**Introduction**

* Prevalence of diabetes and cancer (in U.S. ideally);
* Changing incidence and attributable risks
* Risk factors for them and associated with them (age, sex, certain lifestyle habits etc.)-> begin to hint towards socioeconomic determinants here
* Cost of diabetes and cancer therapies
  + How have costs changed in recent years (significant increases)
  + How many patients report skipping meds and/or other cost saving behaviors or medication stress (if these statistics are available)
  + Impact of insurance (again if known; can also tie to cancer and diabetes outcomes more generally without medication mediator)
* Possible reasons why medication stress/skipping would cause mortality: DKA, worse outcomes, morbidity along the way, uncontrolled diabetes; metastases or recurrence; stress in general

**Aims:** The objective of this study was to determine if medication non-adherence due to cost is associated with mortality in persons with diabetes and cancer.

**Methods**

* NHIS Survey Design, Years Chosen for Analysis (2000 -2014) because these specifically assessed medication skipping/cost cutting measures AND had linkage to NDI
* Describe linkage to NDI:
  + what is right censoring for follow-up
  + weights have to be used to account for those ineligible for follow-up
  + restricted to age 18 and up for confidentiality (weren’t linked to NDI)
  + only given quarter of year for when died + used end of that quarter. Eliminate 43 participants with inconsistent interview and death dates (ie interview supposedly occurred AFTER DOD)
* Variables coded and how (possibly including):
  + medication stress and medication cost-saving behaviors/general health care barriers
    - **(Questions asked from 2010-2014)**
    - Have you ever skipped doses to save $?
    - Have you ever asked doctor to prescribe you cheaper version?
    - Have you ever delayed taking meds to save $?
    - Have you ever purchased medicine from foreign country to save $?
    - Have you every used alternative medicines (e.g. homeopathic, supplements) to save $?
    - **(Questions asked from 2000 – 2014, about barriers including costs)**
    - Have you ever delayed care because it cost too much?
    - Have you ever delayed care because you couldn't get appt soon enough?
    - Have you ever delayed care because office hours didn't work?
    - Have you ever delayed care because you couldn't reach doc by phone?
    - Have you ever delayed care because you couldn’t get transportation?
    - Have you ever delayed care because the wait time too long?
    - In past 12 months have you needed but couldn't afford med care?
    - In past 12 months have you needed but couldn't afford medication?
    - In past 12 months have you needed but couldn't afford followup?
    - In past 12 months have you needed but couldn't afford specialist?
    - In past 12 months have you needed but couldn't afford mental health care?
    - Are you worried about medical costs of healthcare?
  + Diabetes
    - Have you ever been diagnosed with DM? (DIABEV)
    - Age diagnosed with DM (DIABETICAGE)
    - How many years ago were you diagnosed? (DIAYRS)
    - Are you currently taking insulin? (INSULIN)
    - Are you currently taking diabetic pills? (DIAPILLS)
    - If known, what was your most recent HbA1c reading? (DIAHA1C)
  + SES/income
    - Ratio of household income to poverty line in year of interview
    - Household income before taxes
    - Personal earnings
    - Education level (Highest grade completed)
    - Worker classification/industry
    - Maternal and paternal education level
  + BMI (self-report of height and weight)
  + Age (top coded for those above 89)
  + Sex
  + Smoking
    - SMOKEV (Ever smoked 100 cigarettes in life)
    - SMOKAGEREG (Age first smoked fairly regularly)
    - CIGDAYMO (Number days smoked in past 30 days (some day smokers))
    - CIGSDAY (Number cigarettes per day (current smokers))
    - CIGSDAY1 (Number cigarettes per day (daily smokers))
    - CIGSDAY2 (Number cigarettes per day (some day smokers))
    - SMOKESTATUS2 (Cigarette smoking recode 2: Current detailed/former/never)
    - SMOKFREQNOW (Smoke every day, some days, or not at all)
    - QUITNO (Time since quit smoking: Number of units)
    - QUITTP (Time since quit smoking: Time period)
    - QUITYRS (Time since quit smoking: Years)
  + Alcohol Intake
    - ALC1YR (Ever had 12+ drinks in any one year)
    - ALCLIFE (Had 12+ drinks in entire life)
    - ALC5UPYR (Days had 5+ drinks, past year)
    - ALCAMT (Average number of drinks on days drank)
    - ALCSTAT1 (Alcohol drinking status: Recode)
    - ALCSTAT2 (Current alcohol drinking status: Recode)
    - ALCANYNO (Frequency drank alcohol in past year: Number of units)
    - ALCANYTP (Frequency drank alcohol in past year: Time period)
    - ALCDAYSMO (Frequency drank alcohol in past year: Days per month)
    - ALCDAYSWK (Frequency drank alcohol in past year: Days per week)
    - ALCDAYSYR (Frequency drank alcohol in past year: Days in past year)
    - ALC5UPNO (Days had 5+ drinks, past year: Number of units)
    - ALC5UPTP (Days had 5+ drinks, past year: Time period)
  + Insurance: fairly detailed. What type of plan they have (e.g. private, Medicare, Medicaid, CHIP, VA), what the deductible is, if it is received through employer, if it is an HMO, if it is single service plan for specific conditions, and type of PPO. For those without, asks questions about why they do not have insurance.
  + Race (Self-report)
  + Cancer (ever diagnosed + age for 30 different types)
* DAGs to choose what to adjust for
  + Why are arrows in specific directions, which arrows were purposefully omitted given hypothesized lack of causal associations
* Statistical Analysis:
  + Chi-square and ANOVA for testing differences in demographics between Diabetes/No Diabetes and Cancer/No Cancer. Checking for violated assumptions and ways handled [table 1]
  + CoxPH/survival analysis, what went into each model and why. How violations of assumptions handled.
  + Sensitivity analyses

**Results**

* Table 1 (Or possible two separate tables): Sample Characteristics (Split by Diabetes/No Diabetes; Cancer/No Cancer)
* Figure 1: DAG(s) (?) to show which confounders adjusted for [unless this goes in methods]
* Table 2: Hazard Ratios for diabetes mortality
  + Adjust for (or stratify by) difficulty paying for medication
  + Columns represent iterative models, adjusting for additional confounders
* Table 3: Hazard Ratios for cancer mortality
* As above, adjusting for (or stratifying by) difficulty paying for meds
* Columns represent iterative models, adjusting for additional confounders
* Possible Figure(s) 2 and 3: The survival curves

**Discussion**

* What was found: is medication risk factor important factor in mortality or not? Is it especially important in diabetes and cancer outcomes, or just more common?
* Strengths and Limitations
  + Sample size = 😊
  + Population representative = 😊
  + Large number of diabetics and cancer pts included 😊
  + Problems with NDI ☹
    - 43 mysterious pts with DOD before interview
    - Couldn’t include people under age 18 at interview time 🡪 problematic for portion of juvenile diabetic population especially
    - Not exact dates of death
    - Although adjusted for survey design, those eligible for linkage might differ from those who do not
* Assessment of medication stress and SES 🡪 could differ by survey year and might not capture everything ☹
* Self-reported diabetes or cancer ☹
* Immortal time bias🡪 we don’t know about their medication stress in the years following interview, status could change
* Public Health Implications and future studies

1. The Introduction and Objectives section should be between 3-5 paragraphs and include the following information:

• Well-documented background support (literature review) for the importance of your project – HINT: if you are not doing an epi/biostats type project, this is where you will be demonstrating your mastery of epidemiology concepts.

• Be sure to answer “so what?” – who should/would care about this, to whom it will be important

• Use references properly

• State objectives *(“The objectives of this project are to: (a), (b), (c).”)*

• Indicate type of project

2. The Approach section should be around 1 page and include the following information:

• Provide a *detailed* description of the methods for your project o Include design and scope as part of the description

o If your project involves the collection or analysis of information from human participants, please specify whether or not you have and/or need IRB approval.

3. Competencies addressed: In consultation with a faculty advisors, students should select a minimum of four foundational competencies from at least two competency domains and three specialization competencies that will addressed in the capstone project. The possible MPH competencies are listed earlier in this syllabus. In this section, describe how you intend to integrate the competencies that you have selected and will address in the project. This can be formatted as a bulleted list of the competencies with a sentence about how your project addresses each of them.

4. Timeline: The timeline should be broken down in units of 1- to 2-weeks at a time through April, 2020. This timeline will help you & your advisor assess “is this feasible?” and help keep you on track.

5. Bibliography: All literature and other sources used for the proposal should be referenced using either APA or AMA format -- choose one citation style and use it throughout.

*(6) Results* and *(7) Conclusions and Potential Implications* may only have placeholders as these activities won’t have been completed by the due date of this outline.

**E. Oral pitch of project proposal (10%) – due 12/6**

Each student will present the main parts of their project proposal to the class during the final class of the course. Presentations are expected to carefully integrate the statement of the problem, project objectives, and proposed approach. Presentations can be supported with the use of programs such as Powerpoint, but slides should not be read verbatim. Students will be expected to have practiced their presentations beforehand to ensure they are within the time allotted. Each presentation will be limited to 5 minutes and will be timed. An additional 5 minutes will be allocated for a Q&A period