

Team expectations agreement for The Beating Heart team.

Team meetings will be held once per week and all members are expected to attend. The preferred method of communication is email in order to inform each other of team meetings, announcement, updates, reminders, problems. All disagreements will be addressed by a majority vote. Records of meetings will be kept in the process book. Individual attendance and participation is expected at all team meetings:

I participated in formulating the standards, roles, and procedures as stated in this contract and I understand that I am obligated to abide by these terms and conditions.

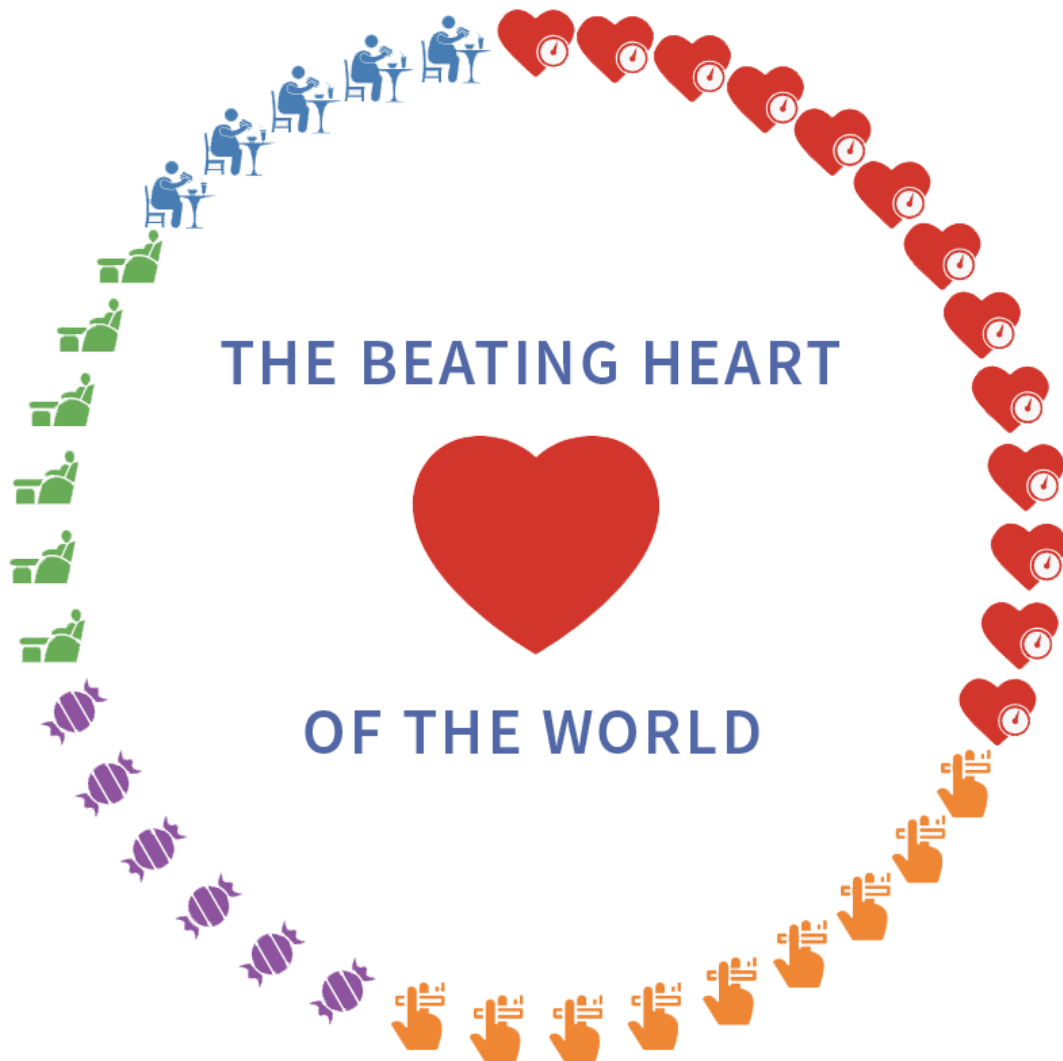
Signed: Kerry Ivey 11 November 2018

Signed: Ka Ning Yip 11 November 2018

Signed: Nil Tuzcu 11 November 2018

Signed: Brendan Murphy 11 November 2018

THE BEATING HEART OF THE WORLD



TEAM

Kerry Ivey: kivey@hsph.harvard.edu - 617 599 3034

Brendan Murphy: bmurphy592@gmail.com - 781-467-6686

Nil Tuzcu: [Nil_tuzcu@hks.harvard.edu](mailto:nil_tuzcu@hks.harvard.edu) 617.710.5025

Ka Ning Yip kaning.yip@pfizer.com; 917.626.2073

Process Book Link:

<https://docs.google.com/document/d/1aEb4jSAGjDJrvxjQ0BqR00MyYIQk9UK3PxaTC97g-Zs/edit?usp=sharing>

PROJECT ABSTRACT

With 610,000 people dying of heart disease in the United States every year, heart disease is the leading cause of death for both men and women ¹. Even when heart disease does not cause death, it can cause disability and decrease the overall quality of life². We want to raise awareness about heart disease, the different factors which contribute to this disease, and ways that one can mitigate their risk. We will be using two datasets from the U.S. Department of Health and Human Services. The [first data set](https://catalog.data.gov/dataset/u-s-chronic-disease-indicators-cdi) (<https://catalog.data.gov/dataset/u-s-chronic-disease-indicators-cdi>) contains chronic disease indicator data gathered from the Center for Disease Control and Prevention (CDC)'s Division of Population Health. The [second data set](https://catalog.data.gov/dataset/behavioral-risk-factor-data-heart-disease-amp-stroke-prevention-67c1f) (<https://catalog.data.gov/dataset/behavioral-risk-factor-data-heart-disease-amp-stroke-prevention-67c1f>) contains behavioural risk factor data collected from the CDC about chronic diseases, their risk factors, and other leading causes of death.

¹ CDC, NCHS. Underlying Cause of Death 1999-2013 on [CDC WONDER Online Database](#), released 2015. Data are from the Multiple Cause of Death Files, 1999-2013, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed Feb. 3, 2015.

² Blok, I., van Riel, A., Schuurin, M. et al. Neth Heart J (2015) 23: 278.
<https://doi.org/10.1007/s12471-015-0666-9>

PROJECT ABSTRACT # 2

Cardiovascular disease is the main cause of death worldwide, and affects close to one third of the world's population (1). Even when heart disease does not cause death, it can cause disability and decrease the overall quality of life⁽²⁾. We want to raise awareness about heart disease, the different factors which contribute to this disease, and ways that one can mitigate their risk. We will be using two datasets from the World Health Organization. The first dataset (http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html) contains mortality data for the world, and the second dataset (<http://apps.who.int/gho/data/node.main.A867?lang=en>) contains behavioural risk factor data about chronic diseases, their risk factors, and other leading causes of death.

¹ [http://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](http://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)).

² Blok, I., van Riel, A., Schuurin, M. et al. Neth Heart J (2015) 23: 278.

<https://doi.org/10.1007/s12471-015-0666-9>

BACKGROUND RESEARCH

Client, audience and goals

- Member of the general public at risk of cardiovascular disease (CVD)
- Current CVD patient
- General public interested in mortality data

10 interesting questions

1. How does diet affect one's risk of developing CVD?
2. What other diseases do CVD patients often contract?
3. What ages have the biggest risk
4. Are men/women at higher risk for different factors
5. What can someone do to reduce their risk of CVD
6. How do CVDs compare to other causes of death
7. What are the biggest risk factors
8. What geographic locations have the biggest risk
9. What is the distribution of risk factors in the population
10. What are the consequences of having CVD - mortality
11. What risk factors are modifiable
12. What is the prevalence of the different types of CVD
13. Is race/ethnicity a factor for types of CVD
14. How have deaths by CVD changed over time
15. Poverty vs. CVD?

Describe what kind of story you want to tell. Come up with some candidates for your main messages

- CVD kills a lot of people (punchline) with some key indicators
- What other diseases could you get due to heart disease
- There are many important risk factors that are modifiable
 - Modify yours, save your life!
- Calculate your own risk - build your own story: (reader-driven part of the story) <https://www.mdcalc.com/framingham-coronary-heart-disease-risk-score>

Cardiovascular disease is the main cause of death worldwide, and affects close to one third of the world's population (1). Nearly all incidences of cardiovascular disease are preventable. High blood pressure (hypertension) is the leading modifiable risk factor for cardiovascular disease.

Hypertension is the leading risk factor for cardiovascular and total mortality. It affects one quarter of world's population (~1 billion people), and is projected to affect one third of world's population within 20 years (~1.5 billion people) (2). It is well established that reductions in population blood pressure of 3 to 4 mm Hg are estimated to result in a 10 to 15% lower risk of cardiovascular disease. In Australia approximately 30% (32% of males and 27% of females) of adults over 25 y, or 3.7 million Australians, are hypertensive (3). By 50 y about half of the Australian population have hypertension. With 610,000 people dying of heart disease in the United States every year, heart disease is the leading cause of death for both men and women (6) this project aims to visualise the prevalence of cardiovascular disease risk factors throughout the world.

Diet is one of the best avenues whereby population level hypertension and cardiovascular disease prevention can be achieved. Large randomised controlled trials demonstrate that consumption of a plant food-rich diet lowers blood pressure. The demonstration that a small and achievable change in intake of particular vegetables can lower blood pressure would provide a simple and effective approach to reducing blood pressure in the community. It may ultimately lead to a powerful vehicle to achieve a beneficial change in food intake via public health interventions. This project aims to visualise how many people would benefit from improvements of various cardiovascular disease risk factors.

In addition to diet, lifestyle is also an important piece of the cardiovascular disease prevention puzzle. Diet and lifestyle change, which can reduce the need for costly

antihypertensive medication, have the largest potential impact on hypertension in the community. Several diet and lifestyle factors are proven to lower blood pressure. These include engaging in regular moderate physical activity, maintaining a healthy body weight/weight loss, limiting alcohol consumption, and reducing sodium intake . A dietary pattern rich in plant foods is also proven to lower blood pressure (4, 5).

REFERENCES

1. [http://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-\(cv-ds\)](http://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cv-ds))
2. Kearney P, Whelton M, Reynolds K, *et al.*, Global burden of hypertension: analysis of worldwide data. *The Lancet* 2005, 365 (9455), 217-223.
3. Dunstan D, Zimmet P, Welborn T, Sicree R, Armstrong T, Atkins R, *et al.* Diabetes & Associated Disorders in Australia 2000: The Australian Diabetes, Obesity and Lifestyle Study (AusDiab). Melbourne: International Diabetes Institute; 2000.
4. Appel LJ, Moore TJ, Obarzanek E, Vollmer WM, Svetkey LP, Sacks FM, Bray GA, Vogt TM, Cutler JA, Windhauser MM, Lin PH, Karanja N. A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. *New Engl J Med* 1997; 336: 1117-24.
5. Beilin LJ, Rouse IL, Armstrong BK, Margetts BM, Vandongen R. Vegetarian diet and blood pressure levels: incidental or causal association?. *Am J Clin Nutr* 1988; 48(3 Suppl):806-10.
6. CDC, NCHS. Underlying Cause of Death 1999-2013 on CDC WONDER Online Database, released 2015. Data are from the Multiple Cause of Death Files, 1999-2013, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed Feb. 3, 2015.

INSPIRATION

The World Health Organisation fact sheet on cardiovascular diseases ([http://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](http://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds))) was the inspiration for this project. Primarily, the statement that “CVDs are the number 1 cause of death globally: more people die annually from CVDs than from any other cause” was especially interesting for our group. As the leading killer throughout the world, the group was inspired to explore potential modifiable risk factors of cardiovascular disease. Not only does our website aim to increase awareness of the lethality of cardiovascular disease, it also aims shed light on the prevalence of modifiable risk factors throughout the world. The motto that “knowledge is power” underpins our project aims as the overarching goal of this project is to empower individuals to make a change to their diet or lifestyle in order to reduce their cardiovascular disease risk.

DEFINITION OF GOALS AND TASKS OF THE FINAL PROJECT

Heart disease is a leading cause of death globally. Since there are many risk factors contributing to multiple types of CVD, we want to bring this attention to the readers. The main points we plan to deliver to our audience is as follows:

- Compare heart disease to other causes of death
- Describe the prevalence of CVD Worldwide
- Prevalence of risk factors (individual - e.g. smoking, nutrition, obesity, physical inactivity)
 - Risk factors (aggregate)
- Describe the different types of heart disease that are there, and whether a specific risk factor feeds into a larger contribution towards each.

The tasks each week are as follows:

- Week 1: Assemble team and gather data
 - Gather team

- Select and download dataset
 - Write project proposal
- Week 2: Detailed Project Plan
 - Basic info
 - Background and motivation
 - Related work
 - Project objectives and goals
 - Data manipulation
 - Visual manipulation and design
 - Data processing
 - Design must-haves + optional nice-to-haves
 - Project Schedule
 - Create GitHub page
- Week 3:
 - Implement TF comments
 - Create selected visualizations
 - Begin Implementing Storyboard
 - Update GitHub and Process Books
- Week 4:
 - Implement TF comments
 - Complete storyboard
 - Testing + implement comments
 - Update GitHub and Process Books
- Week 5:
 - Implement final comments
 - Create video
 - Update GitHub and Process Books
 - Peer Eval

A DESCRIPTION OF THE DATA AND FROM WHERE WE WILL OBTAIN THE DATA

We had initially planned to only focus on heart disease risks within the United States. However, once we began sifting through the data and searching for other dataset to supplement our visualization, we realized that due to the nature of the disease it would be a better story to tell if we focus on the disease in a global manner.

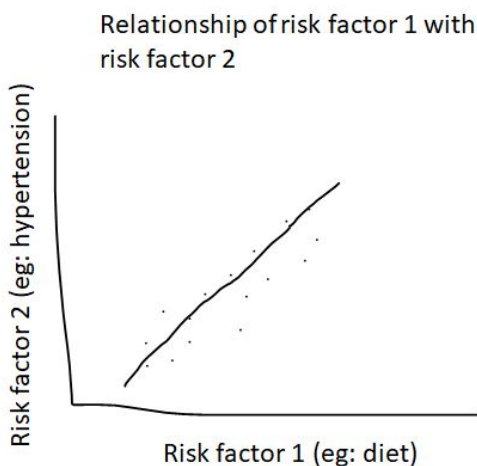
The first dataset that we are using describes the disability adjusted life years lost for every cause of death. This is a metric used by the World Health Organization which can be thought of

as the number of years lost for a “health” life. This metric is different than the number of deaths because it also encapsulates time spent suffering under the effects of different conditions in addition to early loss of life. The dataset has various levels of granularity for the different conditions, such as communicable vs non-communicable diseases, cardiovascular disease vs neurological disease, and hypertensive heart disease vs stroke. The dataset is broken down by country, sex, and age group, and contains data for 2000, 2010, 2015, and 2016. http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html

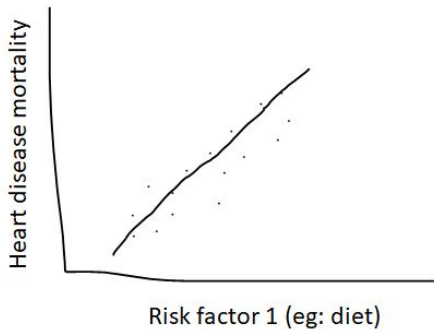
The second dataset that we are using is actually a collection of smaller datasets. It describes the rates for risk factors for noncommunicable diseases among different groups. The risk factors are alcohol consumption, blood glucose levels, blood pressure, cholesterol, insufficient physical activity, obesity, and tobacco use. The groups are broken down by age group, country, and sex.

<http://apps.who.int/gho/data/node.main.A867?lang=en>

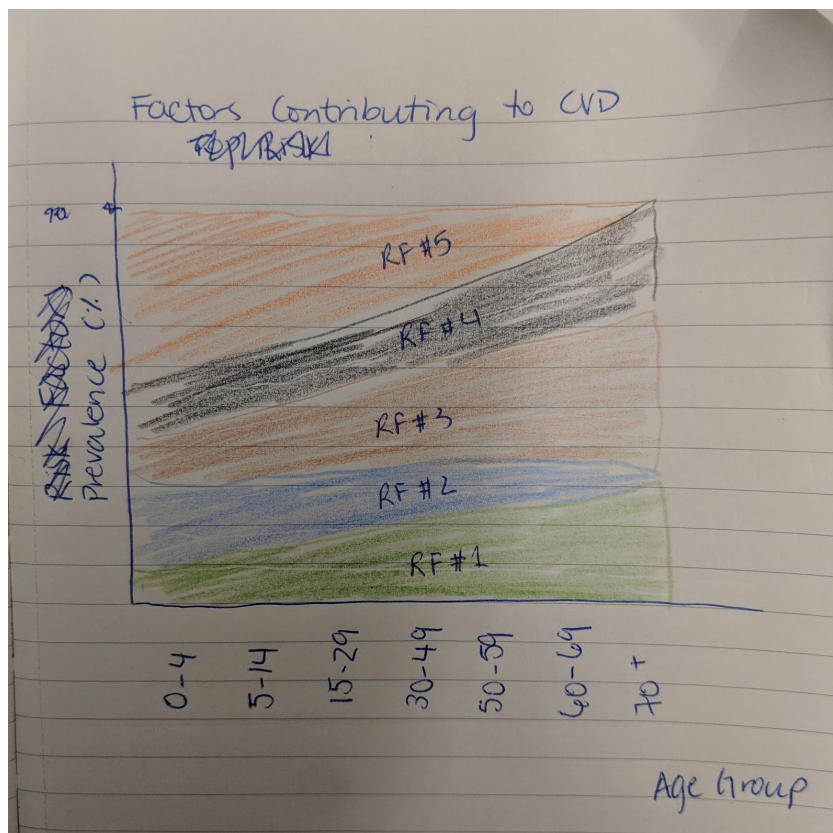
SKETCHES OF VISUALIZATION IDEAS FOR THE PROJECT



Relationship of risk factor 1 with
Heart disease mortality

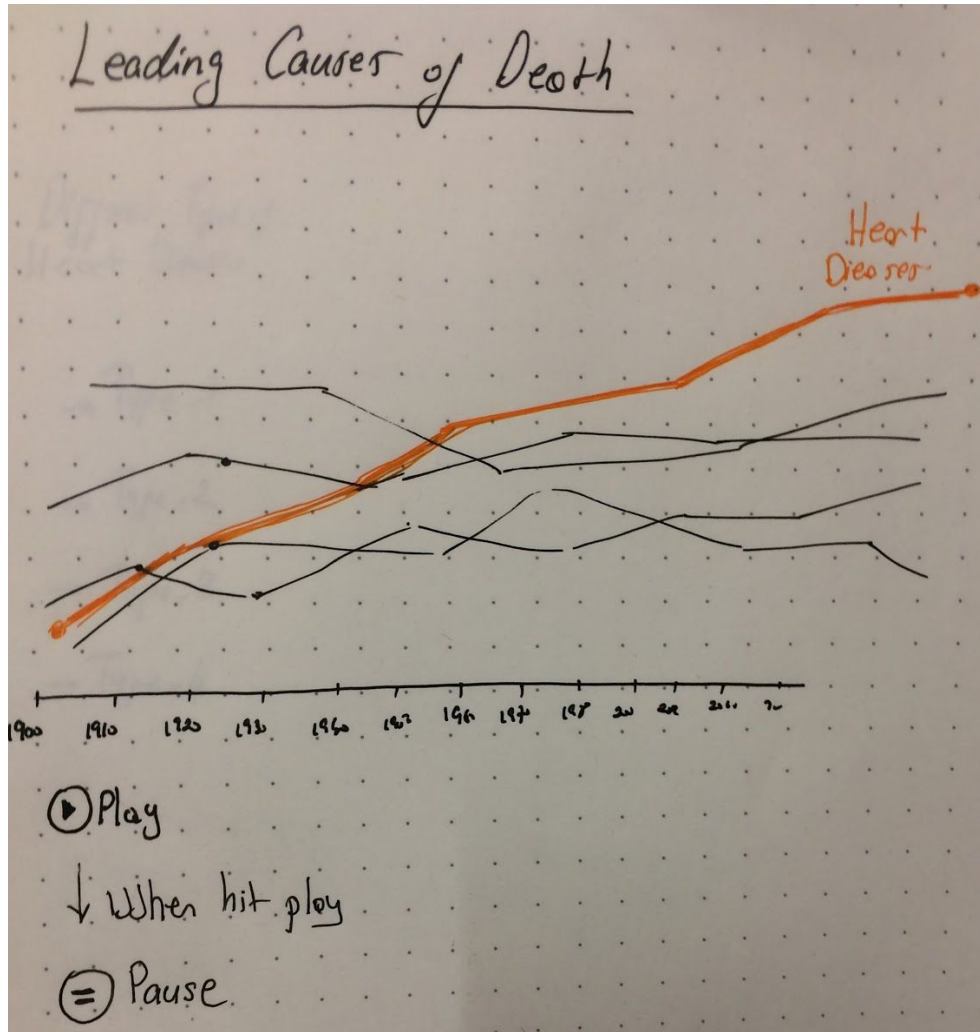


The above two scatterplots were chosen to show relations between risk factors and of risk factors with heart disease mortality. A trend line will be inserted in order to draw the viewer's attention to the trend in the data. A hover functionality will be utilised whereby the viewer can hover their mouse over a data point and details of the country will be displayed. The size of the data points will represent the population of the country.

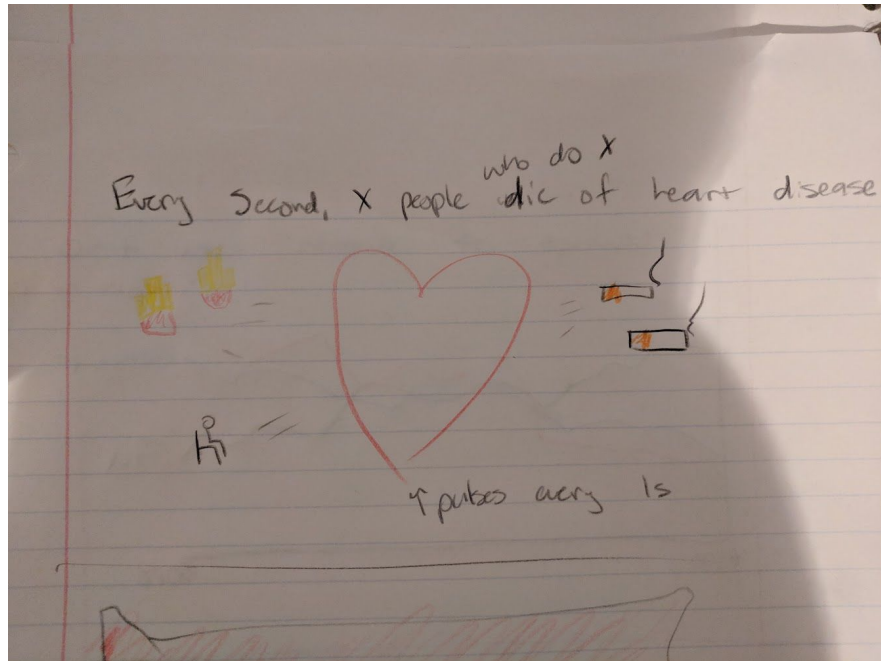


The above area chart shows the prevalence of the five selected risk factor (depicted as RF #) among each age group. The goal is to show whether or not each risk factor impacts each age group equally, or if a certain risk factor impacts an age group more so than others. Since one of

our goals is to have our audience understand the impact of contracting CVD and that they should act early to minimize their risks, it may be important to show them risk factors based on their current age. A hover feature will highlight the age group and shows the percentage of each risk factor.

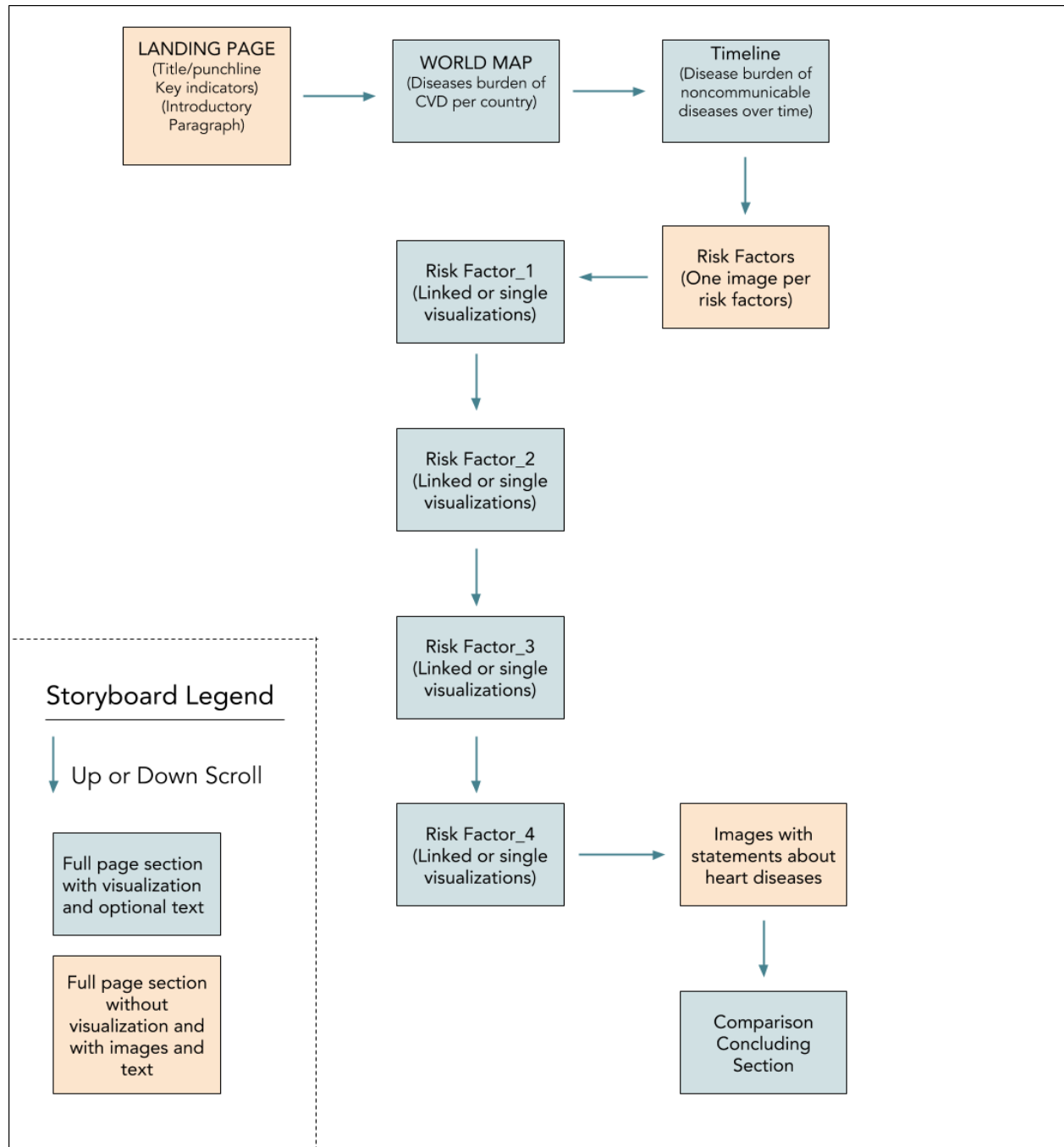


The above line chart compares CVD with other chronic diseases over time. The goal is to show how CVD increasingly causes more death in comparison to other diseases such as cancer. In the line chart, only CVD line will be colored while other lines will be grey in order to get users attention to the CVD. The line chart will be automatically animated when user arrives this section. User will have an option to pause the animation or re-play it.

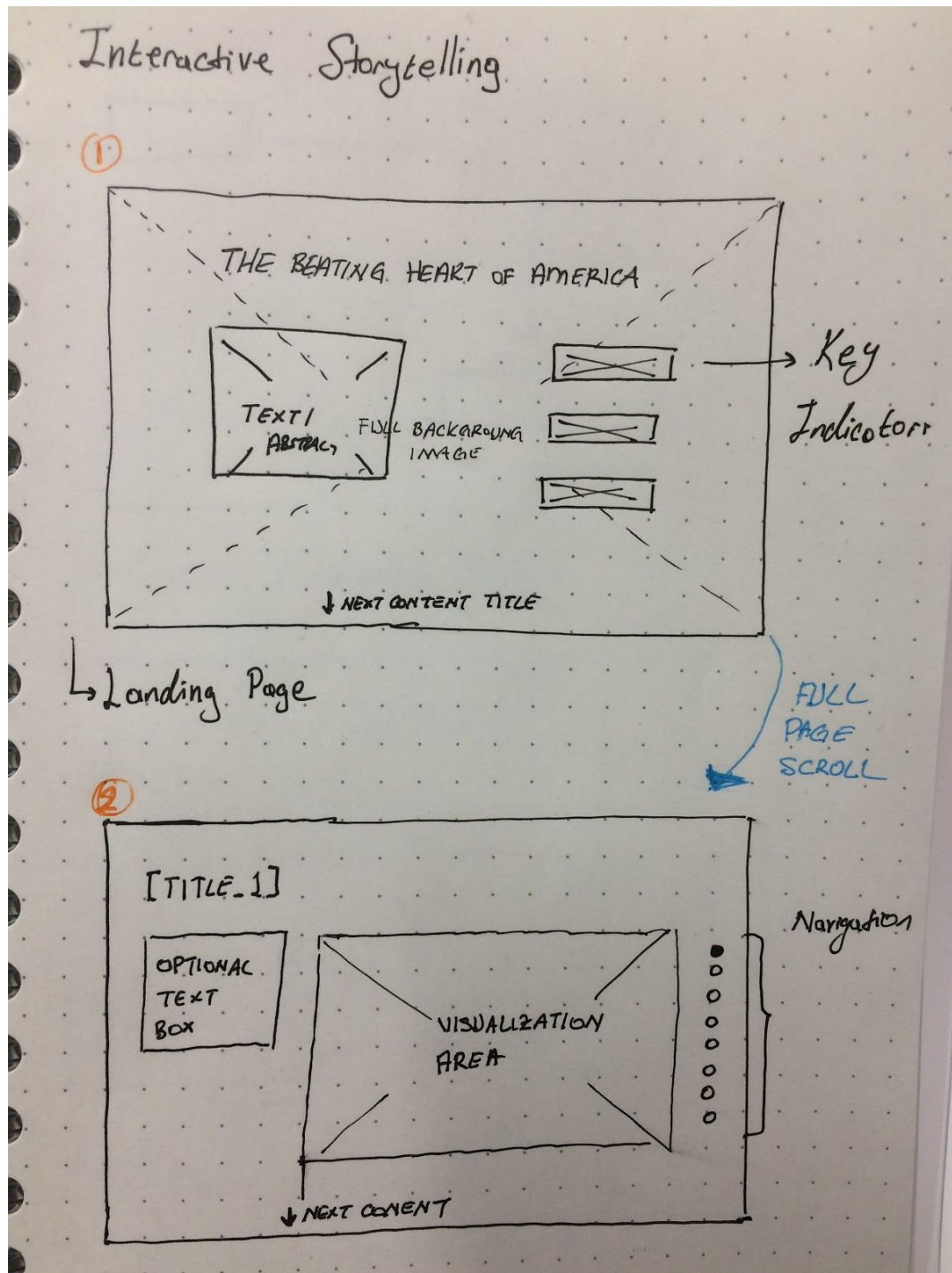


This visualization shows the number of people who die by heart disease who had each of the risk factors. The risk factors are encoded by different symbols, such as cigarettes for smoking and fast food for obesity. The heart pulses every second, scattering a set of symbols which disappear over a second. The number of symbols encodes how many people were expected to die to heart disease by that risk factor in that second.

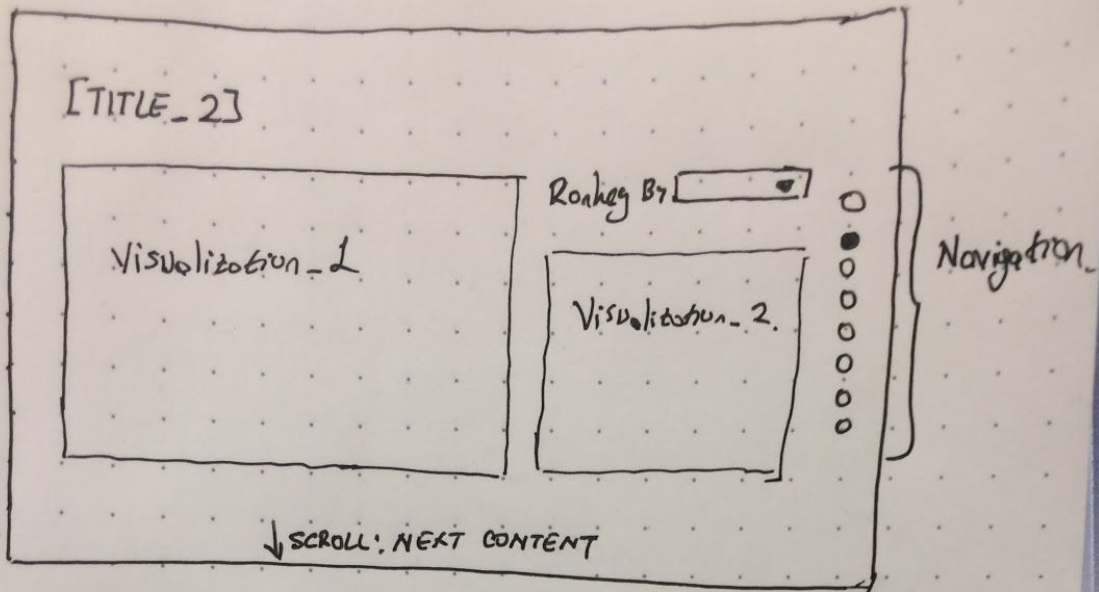
SKETCH OF AN INTERACTION STORYBOARD



SKETCH OF THE WEB PAGE LAYOUT / STORYTELLING

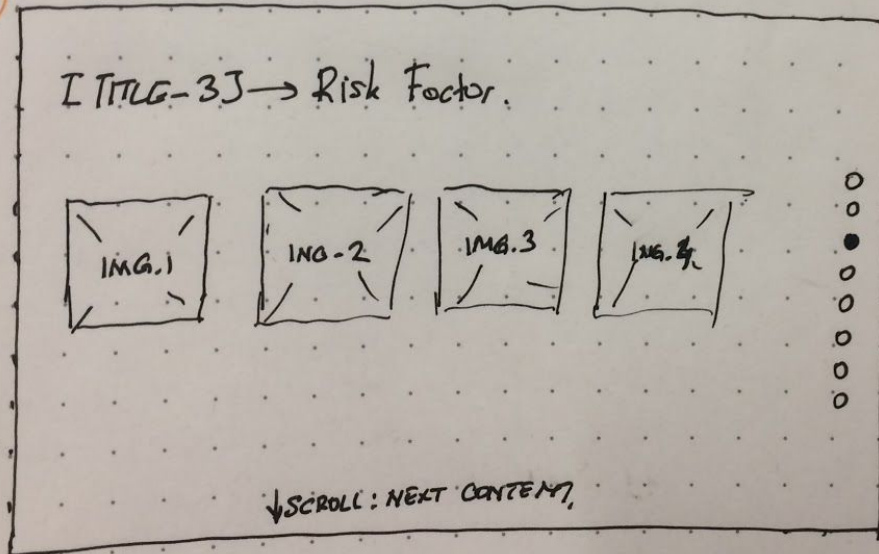


③



→ Linked Visualization Template.

④



→ Template without any visualization
Showing information about Risk Factor.

PROJECT TIMELINE

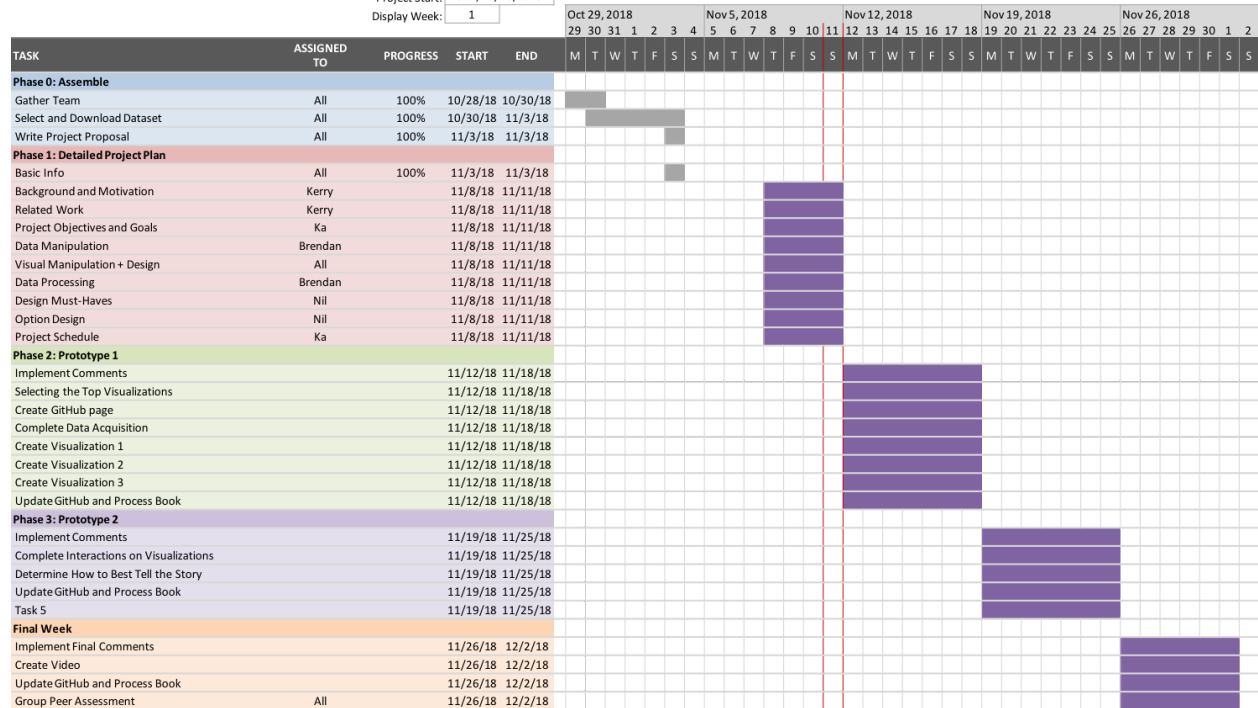
THE BEATING HEART OF THE WORLD

CS 171 Final Project

Group Members: Kerry Ivey (Leader), Brendan Murphy, Nil Tzucu, Ka Ning Yip

Project Start: Sun, 10/28/2018

Display Week: 1



FEATURE LIST

The list of "must have" features is as follows:

Landing Page: The first page of the story that user will see. This page will include the title/punchline and an introductory text. This section may also include key indicators and a background image.

Punchline / Title: Title can be in the form of a question or a punchline.

Introductory Text: The landing page will include an introductory text or abstract of the narrative.

Visual Structuring / Layout Templates: We will have one or more layout templates to represent the information including text, visual materials and interactive visualization.

Navigation structure: We will design a navigation structure that is convenient for our narrative. This structure can be scrolling template in which new information will appear as user scrolls or this can be in the form of steppers in which user will click on a navigation button to continue reading. In recent years, scrollytelling vs. steppers¹ has created fruitful discussions among designers and storytellers, so we will benefit from previous research to decide which navigation structure we will design.

Color Scheme: We will implement two color scheme; (1) colors for user interface features such as background color and button colors. (2) colors for visualization such as diverging or sequential color scales.

Typography Design: Typography will include selections for font families and sizes. In order to keep the design clean, we will work with only one font family (sans-serif) and have multiple font sizes and weights for titles, footnotes and content paragraphs.

Images: We will use images related our story.

Text: We will use short and long format paragraphs to support visualization.

Controller Components: We will have a series of designed control buttons such as dropdown or switch button to provide interactivity in the visualization.

Information-on-demand: We will implement an information hierarchy; (1) the information that we have to show to tell the story (2) the information that would be good to show on demand for more interested or expert users. For information-on-demand, we will design tooltips.

Conclusion: The final part of the narrative will summarize all the information that was presented earlier in the narrative.

Visualizations: We will design series of interactive visualizations which complement any textual components.

Optional features include:

¹ <https://medium.com/@zanarmstrong/why-choose-scrollytelling-steppers-155a59dd97fe>

Animated Transitions: In storytelling platforms, it is important to make sure that there is a good flow in the narrative structure. Animated transitions are good methods to keep user oriented.

Guide / Instruction Components: Depending on the complexity of user interface and visualization, we can introduce ui helpers to explain certain features and visualizations.

Key indicators: Key indicators can include mix of text and numbers such as "X million of people.."

Video Clips:

Audio: Although the audio will always have to be optional, it's nice to have voice overlays to augment the effect to narrative,

TEAM ROLES

Team Member	Responsibilities
Kerry Ivey	Leader - Maintains the process book. Enforces the timeline. Gives presentation/voice for video. Provides final sign-off on milestone completion.
Ka Ning Yip	Editor - Spell-checks the textual content and ensures that it has a consistent voice. Creates the timeline. Creates supplementary powerpoints.
Nil Tuzcu	Designer - Makes sure that color, font, and CSS choices stay consistent across all parts of the visualization. Fine-tunes general layout and content flow.
Brendan Murphy	Code monkey - Preprocesses the data into appropriate formats for the visualizations. Assists with code implementation challenges. Maintains the GitHub repository.

Prototype_1

Link to Github: <https://github.com/bemurph/cs-171>

Additional References:

Facts about deaths by risk factors:

https://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf

Icon and Image Sources:

Inactivity icon: <https://thenounproject.com/search/?q=inactivity&i=684075>

Sitting by Gan Khoon Lay from the Noun Project

Obesity icon: <https://thenounproject.com/search/?q=obesity&i=684069>

Eating by Gan Khoon Lay from the Noun Project

Smoking icon: <https://thenounproject.com/search/?q=smoking&i=785665>

Smoke by Hare Krishna from the Noun Project

Sugar icon: <https://thenounproject.com/search/?q=sugar&i=1375945>

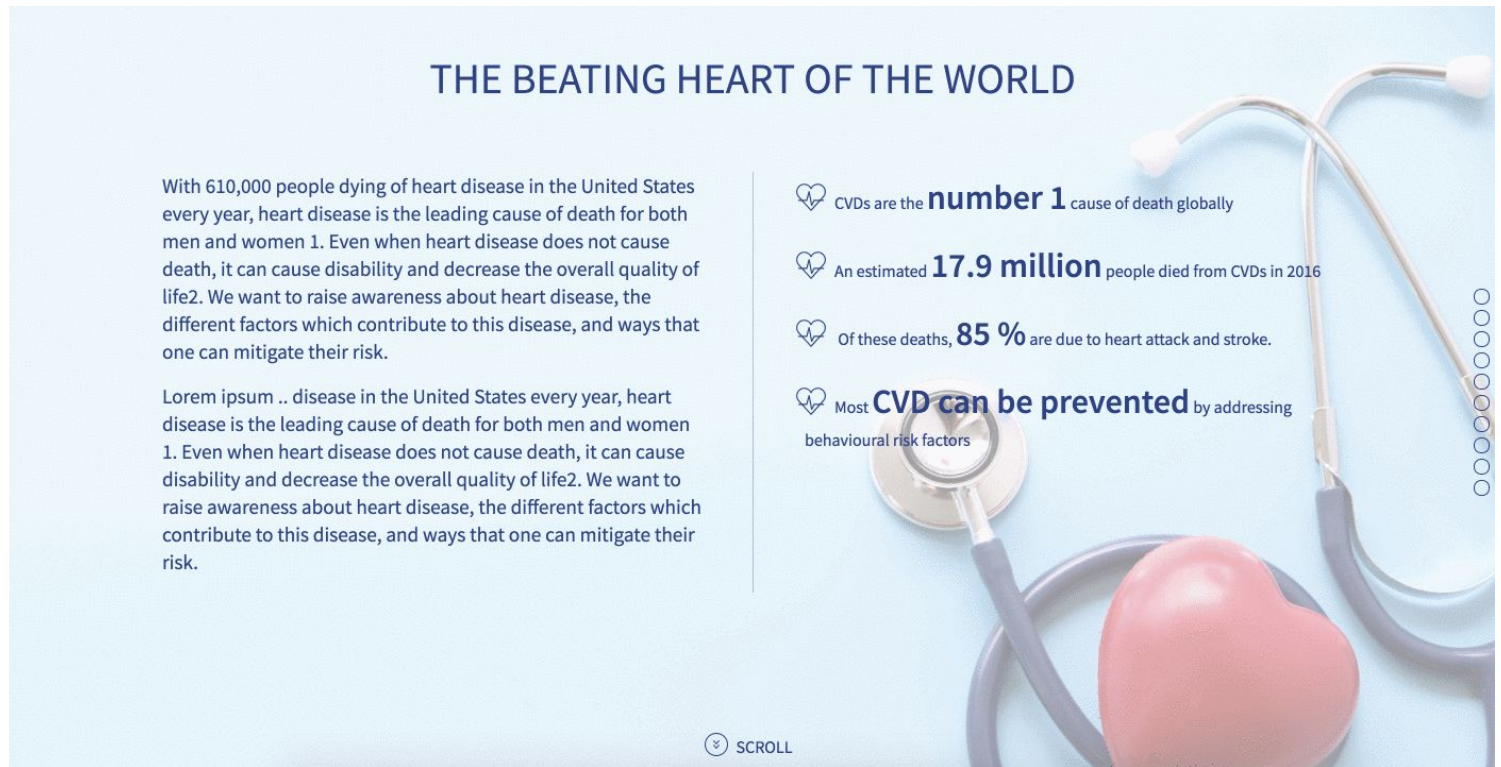
Sugar by Dinosoft Labs from the Noun Project

Blood pressure icon:

<https://thenounproject.com/search/?q=blood%20pressure&i=1957357>

Sphygmometer by LAFS from the Noun Project

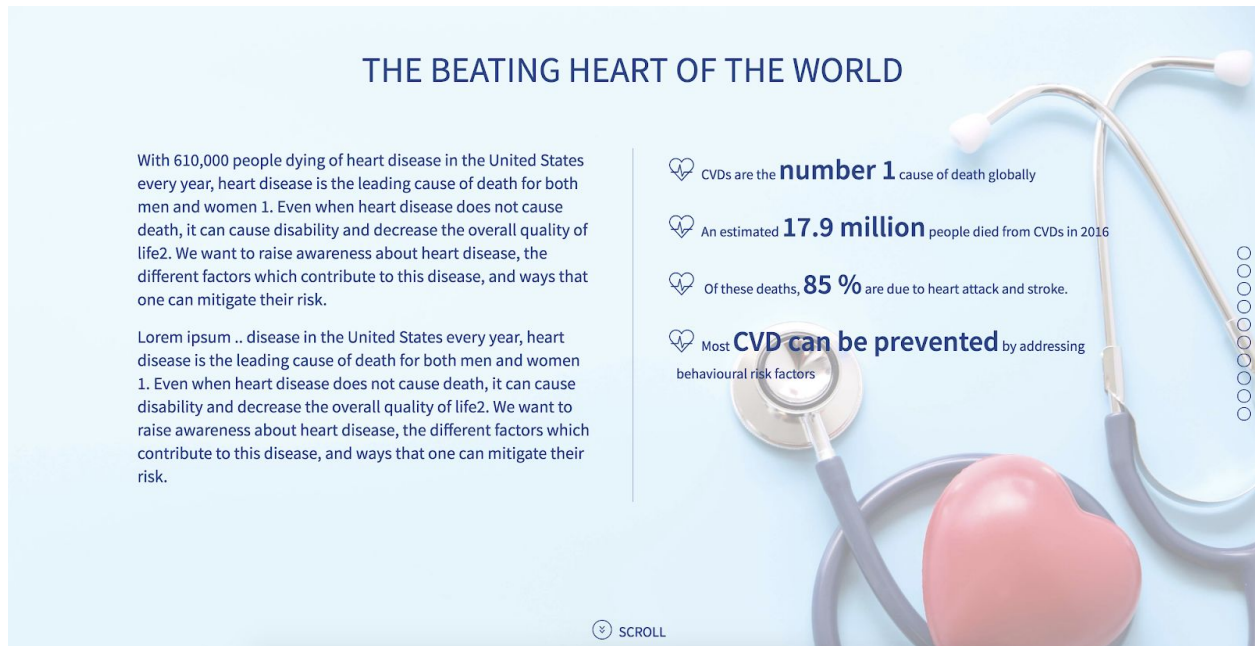
Web design, layout, storytelling and implemented Viz: (See the .gif below)



Web and Navigation Design: We are using a one-page scroll pattern. There is also a side navigation design where users can follow where they are in the story or go to a specific section in the story. When hovering over the right navigation dots, users will see the title of the section.

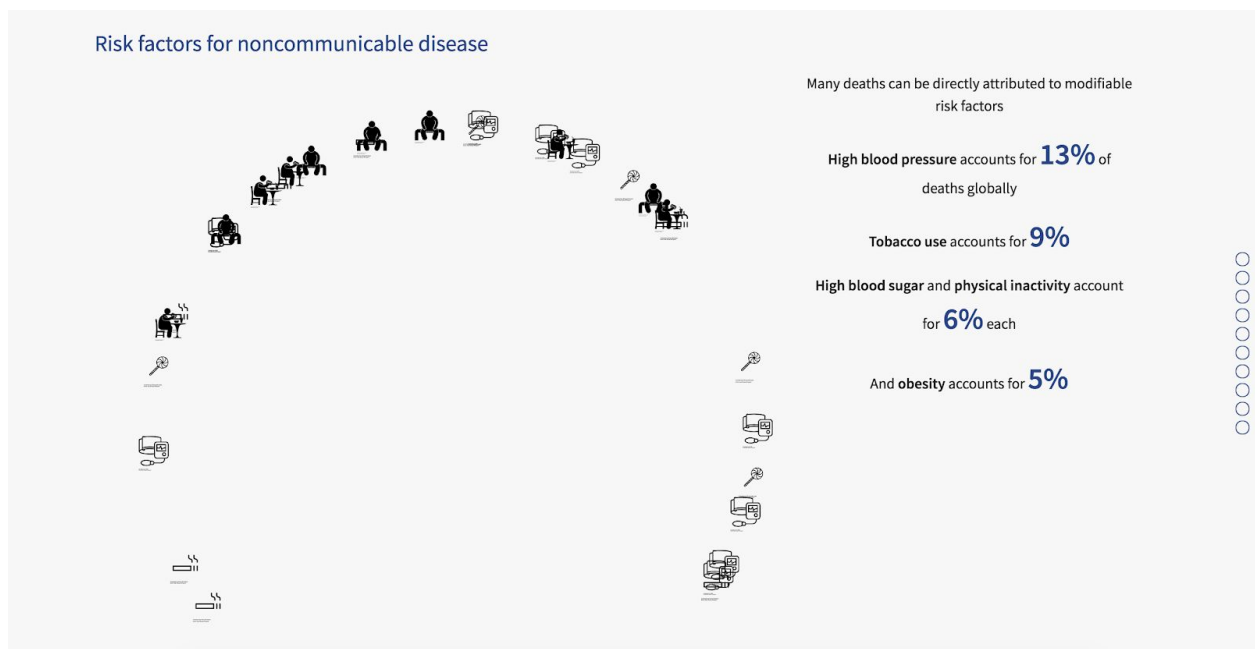
On each page, users see the title of the current visualization and a short title of the next visualization. We implemented this method to make sure that the user is always correctly oriented and how to get to end of the story.

1. Landing Page: (URL: /#view-1)



Our landing page includes a short introductory paragraph and key factors about the cardiovascular heart diseases.

2. General Risk Factor Info: (URL: /#view-2)



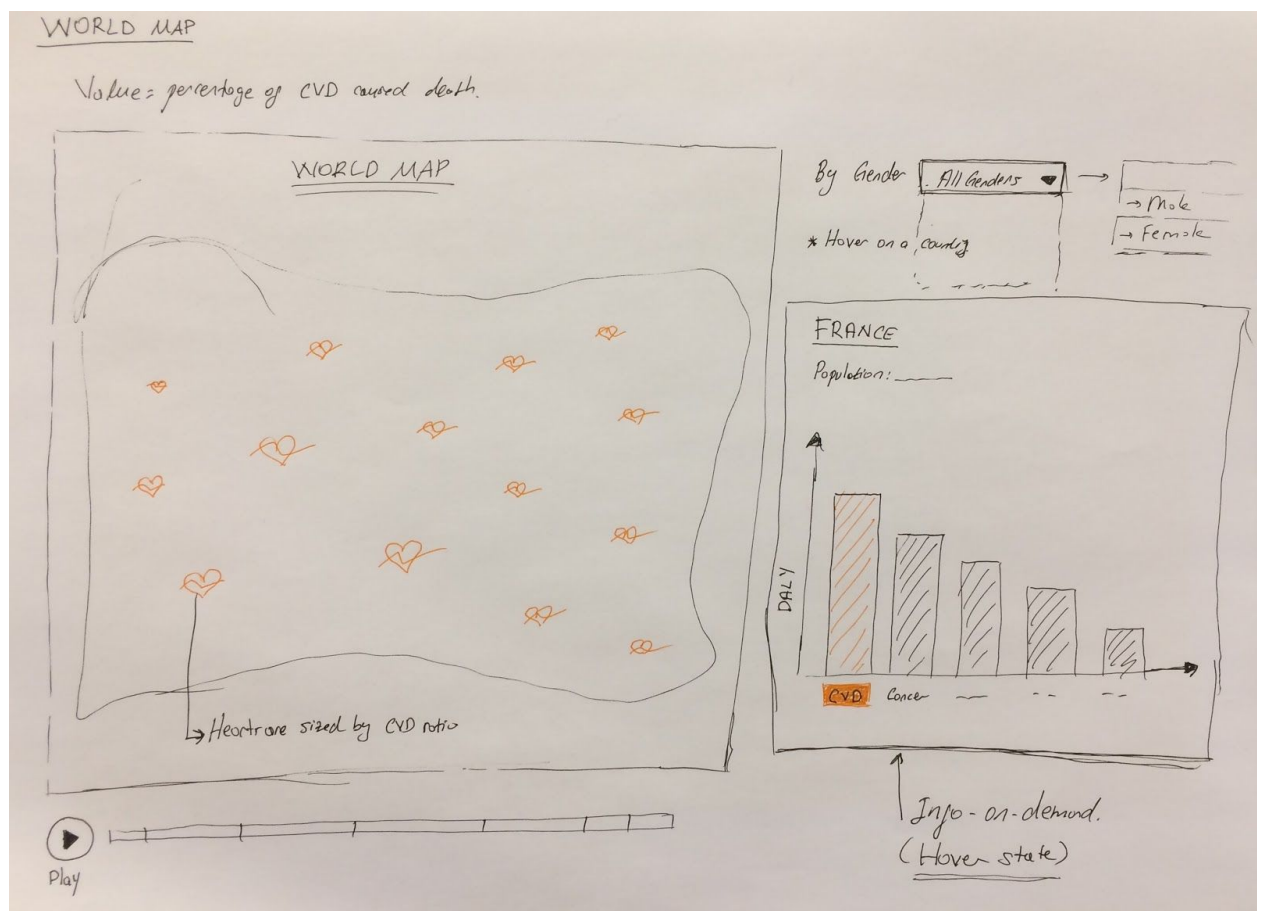
Dataset: risk_factors.json

Source:

https://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf, page 6

The visualization on the left shows the percentage of deaths that are caused by each of the risk factors listed in the right side of the page. There are 13 sphygmomanometers for high blood pressure, 9 cigarettes for tobacco use, 6 lollipops for high blood sugar, 6 people sitting for physical inactivity, and 5 people eating for obesity. The icons radiate outward from the center every three seconds. In the next iteration, a heart will pulse at the center in time with the transition. Each risk factor will have its own color encoding in addition to the separate icons to better distinguish them. Different styles for transition speeds, opacity, acceleration, and position will need to be explored. Additionally, the number of icons can be confusing depending on how they are split up. One possible solution is to separate the icons into 'waves' such that each heart pulse shows the icons for only one risk factor at a time. Another possible solution is to distribute them evenly in the circle around the center, as right now it is random.

3. World Map: (URL: /#view-3)



Datasets: DALY-2000-country-all.csv, DALY-2010-country-all.csv, DALY-2015-country-all.csv, DALY-2016-country-all.csv

In this two-column visualization layout, users will see a world map and an info-on-demand area (area that appears with hover).

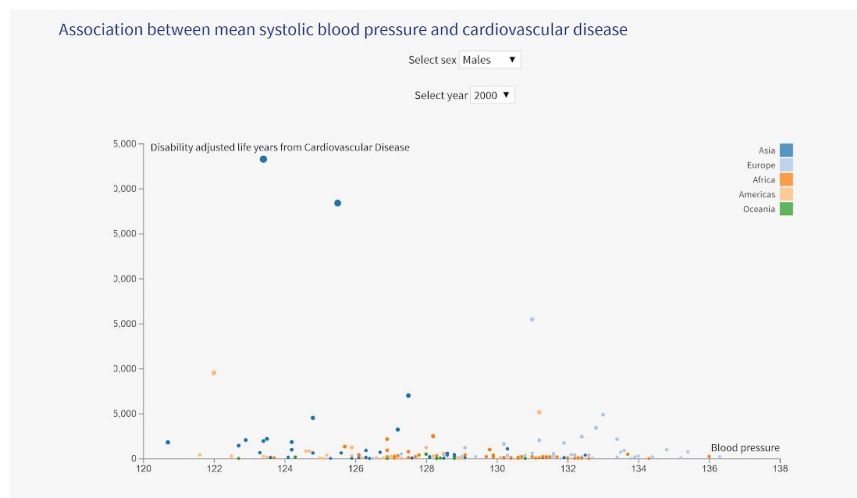
The world map has heart-shape visual encodings showing the ratio of CVD-caused deaths / Total deaths. When users hover on a country, they will see a bar graph showing the mortality rate of CVD and other select diseases. They will also see some additional text about the country such as population.

Filtering: Three datasets were merged in order to create a timeline-based visualization. The data is filtered based on the years and based in the select gender. (1. Total (Female+Male) 2. Female 3. Male)

4. Introductory Page to CVD factors (URL: /#view-4)

This page will have pictures and text about upcoming visualizations. It will introduce two CVD factors: blood pressure and cholesterol.

5. Factor #1: Blood Pressure (URL: /#view-5)



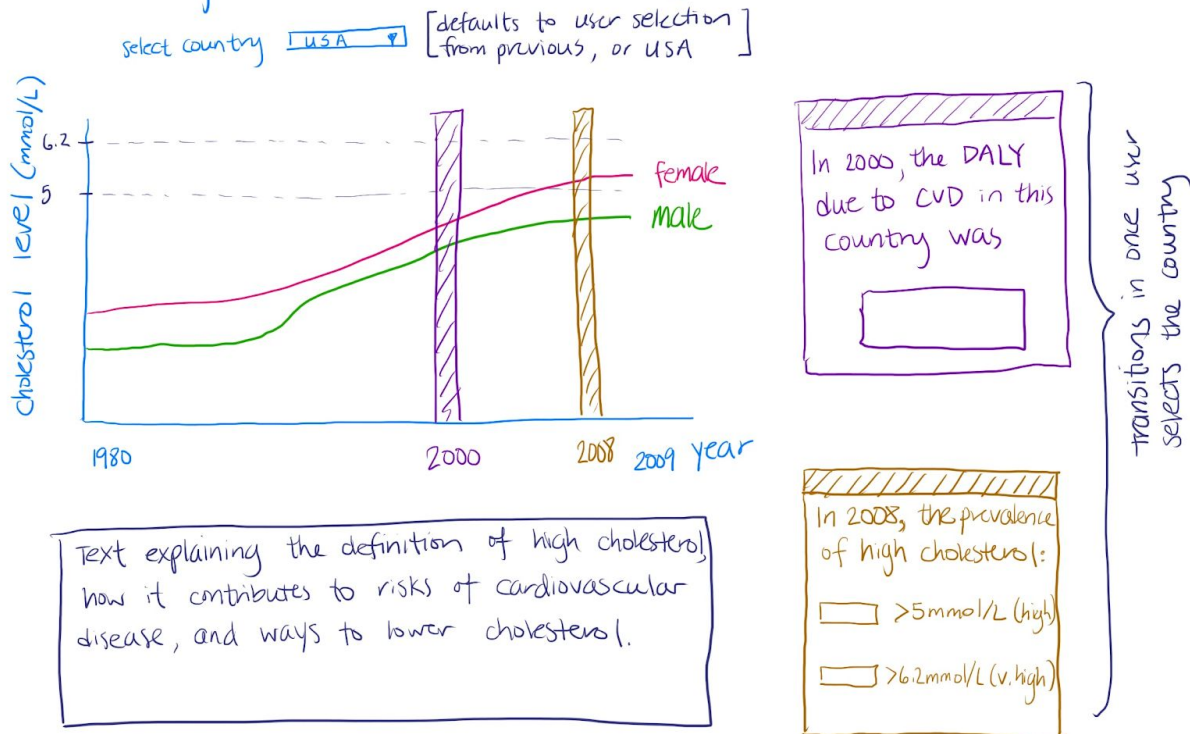
This scatter plot is the implemented visualisation and it shows the relationship between blood pressure and the disability adjusted life years from cardiovascular disease. We are showing this plot to give the viewer an idea what the relationship is between risk factors and CVD. It is coloured by geographic region, and the size of the circle corresponds to the population size of a given country. Hovering over a circle indicates the country which has been selected. The user is able to interact with the chart by specifying the sex and the year that they want to view.

Filtering: Data formatting was performed in order to make this visualisation. Three datasets were merged into one csv file. Datasets were formatted so that the first column represented the country, and subsequent columns represented the variables describing geographic region, blood pressure and CVD DALYs.

This plot will be improved by changing some layout characteristics, and some text will be added to describe why blood pressure is an important risk factor for CVD.

6. Factor #2: Cholesterol (URL: [/#view-6](#))

Average Cholesterol Levels Among Adults 25+



The impact of high cholesterol in CVD will be visualized via a line chart. A dropdown menu will be available where the user selects a country of interest (default to United States). Once a country is selected, then a line chart showing average total cholesterol levels among males and females for that country will be shown in mmol/L from 1980 to 2009. A text box describing the meaning of data (e.g. definition of high cholesterol) will be shown below the line chart.

Two additional sets of information will be transitioned in once the main line chart appears. The first is the DALY due to CVD (as introduced previously) for the selected country in the year 2000 will be shown. The second is the prevalence of high cholesterol for the selected country in 2008 will be shown. In addition, two dotted lines at 5 mmol/L and 6.2 mmol/L will be drawn to show where the threshold to high cholesterol are.

Datasets used: mean-total-blood-cholesterol-age-adjusted.csv, raised-total-cholesterol-adult-5plus-2008.csv, raised-total-cholesterol-adult-6plus-2008.csv

Formatting: The datasets were distinguished between male and female data

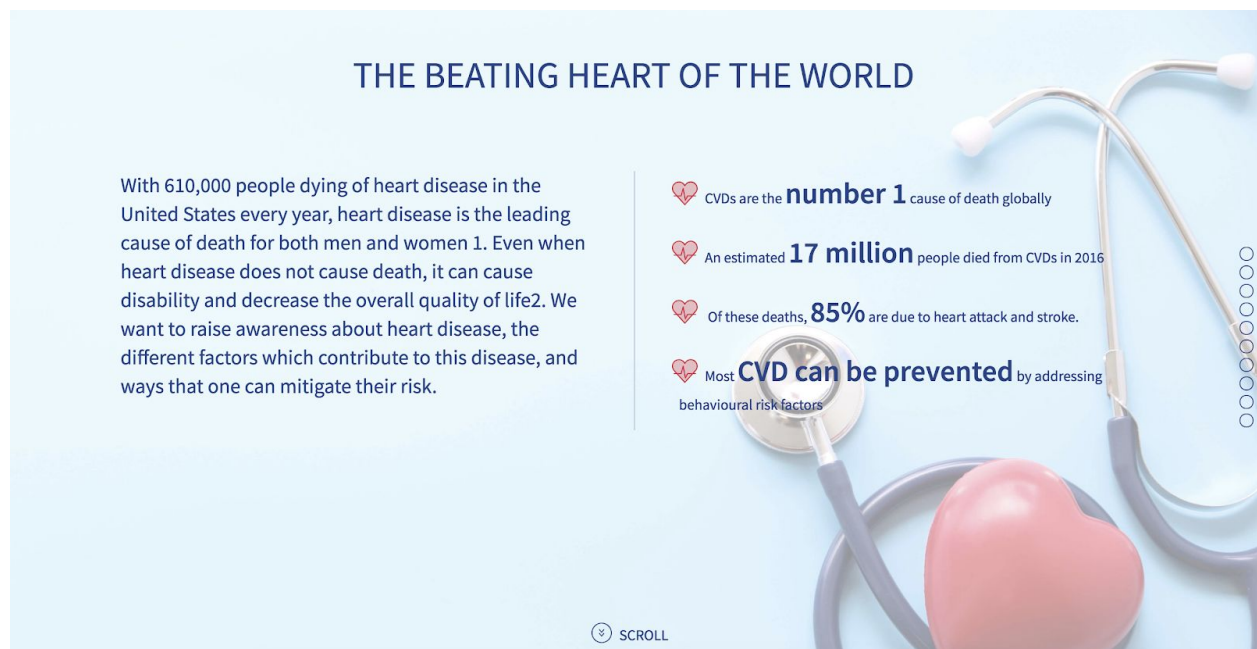
7. Summary/Concluding Remarks (URL: /#view-7)

This page will have concluding remarks on CVD and resources available for the viewer to learn more.

Prototype_2

1. Landing Page: (URL: /#view-1)

- Based on our TA's feedbacks, we fixed the introduction paragraph and made it short and more reader-friendly. We introduced a red color (#d72748) that will carry through the entire website. We decided to keep the light-blue mask at the background as it represents the emotion of calm that we think it is appropriate for a health-related web platform.



Beating heart concept: In order to carry the beating heart design concept, we designed a CSS animation for page titles.

Global Atlas of Cardiovascular Disease

2. Risk factors for CVD: (URL: /#view-2)

Blood Pressure by John Salzarulo from the Noun Project:

<https://thenounproject.com/search/?q=blood%20pressure&i=859340>

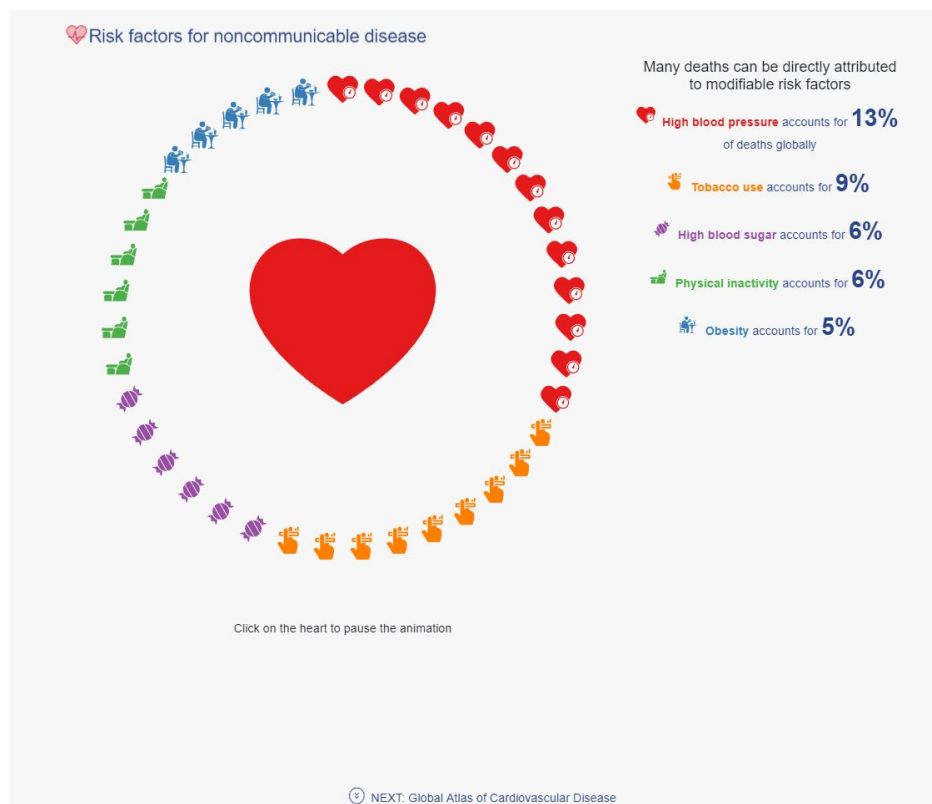
candy by Deemak Daksina from the Noun Project:

<https://thenounproject.com/search/?q=candy&i=1423244>

Smoking by Andrejs Kirma from the Noun Project:

<https://thenounproject.com/search/?q=smoking&i=716085>

Heart by DesignBite from the Noun Project



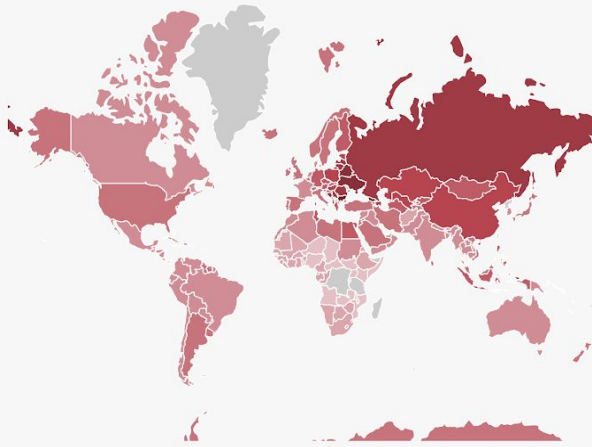
Each risk factor was given a distinctive color (from color brewer) and icon that could be viewed in the visualization. The icons also are arranged by category and do not overlap to better distinguish them from each other. They also fade out at the end of the animation before starting another loop. The heart in the middle was a new addition and it animates in time with the icons. The user is able to click on the heart to stop the animation and click on it again to restart it.

3. World Map: (URL: /#view-3)

- We finished the implementation of the world map visualization titled as “Global Atlas of Cardiovascular Diseases”
- The default setting shows the latest available year and total population (male and gender) data mapped with using the primary red color. User has the option of filtering data based on gender and years. Gender option has different color coding. (Green and purple scale)
- When hover on a country, users see detailed information about the select country (name, population, ratio) and a comparison bar chart showing the top 10 causes of death. User can hover on bars and see the names of the diseases. We didn't implement the x-axis for the bar chart because the names are too long. We also colored cardiovascular disease bar on red to get the user's attention.
- Previously, we planned to have an interactive timeline below the map. However, because the data is only available for 4 years (2000, 2010, 2015, 2016) timeline idea didn't work out, so we included a dropdown with years selection.

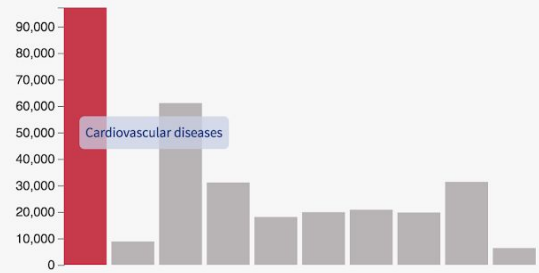
Global Atlas of Cardiovascular Disease

Gender by 2016



COUNTRY: CHINA
POPULATION: 1411415K
CARDIOVASCULAR DISEASES RATIO: 26%

TOP 10 DISEASES CAUSING THE MOST DEATHS WORLDWIDE. (HOVER TO SEE NAME OF THE DISEASES)



⏏ NEXT: TITLE-3

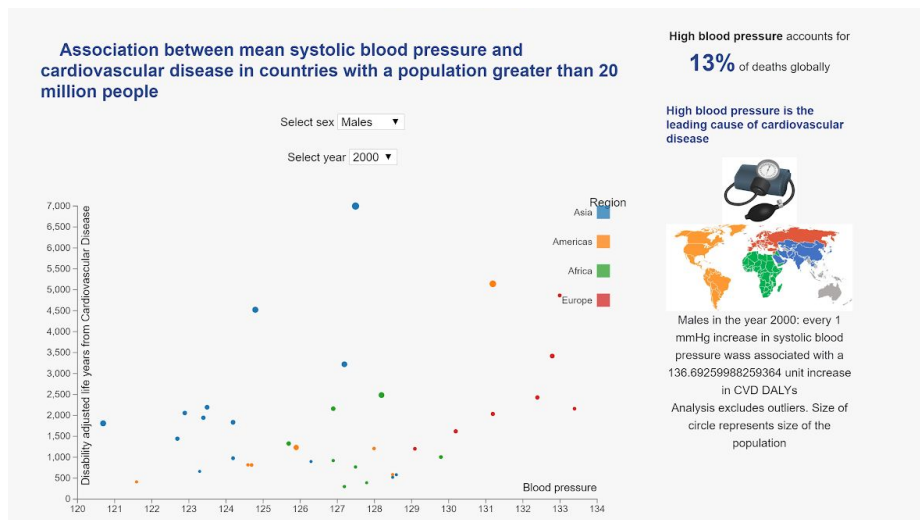


4. Blood pressure (intro): (URL: /#view-4)

- We added information and graphics to describe blood pressure; what it is and why it's a risk factor

5. Blood pressure (visualization): (URL: /#view-5)

- We further filtered the data so that outliers were removed.
- We added a world map showing the different regions by color
- We added text to describe the visualisation
- We added code to allow filtering based on button press of the legend, but could not get the code to work, yet
- Changed the size of the visualisation so it fits on one page



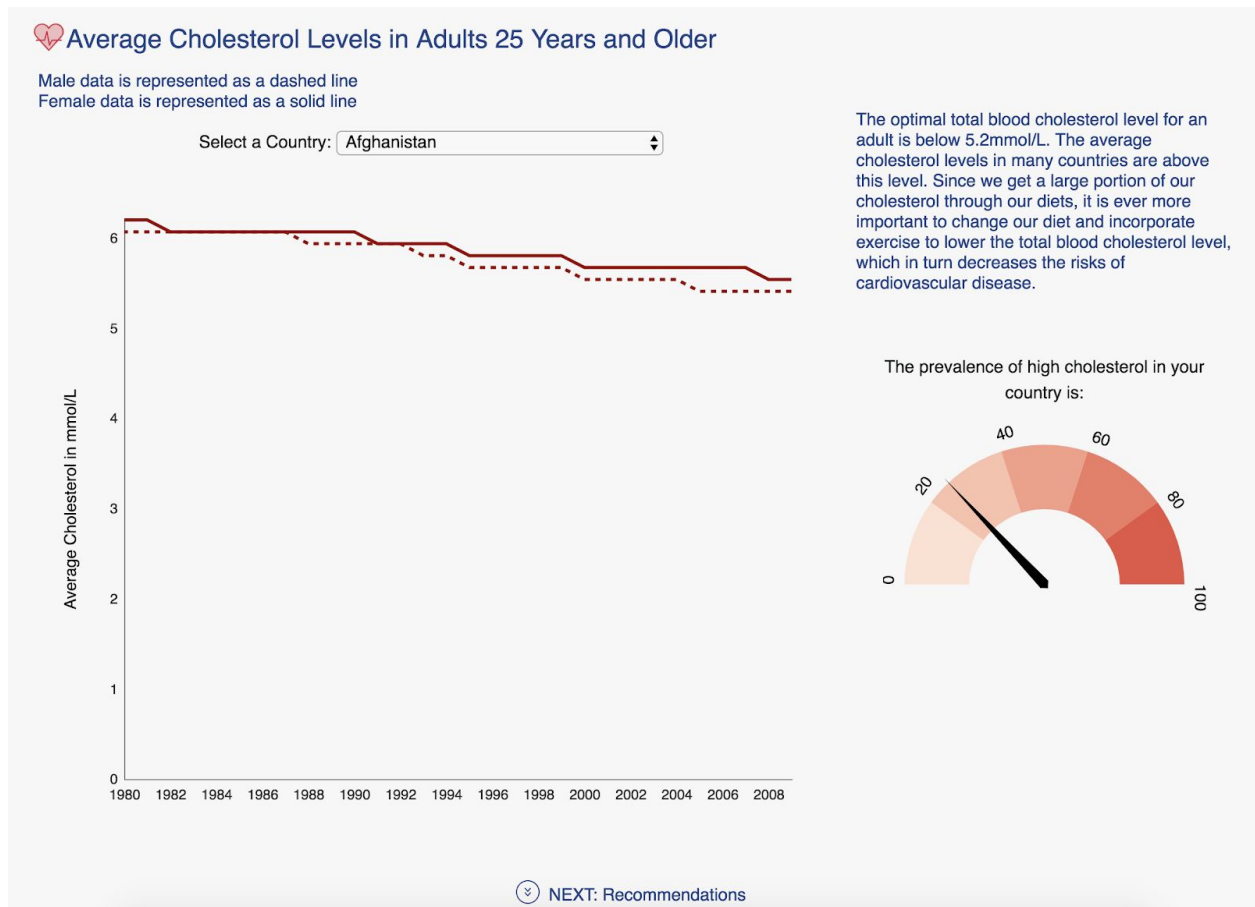
6. Cholesterol (intro): (URL: /#view-8)

- We added information and to describe high cholesterol; what it is and why it's a risk factor

6. Cholesterol (visualization): (URL: /#view-6)

- We implemented the visual to show the average cholesterol levels among individuals in each country from 1980 to 2009.

- A dropdown menu was added to allow user to select a country of choice, and the graph would update with a transition
- Text was added for analysis
- A gauge is added to the right to show the prevalence of high cholesterol in the selected country, but the code is still in progress
- Goal for the final version is to better differentiate the male and female data



8. Recommendations: (URL: /#view-7)

- Added summary text
- Added recommended actions to take on selected risk factors
- Added hyperlinks for more information
- Added references

Final Submission

As part of our final submission, we created one folder that contains:

- A detailed readme file
- The process book
- The website files and folders

The major changes we made to the website since the previous submission are as follows:

1. Completed implementation of all visualisations.
2. Fully polished the website and ensured all visualisations are fully functioning.
3. We included in the readme file the viewing parameters that result in optimal user experience. Specifically, for best results, this website should be viewed on a Chrome web browser at 1435px X 772px.
4. Improved storytelling by...
 - a. Re-writing the landing page text to better explain what the website is about and why heart disease is important.
 - b. Added text to accompany each visualization in the website.
 - c. Rewrote the text sections regarding risk factors to better link them to the main themes of the website.
 - d. Rewrote the conclusion to emphasise the actions the viewer can take to reduce their heart disease risk.
 - e. Iterated why gender is important in the landing page by highlighting that it is a non-modifiable risk factor.
 - f. Added text on each slide to link it to the content of the following slide. This improved storytelling flow and connected one slide to the next.
 - g. Added more text to better tell the story.
5. Improved user interaction by making each visualisation interactable. Specifically...
 - a. The user can interact with visualisations on view 2 by...

- i. Clicking on a country to see top 10 diseases causing most deaths, the proportion of deaths attributed to heart disease, and the population of the country.
 - ii. Using drop down menus to select the gender and year they are interested in seeing data for.
 - iii. Hovering over bars in the bar chart to assess what diseases are contributing to mortality in that country.
- b. The user can interact with visualisations on view 3 by clicking on the animation to pause and restart it.
- c. The user can interact with visualisations on view 5 by...
 - i. Hovering over scatterplot bubbles to see the name and the population of the country.
 - ii. Using drop down menus to select the gender and year they are interested in seeing data for.
 - iii. Clicking on regions of the world map to view a scatterplot of countries just for that region.
- d. The user can interact with view 6 by clicking on hyperlinks to see the original source of the referenced text.
- e. The user can interact with visualisations on view 7 using the dropdown menu to select a country they are interested in viewing data for.
- f. The user can interact with visualisations on view 8 by...
 - i. Using the dropdown menu to select the risk factor that they are interested in viewing.
 - ii. Hover the mouse over a given bar in the bar chart to see the name of the country that the bar represents.
 - iii. Click on a geographic region to see data just for that region.
- 6. We renamed the navigation dots on the right of the page to be more reflective of the content of each slide. We also offset slightly the navigation dot tooltips, so they are more practical.
- 7. We removed the beating heart icon that was before each page title. We are now using icon/color-coding for risk factors. Each risk factor

has a dedicated color and icon. We placed respective icons before each page title.

8. We changed the styling of "Source" and made it a darker color with smaller font-size.
9. Added text in the readme document to state what level of zoom the website should be viewed with to ensure all slides fit on one page.
10. We made the the circle icon next to "NEXT" function as a button so that it is clickable and progresses the user to the next view.
11. Specific changes we made to the landing page (view 1) are...
 - a. Fixed typos.
 - b. Rewrote introductory text to better describe what heart disease is and why it is important, and to introduce the concept of risk factors.
 - c. Highlighted certain key words/phrases.
12. Specific changes we made to view 2 are...
 - a. Made the mouseover tooltips functioning.
 - b. Wrote text to describe to the user how to interact with the page.
 - c. Selected (clicked) countries are now filled with orange-red.
 - d. When users hover over grey areas, a mouseover tooltip shows "No Information". These are the countries we don't have data for.
 - e. Added explanatory text to say that males and females have different heart disease risks, and the prevalence of heart disease has changed over time. And then guide the user to use the drop down menus to explore how gender and time influence the proportion of deaths attributable to heart disease.
 - f. Because our visualizations have the option of filtering data by gender, we added an exploratory paragraph to the landing page explaining why such filtering is important for our storytelling.

- g. Explained more clearly what the heart disease ratio represented by renaming it to be the proportion of deaths attributable to heart disease.
13. Specific changes we made to view 3 are...
 - a. Coordinated the pulsating with the beating of the heart.
 - b. We added an extra element of user interaction by allowing the user to hover over risk factor icons, which results in the icons becoming larger.
 14. Specific changes we made to view 4 are...
 - a. We left-aligned the text.
 - b. We organized the text better so that it now states why blood pressure is an important risk factor for heart disease.
 - c. Added a graphic to explain what systolic and diastolic blood pressures are.
 - d. Highlighted relevant text by bolding some phrases and adding links to other parts of the document.
 15. Specific changes we made to view 5 are...
 - a. Added mouseover capabilities to the scatterplot, that give details of the population size of each country, which represents the diameter of each bubble.
 - b. Added a world map that represented the colour legend for the graph, that users could interact with by clicking on regions they want to see more information for.
 - c. Explained why we are just interested in systolic blood pressure, and not diastolic.
 - d. Removed filtering of only looking at 20 million + population, and are now instead showing all countries for which the World Health Organisation has data.
 - e. Added a legend that describes all the visualisation and decisions made.
 - f. Fixed the bug that results in interacting with the scatterplot breaking all other visualizations. The scatterplot can now be interacted with without affecting any other visualizations.

16. Specific changes we made to view 6 are...
 - a. We left aligned the text.
 - b. Changed the text from being 1 long paragraph into being multiple short paragraphs.
 - c. Added a figure to show what happens to your blood vessels when cholesterol levels are too high. This was done to re-emphasise the importance of cholesterol as a heart disease risk factor.
 - d. Highlighted relevant text by bolding some phrases and adding links to other parts of the document.
17. Specific changes we made to view 7 are...
 - a. Set the minimum and maximum values for the y axis to be 3.8 and 6.4, respectively, to make it easier to see differences between the countries. These values are based on the minimum and maximum values of the entire dataset.
 - b. Parts of the text that are important have been emphasised using bold lettering. Some text was also assigned a clickable hyperlink that lets the user navigate to the relevant sections of the website.
 - c. A legend with a visual of the male vs. female lines was added.
 - d. The optimal total blood cholesterol and the line representing high cholesterol level are indicated on the line chart itself.
18. We added a new visualisation in at view 8 to show a bar chart of the prevalence of the remaining risk factors; obesity, physical inactivity and smoking. This allowed us to better integrate all risk factors presented in view 2.
19. Specific changes we made to view 9 are...
 - a. We created an interactive graphic where users can select a risk factor **THEY HAVE**, and then text appears explaining what they **SHOULD DO** to improve that particular risk factor.
 - b. We added text to make it clear that certain text is clickable.
 - c. We added more visual elements by including icons to represent each of the heart disease risk factors.

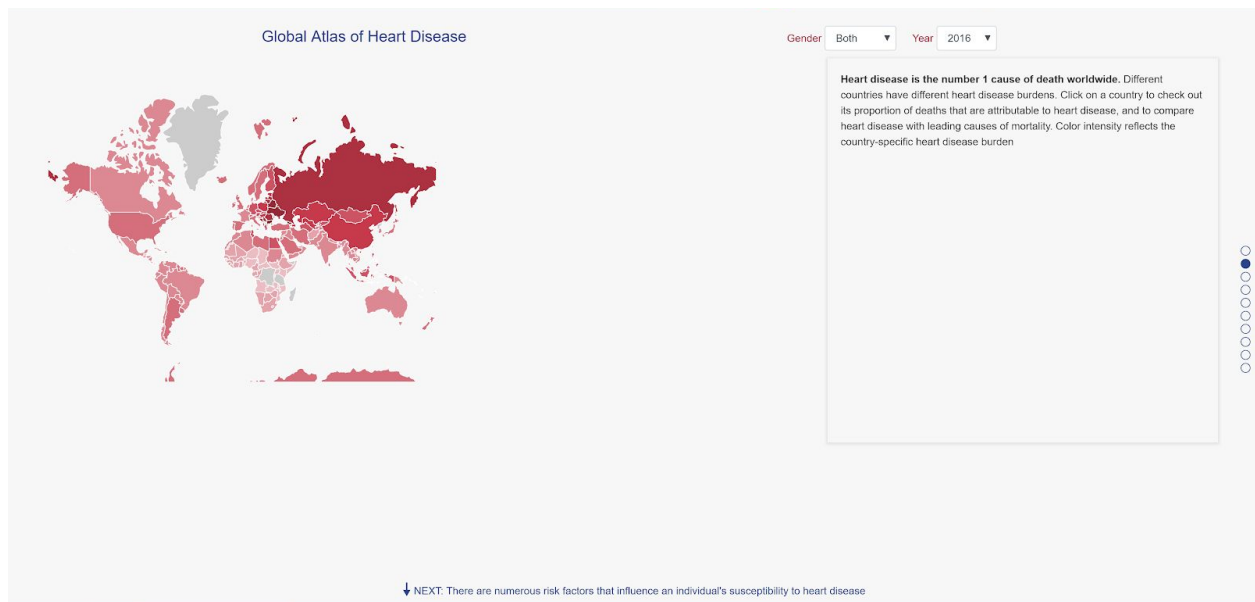
- d. Moved the source links closer to the text.
20. We added a final view that identifies the team members and provides reference links to the data used to create the visualisations in the website. We also provided references for the figures and icons used in the website.

These changes and improvements resulted in our final website, views of which are detailed below:

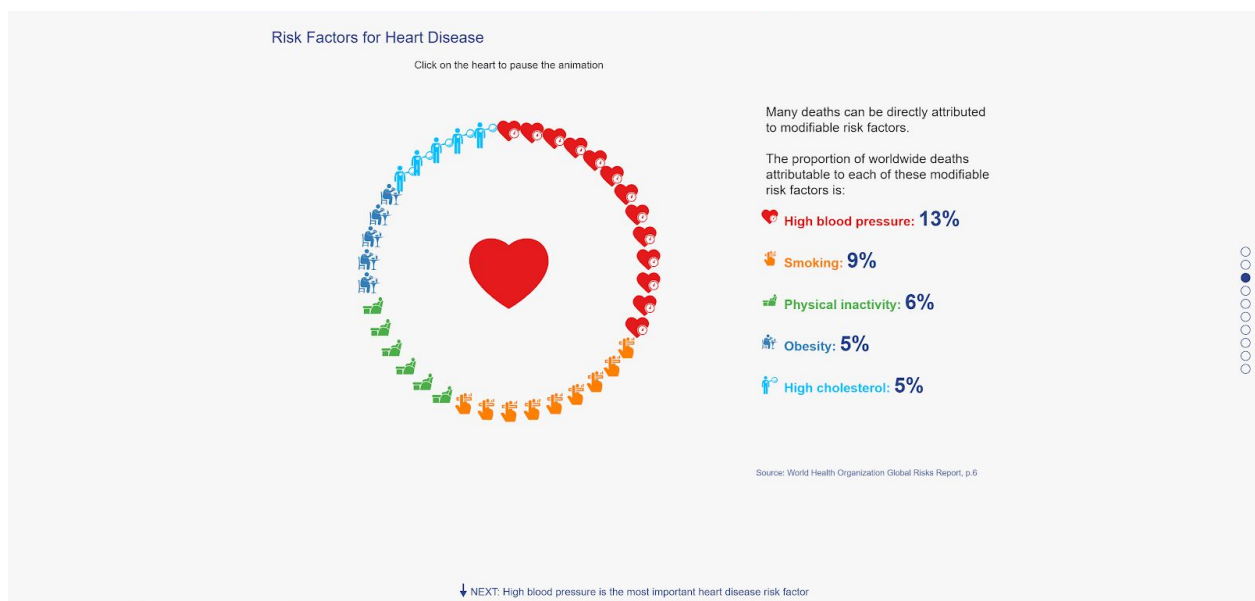
View 1



View 2



View 3



View 4

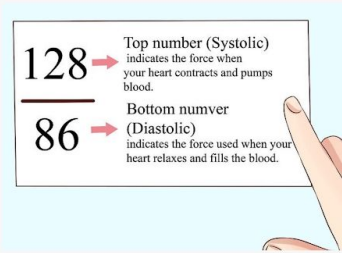
♥ High Blood Pressure is the Leading Cause of Heart Disease

Blood pressure is the pressure your blood puts on your artery walls. Your blood pressure naturally goes up and down all the time, adjusting to your heart's needs depending on what you are doing. **A blood pressure reading under 120/80mmHg is considered optimal.**

Blood pressure that's high (over 120/80mmHg) over a long time is one of the main risk factors for heart disease. In fact, uncontrolled high **systolic blood pressure** can lead to a heart attack or stroke. It may also affect your kidneys.

There are many things you can do to lower your blood pressure, such as **losing excess weight**, **undertaking regular physical activity**, and **quitting smoking**. However, the importance of blood pressure as a risk factor is different across different geographic regions of the world.

Source: Australian Heart Foundation.

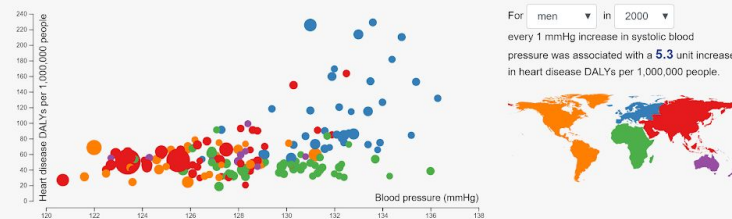


↓ NEXT: Elevated systolic blood pressure is associated with increased heart disease burden

View 5

♥ Systolic Blood Pressure Contributes to Heart Disease Mortality

Systolic blood pressure is the maximum pressure in the arteries when the heart contracts, and is therefore a **major determinant of heart disease risk**. The visualization below explores the correlation between a country's mean systolic blood pressure and the **burden** of heart disease, represented as heart disease Disability Adjusted Life Years (DALYs)*. You can click on the different regions in the world map to filter by those regions. The size of a dot is proportional to the country's population. Hover over the dots for more information about individual countries.



*One DALY can be thought of as one lost year of "healthy" life. The sum of these DALYs across the population, or the burden of disease, can be thought of as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability.

Source 1: Centers for Disease Control and Prevention Source 2: Elevated systolic blood pressure as a heart disease risk factor Source 3: World Health Organization

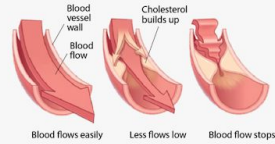
↓ NEXT: High blood cholesterol is an important heart disease risk factor

View 6

 High Cholesterol is an Important Heart Disease Risk Factor

Cholesterol is a waxy like substance that circulates in the blood. As the amount of cholesterol in your blood increases, so too does your risk of heart disease. It is **optimal** to have cholesterol levels below 5.2 mmol/L (or 200 mg/dL).

Your cholesterol levels are considered high if they are greater than 6.2 mmol/L (or 240 mg/dL). When there is too much cholesterol in the blood, it can build up on the inside of blood vessel walls, causing the blood vessels to narrow and less flexible. Heart attacks and strokes occur when a blood clot forms and blocks one of these narrowed arteries.



If you have other risk factors such as [high blood pressure](#), [smoking or obesity](#), your risk increases even more. The more risk factors you have and the more severe they are, the more your overall risk is compounded. The good news is that much can be done to improve blood cholesterol levels, and in recent years, some [countries](#) have managed to lower the blood cholesterol concentrations of their population.

Source: National Institute of Health.

↓ NEXT: The average cholesterol level in adults varies across geographic regions

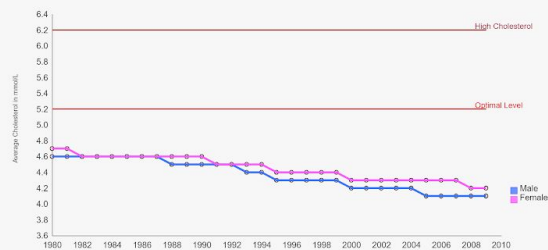
View 7

 Global Trends in Average Cholesterol Levels in Adults 25 Years and Older

The **optimal** total blood cholesterol level for an adult is below 5.2 mmol/L. High cholesterol occurs when the total blood cholesterol level is above 6.2 mmol/L. In recent years cholesterol levels have improved in many countries; however the average cholesterol levels are still often elevated above the desirable level.

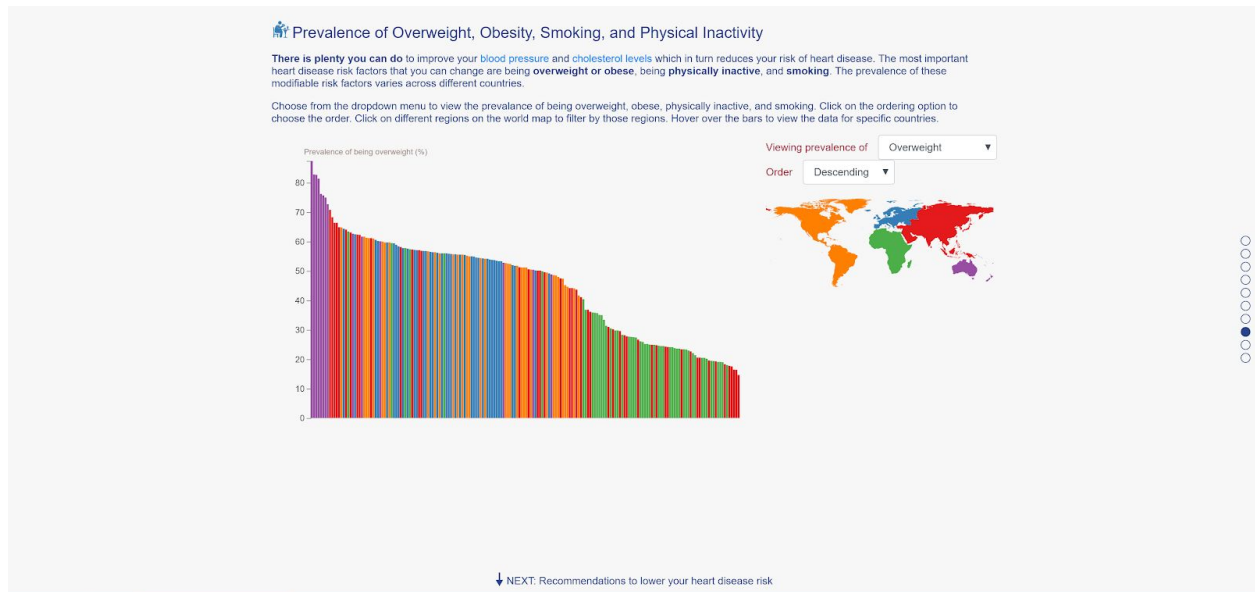
Having high cholesterol puts you at risk for heart disease. Your personal cholesterol goal depends on other risk factors you may have, including smoking, being overweight, and being physically inactive.

Select a Country: Afghanistan



↓ NEXT: Overweight, obesity, physical inactivity, and smoking are important heart disease risk factors

View 8



View 9

Recommendations to Lower Your Heart Disease Risk

Heart disease is the leading cause of mortality and morbidity world wide. The good news is that all of the biggest factors which contribute to heart disease are in your direct control.

IF YOU... (Select A Risk Factor)	YOU SHOULD...
Have high blood pressure	<input checked="" type="checkbox"/> Eat a low-sodium diet
Have high cholesterol	<input checked="" type="checkbox"/> Limit your alcohol intake
Are obese	<input checked="" type="checkbox"/> Exercise regularly
Are physically inactive	<input checked="" type="checkbox"/> Manage stress
A smoking habit	<input checked="" type="checkbox"/> Quit smoking

Source


For more information, visit:

[Heart Foundation](#) [American Heart Association](#) [World Health Organisation](#)

↓ NEXT: About

About

Our Team



Kerry Ivey



Brendan Murphy



Nil Tuzcu



Ka Ning Yip

References

- 1. View 2&5 Data Sources: http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html
- 2. View 5,7,8 Data Sources: <http://apps.who.int/ghodata/data/node.main.A967?lang=en>
- 3. View 8 Data Sources: <http://apps.who.int/ghodata/data/node.main.65>
- 4. High Blood Pressure Icon: By John Salazarulo from the Noun Project
- 5. Smoking Icon: Smoking by Andreja Kirma from the Noun Project
- 6. High Blood Sugar Icon: By Deemak Dakina from the Noun Project
- 7. Physical Inactivity Icon: By Luis Prado from the Noun Project
- 8. Obesity Icon: By Gan Khoon Lay from the Noun Project
- 9. High Cholesterol Icon: By Gan Khoon Lay from the Noun Project
- 10. Heart Icon: By DesignBite from the Noun Project
- 11. Images on views 4 and 6: <https://www.wikihow.com/Lower-Diastolic-Blood-Pressure> <https://cholesterol-about.weebly.com/>

