# Spreadsheet Assignment
due February 14, 2025

For the spreadsheet assignment you choose a developing country, a development indicator, and a time period. You collect quantitative data on the indicator in the country during the time period, create tables and a graph with the data, and pose research questions based on your observations.

The country should be widely recognized as a developing country. The time period is up to you, as long as data on your chosen indicator are available for your country for the whole period.

For the indicator, please choose either Gross Domestic Product (GDP) per capita, infant (0-1) mortality, or the male-to-female ratio at age 5. Each of these indicators has high-quality data presented in a readily-accessible user-friendly form.

The spreadsheet assignment allows you to observe, descriptively, what is distinctive -- unusually good, unusually poor, or (less engagingly) close to average -- about your country's performance on an indicator over a chosen time period. Later, in your research paper, you try to explain this performance, although the spreadsheet assignment encourages you to think about this issue as well.

A country's development performance can be measured in three ways.

(a) **Level**: how well a country did at achieving a particular *level* of a particular development indicator as of a certain year, such as 2022.

(b) **Progress**: how well a country did at *changing* the level of the indicator in a beneficial direction over the whole duration of a particular spell of time, such as 1990 to 2022.

(c) **Tempo**: why in a country the indicator made a sharp and sustained *upturn* or *downturn* over certain years *within* a particular spell of time, such as 1990 to 2022.

The spreadsheet assignment is mainly a *descriptive* exercise whose purpose is to specify what it is that you wish to explain in your end-of-semester research paper.

The research paper is an *explanatory* exercise whose purpose is to identify policies and circumstances that help to explain your country's development performance.

However, the spreadsheet assignment also requires you to frame puzzles about your country's performance on level, progress, and tempo. Your research paper will then identify policies and circumstances that help to explain your country's performance on one of these dimensions.

Your first task will be to choose a developing country, a time period about 25-45 years in length ending in a recent year like 2022 or 2023, and one of these indicators:

*GDP per capita, PPP (constant 2017 international dollars)*
        Source: World Bank via Our World In Data

*Mortality rate, infant (per 100 live births)*
        Source: Inter-agency Group for Child Mortality Estimation via Our World in Data

*Sex ratio (male-to-female ratio) at age 5*
        Source: United Nations Population Division via Our World in Data

• If you're not sure whether a certain country counts as a developing country, ask the instructor.

• Before starting the spreadsheet assignment, make sure that your country has enough data on your indicator during your time period to complete the assignment.

• Part of the assignment is to identify high-quality academic sources that will help you in your subsequent research paper to *explain* your country's performance on your indicator during your time period. You'll have to specify at least three such sources in the spreadsheet assignment.

Optimally your chosen time period will coincide with a substantively coherent interval, such as:

• a particular political regime (e.g., Peru since the end of authoritarian rule, 1990-present)
• the aftermath of a major policy reorientation (e.g., India's market reforms, 1991-present)

The spreadsheet assignment involves seven tasks, which are described below in more detail.

A. Create a levels table with a graph image for your indicator
B. Create an annual change table for your indicator
C. Justify the time period you chose to study
D. Justify your reference group of countries
E. Draw three descriptive conclusions from your tables and graph
F. Pose three analytical questions inspired by your three descriptive conclusions
G. List at least three or more high-quality references that will help you answer those questions

The remaining steps in the assignment depend on the indicator you choose. Accordingly, the remainder of the instruction booklet is divided into three sections:

• GDP per capita in constant dollars at purchasing power parity (the total value of goods and services produced in a country in a certain year, adjusted for inflation and for cost of living differences across countries)

• Infant mortality (infant deaths per 100 live births)

• The sex ratio at age 5 (males per 100 females)

**GDP per capita**

If you end up working on GDP per capita level or progress, your time period should start no earlier than 1990, the first year for which the World Bank (via Our World in Data) provides data on the regional and income aggregates that will serve as reference groups for most countries. It's OK to use an alternative reference group as long as you can justify it.

If you end up working on the *tempo* of progress at raising GDP per capita within a certain time period, you'll mainly be comparing time periods within the same country, rather than comparing countries at the end of (or over the entire course of) a particular time period. Even if you are more interested in tempo than in level or change, however, comparing a country to a regional or income aggregate can be instructive. Say you are asking why GDP per capita in Brazil grew faster in 2002-2012 than in preceding or subsequent periods. You would start by comparing policies and circumstances in Brazil during 2002-2012 to preceding and succeeding spells of time. If, however you went on to compare Brazil and Latin America on tempo of GDP per capita growth, you would see that the *whole region* grew faster in 2002-2012 than in preceding or succeeding periods. A reasonable conclusion would therefore be that the rapid economic growth in Brazil from 2002 to 2012 was due at least in part to international circumstances affecting the whole region (as well as Brazil), notably China and India raising the demand for soybeans, iron ore, and copper, which are exported from many Latin American countries as well as from Brazil.

The [GDP per capita figures you should use in your assignment](#) should be adjusted for inflation (it should say something like "real" or "in 2011 dollars" or "in 2017 dollars") and for cost of living differences across countries (it should specify "PPP," which stands for purchasing power parity). Although your country's GDP per capita performance should be *measured* across a set of years subsequent to 1990, it is probably at least in part *explicable* by factors operating prior to 1990.

A. Create a GDP per capita levels table with a graph image

Create a table comparing the annual GDP per capita level in your country during your time period to the annual GDP per capita level for a reference group of countries during the same time period. The reference group could be all countries in your country's region or income group, all countries in the world, or some other set of countries that are comparable to your chosen country. Drop the .png graph created by Our World in Data to the right of the table. Cite the source of the data below the table. On the Moodle segment for February 14 is an sample spreadsheet comparing Botswana to sub-Saharan Africa on real GDP per capita at PPP from 1990 to 2022. It can be used as a model for your own spreadsheet (feel free to copy its formulas). At the bottom of the spreadsheet are step-by-step instructions for creating the tables and graph.

B. Create a GDP per capita growth table

A couple of lines below your GDP per capita levels table, insert another table that registers annual percent *changes* in GDP per capita. To find out how to do this, go to the February 14 Moodle segment and download the Excel spreadsheet comparing GDP per capita levels and changes in Botswana to those in sub-Saharan Africa from 1990 to 2022. Calculate the (roughly) decadal averages for your country and for the reference group as shown on the spreadsheet.

C. Justify the time period you chose to study

The spreadsheet requires you to justify your choice of a time period for your analysis. Data availability is a valid justification, but even better is to start at a point in time when a major regime change happened (as in Venezuela after Hugo Chávez was elected president in 1998) or a major economic change took place (as with market reforms in Angola in 2002).

D. Justify your reference group of countries

State why you chose to compare your country to a particular reference group, such as all countries in the same region as your country, all countries with level of overall affluence close to the level in your country, all countries in the world, etc.

E. Draw three descriptive conclusions from your tables and graph

Based on your tables and graph, how well did your country do on GDP per capita over the time period you selected? Comment on:

(1) the *level* of GDP per capita your country attained at the end of your time period, compared to its comparison group.

(2) the *progress* on GDP per capita your country made over the course your time period, compared to the progress your comparison group of countries made.

(3) the *tempo* of change of GDP per capita in your country within your time period, compared to the tempo of change in your comparison group of countries.

The Botswana spreadsheet on the February 14 segment of the course Moodle can be used as a model for these descriptive conclusions.

F. Pose three analytical questions

Based on your three descriptive conclusions, pose three analytical questions relating to:
(1) *why* your country attained the level of GDP per capita it did at the end of your period
(2) *why* your country made the amount of GDP per capita progress it did during your period
(3) *why* your country exhibited the tempo of GDP per capita change it did within your period

Your May 13 research paper assignment is to choose *one* of these questions and answer it.

G. List three or more high-quality references that will help you answer those questions

Academic books, book chapters, and/or articles you have already read or skimmed that will help you answer the analytical question you have chosen. Google Scholar is the best way to search. The citations at the end of each of the three example spreadsheets posted on the February 14 segment of the course Moodle are examples of correct bibliography format, but any standard format is fine (see http://libguides.wesleyan.edu/citing).

**Infant Mortality**

Infant mortality figures are available for most countries since 1960 or even earlier, but not for comparison groups like "Latin America & Caribbean" or "middle-income countries." Those data are available from the United Nations Inter-agency Group for Child Mortality Estimation (via the World Bank, after processing by Our World in Data) only since 1990. Hence, if you end up working on the *level* of infant mortality at the end of a time period, or on overall *progress* at reducing infant mortality over the course of a time period, you won't be able to evaluate your country's pre-1990 performance on infant mortality in comparison to a reference group.

If you are working on the *tempo* of progress at increasing GDP per capita within a particular time period, you'll mainly be comparing time periods within the same country. Still, comparing a country to a regional or income aggregate can be instructive. Say you want to know why infant mortality in Peru fell faster from 1990 to 2010 than from 2011 to 2022. You would start by comparing policies and circumstances in Peru during 1990-2010 to preceding and succeeding spells of time, but if you then compared the tempo of infant mortality decline in Peru to that in the Latin American region as a whole, you would see that infant mortality decline was much steeper in Peru than in the region in 1990-2010 -- but not in 2011-2022. That would suggest that the rapid infant mortality decline from 1990 to 2010 was due to factors specific to Peru.

The infant mortality rate is usually expressed in infant deaths per 1000 live births (per mil), but Our World in Data expresses it as deaths per 100 live births (percent). If you want to convert the annual figures to infant deaths per 1000 live births, multiply each annual figure by 10.

Looking ahead to your research paper, your mission will be to identify policies and circumstances that *help to explain* your country's infant mortality performance. In that *explanatory* exercise, you will probably want to explore factors that operated prior to 1990 as well as those that were operating between 1990 and 2022.

A. Create an infant mortality levels table with a graph image

Create a table comparing your country during your time period to a reference group of countries on the annual infant mortality level. The reference group could be all countries in your country's region or income group, all countries in the world, or some other relevant set of countries. Drop the .png graph created by Our World in Data to the right of the table. Cite the source of the data below the table. On the February 14 Moodle segment is an example spreadsheet comparing Peru to Latin America and the Caribbean on infant mortality from 1990 to 2022. It can be used as a model for your own spreadsheet (feel free to copy its formulas). At the bottom of the spreadsheet are step-by-step instructions for creating the tables and graph.

B. Create an infant mortality decline table

A couple of lines below your infant mortality levels table, insert another table that registers annual percent *changes* in infant mortality. To find out how to do this, go to the February 14 Moodle segment and download the Excel spreadsheet comparing infant mortality levels and changes in Peru to those in the Latin America and the Caribbean region from 1990 to 2022.

C. Justify the time period you chose to study

It is fine, often necessary, to justify your choice of such years as reflecting data availability, but even better to pick a point in time when a major change happened, such as a change in political regime (as in Venezuela after Hugo Chávez was elected president in 1998) or a major primary health care plan (as in Ghana with the Free Maternal Health Initiative in 2008).

D. Justify your reference group of countries

State why you chose to compare your country to a particular reference group, such as all countries in the same region as your country, all countries with level of overall affluence close to the level in your country, all countries in the world, etc.

E. Draw three descriptive conclusions from your tables and graph

Based on your tables and graph, how well did your country do at reducing infant mortality over the time period you selected? Comment on:

(1) the *level* of infant mortality your country attained at the end of your time period, compared to its comparison group.

(2) the *progress* at infant mortality decline your country made over the course your time period, compared to the progress your comparison group of countries made.

(3) the *tempo* of change of infant mortality in your country within your time period, compared to the tempo of change in your comparison group of countries.

The Peru spreadsheet on the February 14 segment of the course Moodle can be used as a models for these descriptive conclusions.

F. Pose three analytical questions

Based on your three descriptive conclusions, pose three analytical questions relating to:
(1) *why* your country attained the level of infant mortality it did at the end of your period
(2) *why* your country showed the amount of infant mortality decline it did during your period
(3) *why* your country exhibited the tempo of infant mortality decline it did within your period
Your May 13 research paper assignment is to choose one of these questions and answer it.

G. List three or more high-quality references that will help you answer those questions

Academic books, book chapters, and/or articles you have already read or skimmed that will help you answer the analytical question you have chosen. Google Scholar is the best way to search. The citations at the end of each of the three example spreadsheets posted on the February 14 segment of the course Moodle are examples of correct bibliography format, but any standard format is fine (see http://libguides.wesleyan.edu/citing).

**Sex Ratio at Age 5**

For better or worse, the sex ratio is the ratio of males to females in a population. The sex ratio at age 5 reflects two things: the sex ratio at birth, which is skewed male if there is discrimination against females before birth; and mortality between the ages of 0 and 5, which is skewed female if there is also survival-related discrimination against female infants and young children.

Fetal sex identification became possible in the mid-1980s. In countries where sex identification followed by sex-selective abortion grew popular, a high sex ratio at birth for many years drove the high sex ratio at age 5. After about 2000, however, excess mortality of girl children increased in importance, much as had been the case before the introduction of fetal sex identification.

In both China and India, countries with abnormally high sex ratios, the sex ratio at age 5 in 2023 was *higher* than the already-high sex ratio at birth, suggesting survival-related bias against female infants and young children as well as against females before birth. In Vietnam, by contrast, the sex ratio at age 5 (106.2) was considerably *lower* than the sex ratio at birth (110.3), suggesting survival-related bias against females before birth but not against female infants and young children. Likewise in South Korea, the sex ratio at birth in 2023 was slightly lower than the sex ratio at age 5, which would be expected if under-5 mortality were lower for females than for males, as is typical in countries with little evidence of survival-related bias against females.

The United Nations Population Division provides data on the sex ratio at age 5 for most countries, regions, and income aggregates ("more developed regions," "upper-middle income countries," etc.) from 1950 to 2023. Our World in Data has a [user-friendly interface](#) for these data. The sex ratio is usually expressed as the number of males per 100 females. In what the UN Population Division calls "more developed regions" the sex ratio at age 5 in 2023 was 105.27 males per 100 females. The sex ratio *at birth* was almost identical, 105.28. These figures from more developed regions roughly represent the "expected" level of a sex ratio at age 5 in a country or region where there is minimal or no evidence of survival-related sex discrimination against females, however much there may be in other domains. In countries where sex identification followed by sex-selective abortion is uncommon, about 5 percent more males than females are born, but at every age males die at a higher rate than females, such that the sex ratio typically falls below 100 between ages 40 and 50 and continues to decline thereafter. Among centenarians (100+ years old) there were only 20.4 males per 100 females in 2023. Because there is little or no evidence of survival-related sex discrimination against females in "more developed regions," this is a good comparison group for a country with a high sex ratio at age 5.

The sex ratio at age 5 (and at birth if you wish) is most interesting to study in countries where it either attained a very high level, rose considerably from the beginning to the end of an extended period of time, or rose or fell precipitously during a particular spell of years within such a period of time. Most such countries are in Asia (India, China, South Korea, and Vietnam) or the Caucasus (Azerbaijan, Armenia, and Georgia). The study of the *tempo* of change sex ratio at age 5 and at birth is especially interesting where it has changed dramatically in a short period, such as South Korea, where it skyrocketed from an already high 108.2 in 1985 (up from a roughly normal 104.0 in 1955) to 117.4 in 1999, then plummeted to 105.5 in 2023.

A. Create a sex ratio at age 5 table with a graph image

Create a table comparing the sex ratio at age 5 in your country during your time period to the sex ratio at age 5 for a reference group of countries. The reference group is up to you, but there is little or no evidence of survival-related sex discrimination against females in "more developed regions," which makes "more developed regions" a good comparison group for a country with a high (or rapidly rising or falling) sex ratio at age 5. Drop the .png graph created by Our World in Data to the right of the table. Cite the source of the data below the table. On the February 14 Moodle segment is an example spreadsheet comparing China to "more developed regions" on the sex ratio at age 5 from 1980 to 2023. It can be used as a model for your own spreadsheet (feel free to copy its formulas). At the bottom of the spreadsheet are step-by-step instructions for creating the tables and graph.

B. Create a sex ratio at age 5 change table

A couple of lines below your sex ratio at age 5 levels table, insert another table that registers annual *changes* in the sex ratio at age 5. To find out how to do this, go to the February 14 Moodle segment and download the Excel spreadsheet comparing the sex ratio at age 5 in China to that of "more developed regions" from 1980 to 2023.

C. Justify the time period you chose to study

You will be asked on the spreadsheet to justify your choice of start year and end year. It is fine, often necessary, to justify your choice of such years as simply reflecting data availability. However, it is even better to pick a point in time when a major social change occurred (such as the expansion of market mechanisms in China after 1979) or a sex ratio-related technological innovation became more widely available (like fetal sex determination technology in the 1980s).

D. Justify your reference group of countries

State why you chose to compare your country to a particular reference group. In countries with high sex ratios at age 5, a good comparison group is what the UN Population Division calls "more developed regions," because there is little or no evidence of survival-related anti-female gender bias in such regions.

E. Draw three descriptive conclusions from your tables and graph

Based on your tables and graph, how well did your country do at achieving a normal sex ratio at age 5 (104 or 105:100) over the time period you selected? Comment on:

(1) the *level* of the sex ratio at age 5 that your country attained at the end of your time period, compared to its comparison group.

(2) the *change* in the sex ratio at age 5 that your country experienced over the course your time period, compared to the change in your comparison group of countries.

(3) the *tempo* of change in the sex ratio at age 5 in your country within your time period, compared to the tempo of change in your comparison group of countries.

The China spreadsheet on the February 14 segment of the course Moodle can be used as a model for these descriptive conclusions.

F. Pose three analytical questions

Based on your three descriptive conclusions, pose three analytical questions relating respectively to:

(1) why your country attained the sex ratio at age 5 it did *at the end of the time period* you are studying.

(2) why your country showed the rise it did in the sex ratio at age 5 *over the course of the entire time period* you are studying.

(3) why the sex ratio at age 5 rose or fell particularly sharply *during certain spells of years within the time period* you are studying.

Your May 13 research paper assignment is to choose one of these questions and answer it.

G. List three or more high-quality references that will help you answer those questions

Academic books, book chapters, and/or articles you have already read or skimmed that will help you answer the analytical question you have chosen. Google Scholar is the best way to search. The citations at the end of each of the three example spreadsheets posted on the February 14 segment of the course Moodle are examples of correct bibliography format, but any standard format -- APA, Modern Language Association, Turabian -- is fine (for these and other formats go to http://libguides.wesleyan.edu/citing).