu/conduct/about-us/duke-community-standard) at all times. If a questionable circumstance arises, please seek the instructor's guidance sooner rather than later. In particular, all assignments are to be written in the students own words. Any citing of numbers should be referenced appropriately. All references used should be listed on the paper. If an assignment is late, the student may hand it in at any time but will receive no more than 50% of the possible grade. Any student who commits plagiarism will be reported to DGHI Masters Program leadership. The penalty for plagiarism is severe and can be expulsion from the program.

- Attendance: Students are expected to attend each class session unless they have a legitimate excuse for missing a class. If possible, students should let the instructor know about missing classes ahead of time. Attendance will be taken at the beginning of class. Any unexcused absence from class or tardiness will factor into the final Participation and Attendance grading. It is the student's responsibility to be familiar with the topics and material from any missed class.

- Assignment due dates: Written assignments will be due by 10am on the due date. Assigned work that is turned in late on the due date will be penalized 5% of the total grade for that assignment. Work that is turned in after the due date will be penalized 10% of the total grade points per day that it is late. Emailing assignments is preferable. The email date and time stamp will be used to judge if the assignment has been turned in on time.

- Electronic devices in the classroom: Telephones, pagers, and other communication devices are to be turned off or silenced and are not to be visible during class. Sending or receiving electronic communication of any type (e.g., SMS, email, voicemail) is not allowed including passively monitoring communication. When in class, you are expected to be engaged in the class session. Therefore, use of laptops, tablets and other computers for purposes other than providing a digital copy of the assigned reading material or taking notes is generally disallowed.

- Email communication: Discussion of issues and topics covered in the course should be reserved for class time or office hours as much as possible. Email communication will not be used as a substitute in this regard. The instructor will not review via email any material or lectures that a student might have missed**.** The instructor will strive to answer appropriate email messages in a timely and thorough manner. Email messages should include an appropriate salutation and closing and should follow spelling, usage, and grammar rules.

Course Outline and Reading List by Week and Session

Read each article/chapter before the start of class on the dates listed below. Additional readings will be assigned throughout the semester. The determination of a rigorous yet manageable reading load will be made according to consultation with other DKU professors and feedback from the students, as well as the standards of a Duke University course of this level. Readings marked with "(for undergraduate students" or "(for graduate students)" are for the specific groups and those without are for everyone.

Week 1 Session 1

1.1.a Getting to know each other and NCDs

1.1.b Making choices about what you will do in the course

World Health Organization. 2005. Preventing chronic diseases: a vital investment – a WHO global report. (Required before class: pages 35-36 only).

Read Pages 35 and 36 (pages 51 and 52 of the PDF file) to get a basic understanding of the 4 types of NCDs. Browse (i.e. flipping through the pages quickly) only if you have time.

Week 1 Session 2

1.2.a The Global Burden of Diseases and United Nations NCD Declaration

GBD 2013 DALYs and HALE Collaborators. Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990-2013: quantifying the epidemiological transition. The Lancet. 2015; 386: 2145-2191.

This is a very technical paper. Read the "Research in Context" (box on the 2nd page) first. Then Read the introduction and focus your energy on understanding Figure 2 and Figure 4 (with help of the text or search the web for terms you do not understand). Read other parts only if you have time.

Questions to think about:

- *If we only use one measure to capture the **many** dimensions of health, how will you construct this measure? We will discuss the concepts of DALY and HALE briefly in class.*
- *What does the 3 graphs in Figure 2 show? Why are the trends in the 3 graphs different from each other?*
- *With help of the colors (red, blue, green) in Figure 4, and focus on changes over time (the lines connecting left box with middle box and middle box with right box), which conclusions can you draw for changes in major causes of DALYs?*

United Nations. 2011. Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases.

Quick reading to get a "flavor" of what a political declaration looks like. Be able to name the main parts (bold font headings) in the declaration.

1.2.b Determinants of health and NCDs

Mitchell E. Daniels Jr et al. *The factors behind the rising NCD epidemic.* In: The Emerging Global Health Crisis: Noncommunicable Diseases in Low- and Middle-Income Countries. 2014. Council on Foreign Relations, United States. Large file downloadable from http://www.cfr.org/diseases-noncommunicable/emerging-global-health-crisis/p33883 (For undergraduate students)

This is a US-centric report that is non-technical (ie, written for lay readers). Required reading: Exec. Summary pages 3-8 and Factors behind NCDs (pages 19-23).

Question: identify main factors discussed in this book on pages 19-23. Think about any other factors that you may know that is not addressed here.

David Stuckler et al. *Sick individuals, sick populations: The societal determinants of chronic diseases.* In Stuckler D and Siegel K (eds.). Sick societies: Responding to the global challenge of chronic disease. Oxford University Press. 2011. (For graduate students)

*For graduate students: read this chapter to understand the **KEY** messages. Think about potential ways that these determinants can be addressed. Think about **how** (methods/ways) to prioritize our strategies and actions in different contexts (eg. China, India, or Kenya) (not necessarily to come up with a prioritized list).*

Week 2 Session 1

2.1.a Cardiovascular diseases: Burden, trends, fundamental strategies

IOM (Institute of Medicine). 2010. Promoting Cardiovascular Health in the Developing World: A Critical Challenge to Achieve Global Health. Washington, DC: The National Academies Press. (PDF available at: http://www.ncbi.nlm.nih.gov/books/NBK45693/pdf/TOC.pdf) (**Pages 1-18 "Summary" only**) (for graduate students).

IOM (Institute of Medicine). 2010. Promoting Cardiovascular Health in the Developing World: A Critical Challenge to Achieve Global Health. Washington, DC: The National Academies Press. (**Report Brief, 4 pages**) (for undergraduate students).

2.1.b Hypertension and dyslipidemia: Silent killers and polypills

For the debate (one page only): Sara Reardon. Experts Debate Polypill – a Single Pill for Global Health. Science 333:1813.

Eva Lonn, Jackie Bosch, Koon K. Teo, Prem Pais, Denis Xavier, Salim Yusuf. The Polypill in the Prevention of Cardiovascular Diseases: Key Concepts, Current Status, Challenges, and Future Directions. Circulation. 2010;122:2078-2088.

Read this paper with the controversies regarding polypill in mind: what is polypill? What are the advantages of the polypill (which kind of barriers and problems does it address)? What are some drawbacks (weaknesses, challenges, problems) with polypill? Will polypill be good for primary prevention or secondary prevention of NCDs?

Week 2 Session 2

2.2.a From Framingham, USA to North Karelia, Finland

Nathan D. Wong, Daniel Levy. Legacy of the Framingham Heart Study: Rationale, Design, Initial Findings, and Implications. Global Heart. 2013; 8: 3-9.

This paper should be easy and fun to read. Reflect on the following questions:

- *Which kind of study design does the Framingham Heart Study have?*
- *Why was the small town of Framingham chosen for the study?*
- *What are the main findings from the early period of the study?*

Gérald Baril. The North Karelia Project in Finland: A societal shift favouring healthy lifestyles. The Institut national de santé publique du Québec (available at: http://www.inspq.qc.ca).

A 6-page article written for the general public (non-technical). Ponder:
- *What contributed to the success of the North Karelia Project in Finland?*
- *If you were to lead this project now, what would you suggest them to work on or improve? How would you go about deciding what to do?*

2.2.b Health promotion: Examples of sodium reduction in China and Peru

He Feng J, Wu Yangfeng, Feng Xiang-Xian, Ma Jun, Ma Yuan, Wang Haijun et al. School based education programme to reduce salt intake in children and their families (School-EduSalt): a cluster randomised controlled trial BMJ 2015; 350 :h770

This is a unique study in China. If you are technically challenged, you can bypass the sample size and statistical analyses parts (on the 4th page). Focus on the introduction, results and conclusions. If you have time, think about a policy question: if you were a policy maker, will you advocate to scale up this program nation-wide? Do you need more evidence and data to do so? How should this policy be implemented to ensure effectiveness? (The paper has some hints in Methods and Discussion but not comprehensive discourse on these questions)

Antonio Bernabe-Ortiz, Francisco Diez-Canseco, Robert H Gilman, María K Cárdenas, Katherine A Sacksteder and J Jaime Miranda. Launching a salt substitute to reduce blood pressure at the population level: a cluster randomized stepped wedge trial in Peru. Trials. 2014; 15:93 (for graduate students).

For graduate students: what are the main design differences between this study in Peru, the study in China (School-EduSalt) and another study in China (American Heart Journal. 2013;166:815-822.)

Week 3 Session 1

3.1.a Tobacco control (Guest lecture by Prof. Abu Abdullah)

Centre for Global Development. Chap 14. Curving tobacco use in Poland. In: Case Studies in Global Health: Millions Saved. Case studies 14, 2007. Pages 1-8. ISBN-13: 9780763746209. Available at: http://www.cgdev.org/doc/millions/MS_case_14.pdf

Non-technical 8-page reading (including Poland and South Africa's stories). What led to the "success" (10% reduction in cigarette consumption) in Poland from 1990-1998? Is their presentation of the evidence on the effects of the programme (page 5) convincing? Why or Why not? What should China be doing to curb tobacco use?

3.1.b Strengthening primary care: Examples from Asia and Africa

Yan LL, Fang W, Delong E, Neal B, Peterson ED, Huang Y, Sun N, Yao C, Li X, MacMahon S, Wu Y. Population impact of a high cardiovascular risk management program delivered by village doctors in rural

China: design and rationale of a large, cluster-randomized controlled trial. BMC Public Health 2014 (14): 345.

This paper is a protocol paper describing the design and methods for a study in rural China on strengthening primary care. Focus on the background (page 1), flow chart (page 5, Figure 1) and design principles (page 8). Understand the difference between population-based and high-risk based approaches and ponder why we need to and how can we strengthen primary care for NCD prevention and control?

To know more about the Primary Care 101, Practical Approach to Care Kit, and PACK CCW (Community Care Worker) programs in South Africa, visit
http://knowledgetranslation.co.za/programmes/pc-101/ http://knowledgetranslation.co.za/programmes/pack-adult/
http://knowledgetranslation.co.za/programmes/pack-ccw/

Week 3 Session 2

3.2.a M-health and NCDs: Examples from China & Australia

David Peiris, Devarsetty Praveen, Claire Johnson, Kishor Mogulluru. Use of mHealth Systems and Tools for Non-Communicable Diseases in Low- and Middle-Income Countries: a Systematic Review. J. of Cardiovasc. Trans. Res. 2014 (7):677–691.

This paper is a long systematic review on a large (broad) topic. If you are very interested in the methods of systematic review, I recommend you to read it carefully to learn more. If not, focus on Discussion (pages 681, 4, 7). Questions: how best to harness the power of mobile technology for the prevention and control of NCDs?

Pao-Hwa Lin, Yanfang Wang, Erica Levine, Sandy Askew, Shenting Lin, Cuiqing Chang, Jiani Sun, Perry Foley, Haijun Wang, Xu Li and Gary G Bennett. A Text Messaging-Assisted Randomized Lifestyle Weight Loss Clinical Trial Among Overweight Adults in Beijing. Obesity; 2014 (22): E29-E37.

A small study in Beijing on weight loss. Read the abstract and Table 1, and the discussion, in particular. Consider: what are the factors that may explain the overall effectiveness of this trial? How can the study be improved (some clues in the Discussion already, but think outside of the box is encouraged – i.e., think about aspects that the authors did not discuss in the paper).

3.2.b SMS for secondary prevention among NCD patients

Chow CK, Redfern J, Hillis GS, et al. Effect of Lifestyle-Focused Text Messaging on Risk Factor Modification in Patients With Coronary Heart Disease: A Randomized Clinical Trial. JAMA. 2015;314(12):1255-1263.

Focus on the Intro and Discussion sections if you are not interested in learning more about epidemiological methods. Compare this paper with the one above by Pao-Hwa Lin et al. – what are the main differences between the two papers? How can you improve upon the intervention (explained on pages 1257-8) but not sacrificing its simplicity and potential scalability?

Eapen ZJ, Peterson ED. Can Mobile Health Applications Facilitate Meaningful Behavior Change? Time for Answers. JAMA. 2015;314(12):1236-1237 (*for graduate students*).

Week 4 Session 1

4.1.a You are what you eat?

U.S. Department of Health and Human Services and U.S. Department of Agriculture. *2015 – 2020 Dietary Guidelines for Americans*. 8th Edition. December 2015. Available at http://health.gov/dietaryguidelines/2015/guidelines/.

Read the executive summary (8 pages) and understand the concept of healthy eating patterns and key recommendations (on sakai or at http://health.gov/dietaryguidelines/2015/guidelines/executive-summary/).

Scientific Report of the 2015 Dietary Guidelines Advisory Committee. USDA. February 2015. (Pages 13-23 of the PDF file, Part A: Executive Summary pages 1-11 only) (for graduate students).

F. B. Hu, Y. Liu and W. C. Willett. Preventing chronic diseases by promoting healthy diet and lifestyle: public policy implications for China. Obesity reviews 2011 (12): 552–559.

4.1.b Exercise as Prevention and Medicine

2008 Physical Activity Guidelines for Americans. *Pages vi – 14 only.*

C. Sanz, J.-F. Gautier, H. Hanaire. Physical exercise for the prevention and treatment of type 2 diabetes. Diabetes & Metabolism. 36 (2010) 346–351.

Week 4 Session 2

Overweight & obesity: Trends, measures, consequences, & frontiers

Peter G. Kopelman. Obesity as a medical problem. Nature. 2000 Apr 6;404(6778):635-43.

Pre-diabetes and diabetes in China: Tip of the iceberg

Frank Hu. Globalization of diabetes: The role of diet, lifestyle and genes. Diabetes Care 2011;34(6): 1249-57.

Wenying Yang, et al.
for the China National Diabetes and Metabolic Disorders Study Group. Prevalence of Diabetes among Men and Women in China. N Engl J Med 2010;362:1090-101. *(For graduate students only)*

Week 5 Session 1

Cancer: Global transition and cancer care

Bray et al. Global cancer transitions according to the Human Development Index (2008-2030): a population-based study. Lancet Oncol 2012;13:790-801. (Optional)

Farmer et al. Expansion of cancer care and control in countries of low and middle income: a call to action. Lancet (2010) vol. 376 (9747) pp. 1186-93

Respiratory diseases: Air pollution, cooking stove, and microbiome

Salvi and Barnes. Chronic obstructive pulmonary disease in non-smokers. Lancet (2009) vol. 374 (9691) pp. 733-43.

Ait-Khaled N, Enarson D, Bousquet J. Chronic respiratory diseases in developing countries: the burden and strategies for prevention and management. Bull World Health Organ. 2001;79(10):971-9. (Optional)

Week 5 Session 2

Patient-centered care

WHO. Adherence to long term therapies: evidence for action. World Health Organization 2003; pp3-25 (WHO, 2003). http://www.who.int/chp/knowledge/publications/adherence_full_report.pdf

Self-management, and peer support

Funnell MM. Peer-based behavioural strategies to improve chronic disease self-management and clinical outcomes: evidence, logistics, evaluation considerations and needs for future research. Family Practice (2010) 27(suppl 1): i17-i22.

Week 6 Session 1

Private sector and NCDs: industry, innovation, and inspiration

Tara Acharya et al. Chapter 6 Activities of the Private Sector. In Stuckler D and Siegel K (eds.). Sick societies: Responding to the global challenge of chronic disease. Oxford University Press. 2011.

World Health Organization. Chapter 3 "Innovations in Care: Meeting the Challenge of Chronic Conditions" In. Innovative Care for Chronic Conditions: Building Blocks for Action. (2002) pp. 41-65.

Whole of government, whole of society

Fifteen ministries in China. May 2012. 2012-2015 China National Chronic Disease Prevention and Treatment Plan (Original document in Chinese; translated to English).

David Blumenthal and William Hsiao. Privatization and Its Discontents — The Evolving Chinese Health Care System. N Engl J Med 2005; 353:1165-1170 (For graduate students only)

David Blumenthal and William Hsiao. Lessons from the East — China's Rapidly Evolving Health Care System. N Engl J Med 2015; 372:1281-1285 (For graduate students only)

Week 6 Session 2

Class Debate

Week 7 Session 1

Student Presentations on field trip and their paper sections and interviews

Week 7 Session 2

Group work on integrating the draft sections into an academic paper