1. Describe your data set.
   1. Why was the data collected?
   2. How was it collected?
   3. What are the characteristics of the data?
2. Provide a rationale for a visualization tool.
   1. Why is a visualization tool necessary?
   2. What can we expect to learn?
3. Discuss your final design and justify your design decisions.
   1. Why did you choose your visual encodings?
   2. What kind of interactions did you implement and why?
   3. Does your visualization scale with the size of the data?
4. Record a demo that illustrates key features of your Streamlit app and how insights were generated!

Welcome to our visualization tool, Pediatric Blood Pressure Percentiles for Screening and Management of High Blood Pressure.

In assessing high blood pressure in children under 13 years old, their sex, age, and height must be taken into account. Because this evaluation is dependent on multiple patient data and not just the blood pressure values as is the case for adults, it can be challenging for a healthcare provider to identify high blood pressure in children.

Our visualization aims to help providers identify and manage high blood pressure in children at the point of care.

Pediatric blood pressures are categorized based on percentiles that are determined by the patient’s sex, age, and height.

Less than the 90th percentile is considered normal or not elevated, greater than or equal to the 90th percentile and less than the 95th percentile is considered elevated, and greater than or equal to the 95th percentile is considered hypertensive.

Management decisions differ by this categorization.

To calculate the percentiles, we used blood pressure reference standards found in The Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents.

Our visualization allows the user to manually input a patient’s data to generate the percentiles.

We also connected our visualization to the N HANES dataset to simulate integration with real patient data such as from an electronic health record.

N HANES is a research program that evaluates the health and nutritional status of adults and children in the United States through surveys and physical exams.

From N HANES, we used sex, age, height, and blood pressure data from individuals under 13 years old to calculate the blood pressure percentiles.

For example, let’s say the user wants to assess blood pressure of the patient with the N HANES ID 3.

On the plot, the x-axis is the patient’s age in years and the y-axis is the patient’s blood pressure percentile.

Then there are three horizontal lines denoting the 50th, 90th, and 95th percentiles.

Based on patient 3’s sex, age, and height, the percentiles for the patient’s systolic and diastolic blood pressures are plotted.

The main encodings used are position and color of the plotted points.

A higher position on the y-axis corresponds with a greater percentile.

The color of the plotted point can be green, yellow, or red, corresponding to normal, elevated, or hypertensive blood pressures, respectively. We chose these colors because they are conventionally used for this type of categorization, so are the most intuitive.

For ADA accessibility and further information, we include a hover that allows the user to see whether the plotted point reflects the systolic or diastolic blood pressure, the blood pressure value, the blood pressure percentile, and the blood pressure status.

Then, based on the blood pressure status, the user can go down to the table for management recommendations.

The user can also manually input patient data by selecting the sex, selecting the age, entering the height, and entering the systolic and diastolic blood pressure values.

The plotted point between the 90th and 95th percentiles is yellow since it meets elevated blood pressure criteria. Hovering over the point shows that it denotes the systolic blood pressure with a value of 110 that corresponds to the 94th percentile, which is considered elevated.

Then the user can refer to the table for guidance on next steps for the patient’s elevated blood pressure.

We hope you enjoy our visualization tool for Pediatric Blood Pressure Percentiles for Screening and Management of High Blood Pressure!