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Impacts of Chronic Diseases on Gender, Race, and Ethnicity.

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CAPSTONE PROJECT DOCUMENTATION

Topic: Impacts of Chronic diseases on gender, race, and ethnicity.



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What is colorectal cancer?

The uncontrolled division of unusual cells in the colon or rectum is called colorectal cancer. The colon and rectum (colorectum), alongside the anus, make up the large intestine, the last section of the gastrointestinal (GI) system. The large intestine is called the large bowel, so the colorectal disease is likewise called bowel cancer. The digestive organ can retain water and electrolytes from food matter and wipe out wastes. As portrayed in Figure 1, the initial segment of the large intestine is the colon, a solid cylinder about 1.5 meters (5 feet) in length and 5 centimeters (2 inches) in the distance across that is partitioned into four segments:

The *ascending colon* starts with the cecum (a pocket where undigested food is gotten from the small intestine system) and expands vertically on the right side of the abdomen.

The *transverse colon* crosses the body from right to left and is alluded to collectively with the ascending colon as the proximal, or correct, colon.

The *descending colon* slips on the left side.

The *sigmoid colon*, named for its “S” shape, is the last part of the colon and is referred to collectively with the descending colon as the distal, left colon.

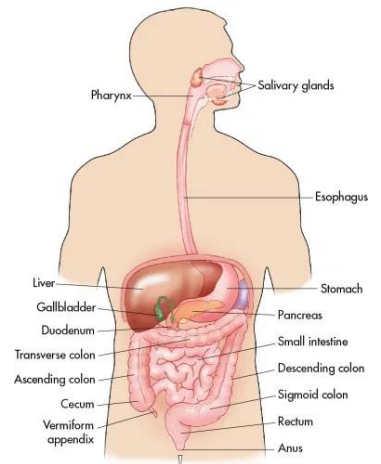


Fig 1. Anatomy of GI System Source: Google

Waste passes from the sigmoid colon into the rectum – the last 15 centimeters (6 inches) of the large intestine – and is then ousted through the rear-end (2-3 centimeters or 1 inch). Regardless of their anatomic vicinity, diseases in the anus are characterized independently from those in the rectum since they generally begin from various cell types and have different qualities.

However, tumors inside the colorectum likewise shift in their atomic, organic, and clinical highlights and their relationship with hazard factors. For instance, physical inactivity is related to an expanded danger of disease in the colon however not in the rectum. Moreover, patients are bound to be determined to have tumors in the proximal colon on the off chance that they are more seasoned (versus more youthful), dark (versus white), or female (versus male).

Risk of developing CRC:

Around 4.4% of men (1 of every 23) and 4.1% of ladies (1 out of 25) will be determined to have CRC in their lifetime. Lifetime hazard is comparative in people notwithstanding higher frequency rates in men since ladies have a more drawn-out future. Notwithstanding, sex, age, and race/identity additionally impact hazards.

Sex:

CRC occurrence rates are 30% higher in men than in ladies, with a more impressive difference for rectal disease (60% higher) than for malignant colon growth (20% higher). Sex incongruities probably reflect contrasts in openings to hazard factors (e.g., cigarette smoking) and sex chemicals,

just as complex interactions between these influences. Notably, CRC incidence rates in men and women younger than 45 years are comparable.

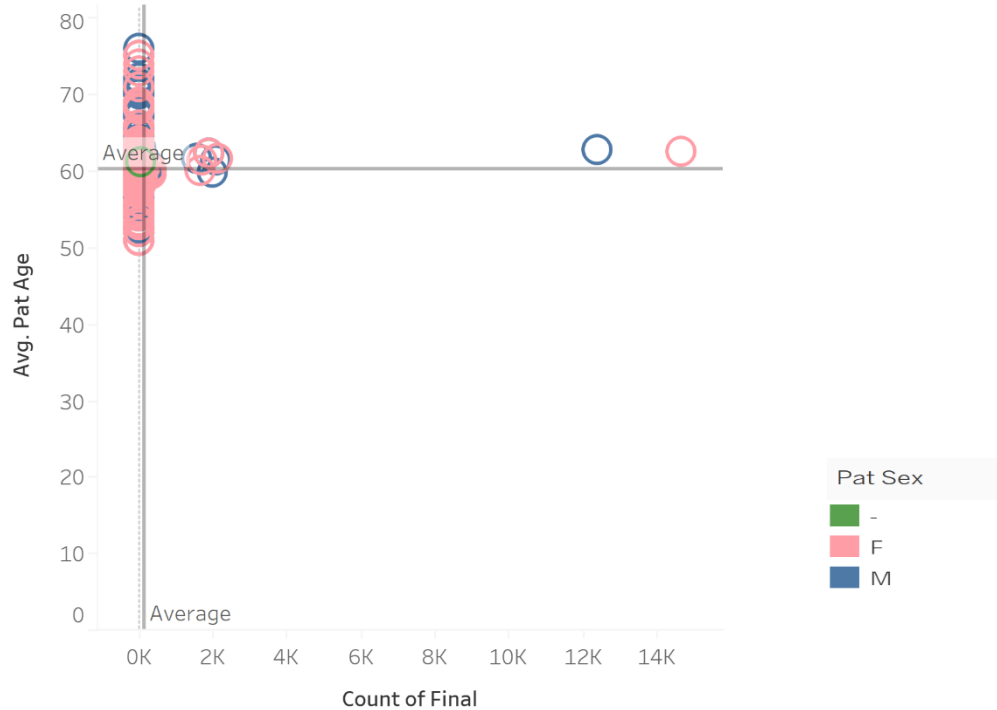


Fig 2. Gender Disparity in Colorectal Cancer

Age:

Like most kinds of malignant growth, the danger of CRC increments with age. For each resulting 5-year age bunch, the frequency rate around copies until age 50 and after that increments by about 30%. The particular case is for a long time 50-54 years versus ages 55-59 years, where is just a 15% distinction (60 versus 68 for each 100,000, individually), mainly because the common age-related effect on hazard is upset by the first-time CRC separating the more youthful age bunch. The screening impact is amplified in current rates by single-year-olds, higher in people ages 50-51 years than those aged 52-55 years. This wonder is missing in occurrence rates during the 1970s, before the take-up of screening.

The middle age at CRC finding is 66 years in men and 69 years in ladies yet is more youthful for rectal cancer (age 62 and 63, individually) than for colon malignant growth (age 67 and 71, separately). CRC patients, in general, are progressively more youthful, moving from a middle-age of 72 years for analysis in the mid-2000s to 66 years today. This is because the frequency is expanding in more youthful grown-ups and declining in more established age gatherings.

Race/ethnicity:

Among extensively characterized racial and ethnic gatherings, CRC rate and mortality are most elevated in non-Hispanic Latinos. The uniqueness for mortality is double that for rate. The purposes behind racial/ethnic inconsistencies in CRC are perplexing. In any case, they generally reflect contrasts in hazard factor commonness and medical care access, both identified with financial status. Near half (44%) of this uniqueness is ascribed to discrepancies in most hazard factors related to CRC (e.g., smoking, weight). A comparable extent is because of contrasts in CRC screening. In the wake of controlling for differences in hazard factors, dark people are not more likely than whites to foster adenomas or CRC. In any case, they are more averse to get convenient development of a positive screening test and great colonoscopy. Higher CRC mortality among blacks may likewise mirror a more critical extent of tumors in the proximal colon.

Notably, the expansive racial and ethnic gatherings to which disease measurements are largely restricted veil striking contrasts inside these heterogeneous populaces. For instance, even though the CRC rate in API men, by and large, is 25% lower than in NHW men, rates in Japanese men are 23% higher. Significantly more disturbing is the weight among Alaska Natives, who have the most noteworthy CRC occurrence (89 for each 100,000) and mortality (40 for every 100,000) rates in the US, twofold those in blacks (46 and 19, respectively).

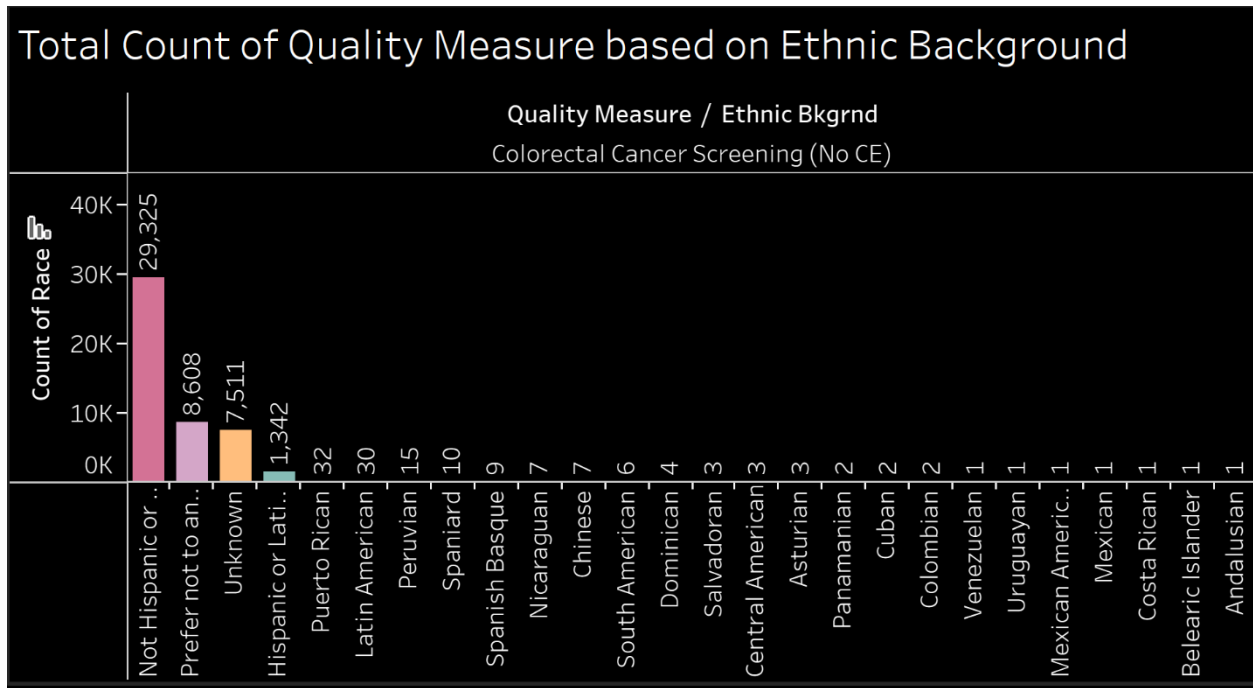


Fig 3. Measure of the disease based on ethnicity

Forecasting the future:

A future prediction has been made concerning the age of incidence of this cancer variant. The average age of the patient has been predicted down the lane with the count of incidence. There is a forecast of 669 people being affected by this kind of cancer after they turn 75. There appears to be a decrease in the number of cases as people aged 75 down to 90.

The Current research on Colorectal cancer revealed some interesting facts:

- Researchers are developing tests to analyze stool samples to find genetic changes associated with colorectal cancer. Researchers want to make sure that they could start curing cancer from its early stages by this process.
- Tests are being designed to identify the genes that are carrying a history of cancer.
- Discovered a class of drugs that targets the tumor cells and avoiding the immune system.
- New types of Chemotherapy and Targeted therapy are introduced to the science to define the course of action.

Forecasting the future no of patients based on the Quality Measure and Age

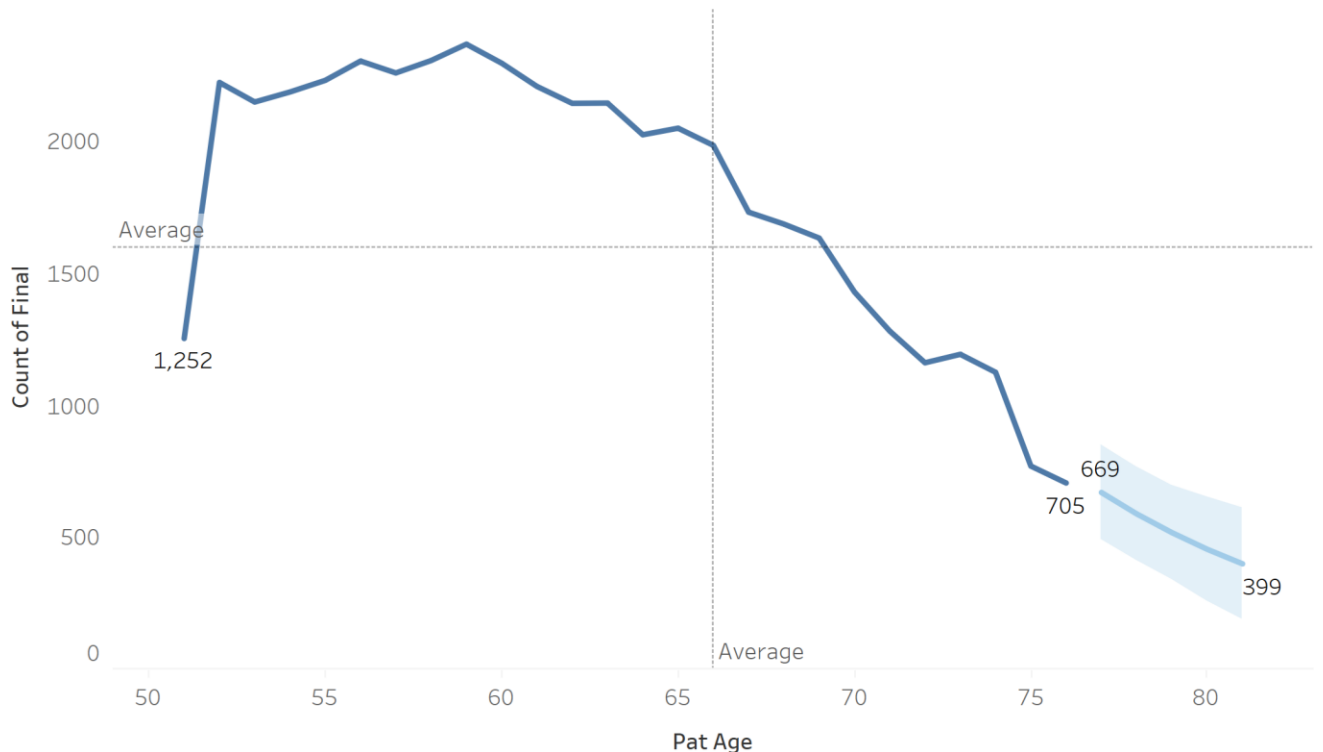


Fig 4. Forecasting the future of Colorectal Cancer

What is Diabetes?

Diabetes is an illness that happens when your blood glucose, additionally called glucose, is excessively high. Blood glucose is your fundamental wellspring of energy and comes from the food you eat. Insulin, a chemical made by the pancreas, helps glucose from food get into your cells to be utilized for energy. Sometimes, your body doesn't make enough—or any—insulin or doesn't utilize insulin well. Glucose, at that point, stays in your blood and doesn't arrive at your cells.

After some time, having an excess of glucose in your blood can mess your wellbeing. Although diabetes has no fix, you can find ways to deal with your diabetes and stay solid.

Types of Diabetes:

The most widely recognized sorts of diabetes are type 1, type 2, and gestational diabetes.

Type 1 diabetes

On the off chance that you have type 1 diabetes, your body doesn't make insulin. Your resistant framework assaults and obliterates the cells in your pancreas that make insulin. Type 1 diabetes is usually analyzed in youngsters and youthful grown-ups, although it can show up at whatever stage in life. Individuals with type 1 diabetes need to take insulin consistently to remain alive.

Type 2 diabetes

If you have type 2 diabetes, your body doesn't make or utilize insulin well. You can foster sort two diabetes at whatever stage in life, in any event, during youth. Be that this kind of diabetes frequently happens in moderately aged and more established individuals as it may. Type 2 is the most well-known sort of diabetes.

Gestational diabetes

Gestational diabetes creates in certain ladies when they are pregnant. More often than not, this sort of diabetes disappears after the child is conceived. In any case, on the off chance that you've had gestational diabetes, you have a more outstanding possibility of creating type 2 diabetes further down the road. Once in a while, diabetes analyzed during pregnancy is type 2 diabetes.

How common is diabetes?

According to the study conducted by CDC, 34.2 million people of all ages, or 10.5% of the US population, are diagnosed with diabetes. According to the Americans, certain ethnicities and races were identified as the most prone individuals. They are a mixture of African Americans, Hispanics, American Indians, and some Pacific Islanders and Asian Americans at higher risk for type 2 diabetes. Blacks are disproportionately affected; they are almost twice as likely as whites to develop type 2 diabetes by middle age. And those who get it are significantly more likely to suffer complications such as blindness, kidney disease, and amputations than their white counterparts. When a gender disparity is considered, it is identified that males are highly diagnosed with diabetes.

Risk Factors for Diabetes-Related complications:

Among the adults(18 or over) diagnosed with diabetes, the risk factors identified are:

Smoking

- 21.6% were tobacco users based on self-report or levels of serum cotinine.
- 15.0% reported current cigarette smoking.
- 36.4% had quit smoking but had a history of smoking at least 100 cigarettes in their lifetime.

Overweight and Obesity

- 89.0% were overweight or had obesity, defined as a body mass index (BMI) of 25 kg/m² or higher.
Specifically:
 - 27.6% were overweight (BMI of 25.0 to 29.9 kg/m²).
 - 45.8% had obesity (BMI of 30.0 to 39.9 kg/m²).
 - 15.5% had extreme obesity (BMI of 40.0 kg/m² or higher).

Physical Inactivity

- 38.0% were physically inactive, defined as getting less than 10 minutes a week of moderate or vigorous activity in each physical activity category of work, leisure time, and transportation.

A1C

- 50.0% had an A1C value of 7.0% or higher.
Specifically:
 - 22.3% had an A1C value of 7.0% to 7.9%.
 - 13.2% had an A1C value of 8.0% to 9.0%.
 - 14.6% had an A1C value higher than 9.0%.
- 16.3% of adults aged 18–44 years had A1C levels of 10% or higher, compared to 12.7% of those aged.
- 45–64 years and 4.3% of those aged 65 years or older.

High Blood Pressure

- 68.4% had a systolic blood pressure of 140 mmHg, or higher or diastolic blood pressure of 90 mmHg or higher or were on prescription medication for their high blood pressure.

High Cholesterol

- 43.5% had a non-HDL level of 130 mg/dL or higher.
Specifically:
 - 22.4% had a non-HDL level of 130 to 159 mg/dL.

- 11.2% had a non-HDL level of 160 to 189 mg/dL.
- 9.9% had a non-HDL level of 190 mg/dL or higher.

Risk Factor	ABCs Goals for Many Adults	Less Stringent ABCs Goals
A1C	<7.0%	<8.0%
Blood Pressure	<140/90 mmHg	<140/90 mmHg
Cholesterol, non-HDL	<130 mg/dL	<160 mg/dL
Smoking, current	Nonsmoker	Nonsmoker
Percentage meeting all ABCs goals	19.2 (15.3–23.9)	36.4 (15.3–23.9)

Fig 5. Risk factors summary

Source: CDC

Diabetes in different race individuals:

Studies have shown that Asians are at a greater danger of developing type 2 diabetes when contrasted to individuals of European ancestry. Asians are bound to foster diabetes even at a lower BMI. This implies that even though some Asian populations at present have a lower predominance of overweight and stout people than the population in the West, they have an excessively high level of individuals with diabetes. Currently, Asians constitute 60% of the world’s diabetic individuals. This danger might be because Asians, particularly South Asians, are bound to have not so much muscle but rather more stomach fat, which builds insulin opposition. For instance, even though Indian babies have a lower body weight than white infants, Indian babies have more elevated muscle versus fat and insulin levels. Imaging technology that measures fat in people has shown that Asians of

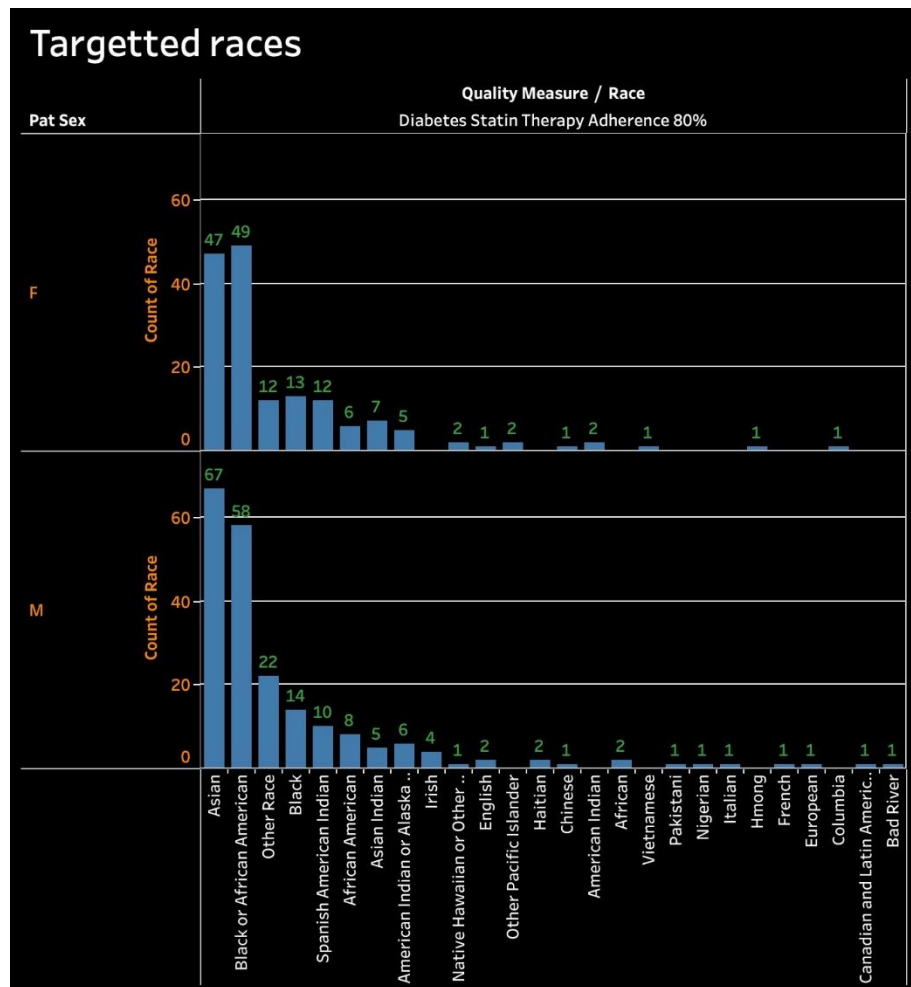


Fig 6. Incidence rates concerning

a solid BMI have more fat around organs and in the midsection region than Europeans with similar BMI.

Due to the statistics showing the higher death rates from type 2 diabetes among Black populations, people have assumed that Black individuals have specific genes that make them more likely to develop the condition. American people face barriers every day that make it more difficult for them to prevent or manage diabetes.

According to figure 6, we could say that Asian males are highly infected with diabetes compared to Black or African American males. Black or African American women are more exposed to diabetes when compared to Asian women. Many people assume that African American people have a higher risk of developing diabetes due to genetic factors that lead to higher cortisol levels in their bloodstream. Cortisol is the primary stress hormone, and it can increase blood sugar levels. However, having higher cortisol levels may also result from the additional stress that African American people must endure daily due to racial discrimination.

Future forecast:

Diabetes is one sort of disease that people of any age can develop. There are many cases of genetic transformation of diabetes. Type 2 Diabetes is one such kind that is inherited from the mother or father or both to their children. Type 1 Diabetic adults also can pass this to their generations, but the people diagnosed with type 2 have a greater chance of transmitting the disease to generations.

If we observe the graph, there is a peak at the age of 60. It is generic that people of this age tend to skip the routines, and it becomes hard to follow regular healthy practices. There is a prediction that the incidence rate of diabetes would stay constant at 83 as the patients of age 70+ appear for diagnosing for the first time.

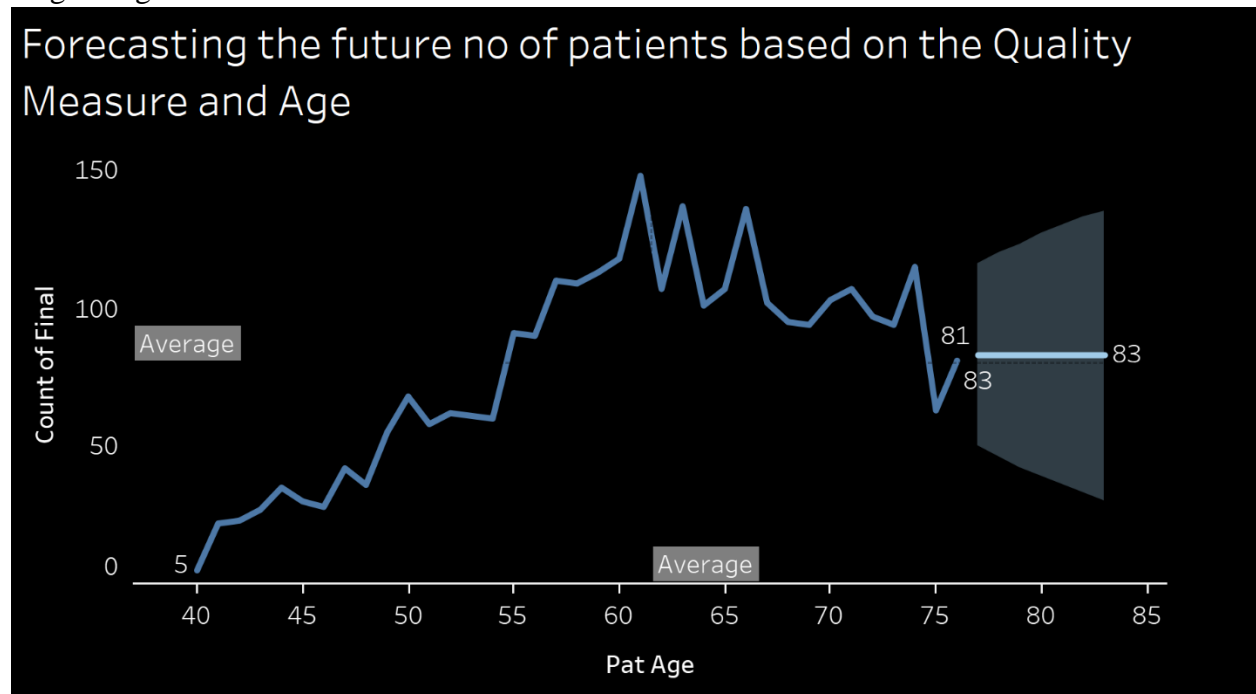


Fig. 7 Forecasting the future of diabetes

What is Blood Pressure:

Blood pressure is a measure of the force that your heart uses to pump blood around your body. Blood pressure is measured in millimeters of mercury (mmHg) and is given as two figures:

- systolic pressure – the pressure when your heart pushes blood out
- diastolic pressure – the pressure when your heart rests between beats

The ideal Blood pressure is considered to be between 90/60 mmHg and 120/80 mmHg. High blood pressure was initially supposed to be 140/90 mmHg, but in 2017, the readings are revised. Now the high blood pressure is considered to be 130/80 mmHg.

The new revision indicates the significance of utilizing the appropriate method to gauge blood pressure. Blood pressure levels should be founded on an average of two or three readings taken on different occasions.

Hypertension represents the second most significant number of preventable coronary illnesses and stroke deaths, second just to smoking. It's known as the "quiet executioner" because regularly, there are no manifestations, notwithstanding its job in altogether expanding the danger for coronary illness and stroke.

What is Hypertension?

High blood pressure (hypertension) is a common condition in which the long-term force of the blood against your artery walls is high(130/80 since 2017) enough that it may eventually cause health problems, such as heart disease. The more blood your heart pumps and the narrower your arteries, the higher your blood pressure. You can have hypertension for quite a long time with no side effects. Uncontrolled hypertension builds your danger of genuine medical conditions, including cardiovascular failure and stroke. Luckily, hypertension can be handily distinguished. Furthermore, when you realize you have hypertension, you can work with your primary care physician to control it.

Facts:

1. In 2018, almost a large portion of 1,000,000 passings in the United States included hypertension as an essential or contributing reason.
2. Almost 50% of grown-ups in the United States (108 million, or 45%) have hypertension or are taking the drug for hypertension.
3. Just around one of every four grown-ups (24%) with hypertension have their condition leveled out.
4. Around 30 million grown-ups prescribed to take medicine may require it to be endorsed and begin taking it. About two out of three of this gathering (19 million) have a 140/90 mm Hg BP or higher BP.
5. Hypertension was a fundamental or contributing reason for death for more than 494,873 individuals in the United States in 2018.

- 6. High blood pressure is more common in non-Hispanic black adults (54%) than in non-Hispanic white adults (46%), non-Hispanic Asian adults (39%), or Hispanic adults (36%).

Blood Pressure variance with race, ethnicity, age, and gender:

Ethnicity and the number of patients belonging to the ethnic group are represented in fig 8. According to the analytics, Not Hispanic or Latino are highly diagnosed with blood pressure constituting above 5000 patients.

Fact: High blood pressure is more common in non-Hispanic black adults (54%) than in non-Hispanic white adults (46%), non-Hispanic Asian adults (39%), or Hispanic adults (36%).

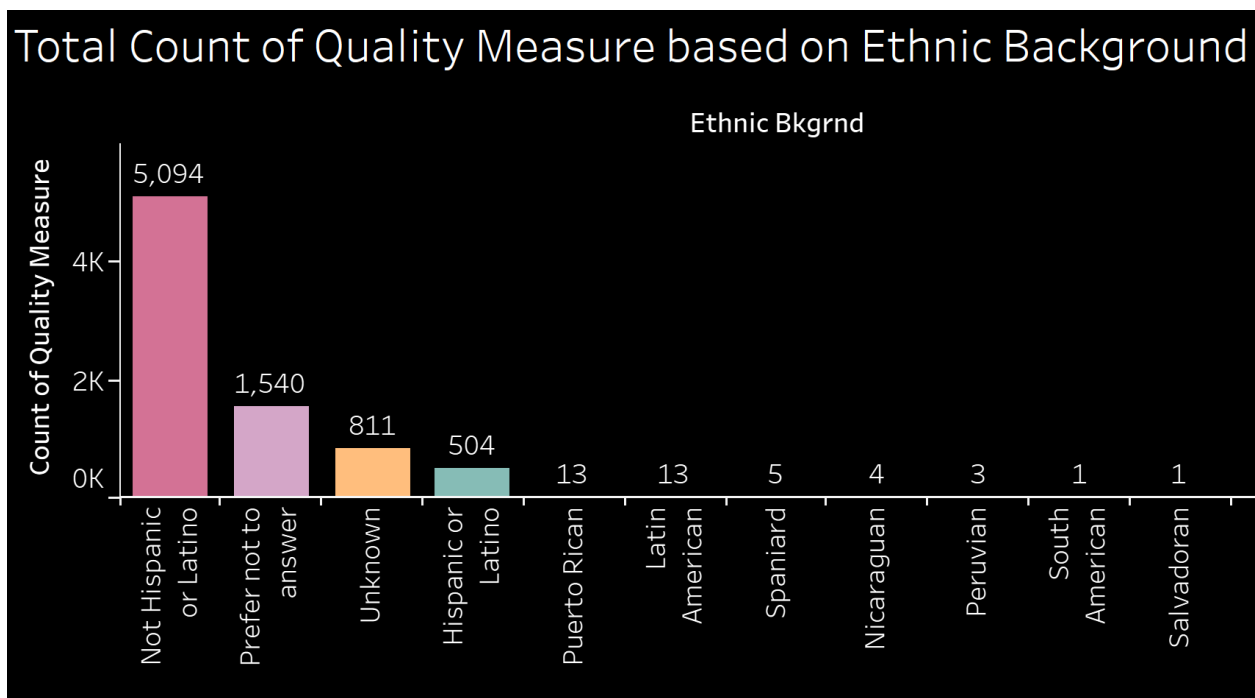


Fig 8. Count of measure against ethnicity

Gender disparity exists in the case of Blood Pressure and Hypertension. A more significant percentage of men (59%) have a high blood pressure than women (58%). Men’s lifestyle is a general cause that would suspect the incidence in men is more than in women. The adjacent figure showcases the disparity of BP according to gender.

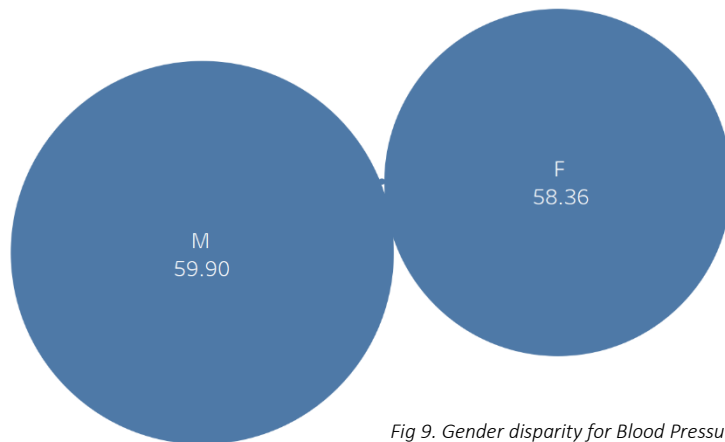


Fig 9. Gender disparity for Blood Pressure

Hypertension and COVID-19:

A recent study shows a greater danger of COVID-19 diseases and inconveniences in individuals with hypertension. Analysis of early information from both China and the U.S. shows that hypertension is the most regularly divided prior condition between those hospitalized, influencing between 30% to half of the patients. Other ailments included malignancy, diabetes, or a lung infection. In Italy, a report said that over 99% of individuals who died of Covid 19 had one of these conditions - and 76% of them had hypertension.

Relation between Blood Pressure and Diabetes:

High blood pressure (hypertension) can lead to many complications of diabetes, including diabetic eye disease and kidney disease, or make them even worse. Most people with diabetes (type 2 is more serious) will eventually have high blood pressure and other heart and circulation problems.

Diabetes damages arteries and makes them targets for hardening, called atherosclerosis. That can cause high blood pressure, which, if not treated, can lead to trouble, including blood vessel damage, heart attack, kidney failure, and eventually causing death.

There's also significant evidence to show that chronic high blood pressure can speed the arrival of problems with the ability to think that are associated with aging, such as Alzheimer's disease and dementia. According to the AHA, blood vessels in the brain are particularly susceptible to damage due to high blood pressure. This makes it a significant risk factor for stroke and dementia.

Future Forecast:

The global burden of Blood Pressure has been growing over time—population growth, lifestyle changes, and aging as the significant consequences. The number of adults with raised blood pressure increased multiple folds, mainly in low- and middle-income countries. Approximately 75% of people with hypertension live in low- and middle-income countries. Likewise, deaths from elevated Blood Pressure grew by an average of 1.6% per year and sometimes even more. When graded by developmental status as measured by the sociodemographic index, countries with lower developmental rates showed more significant increases

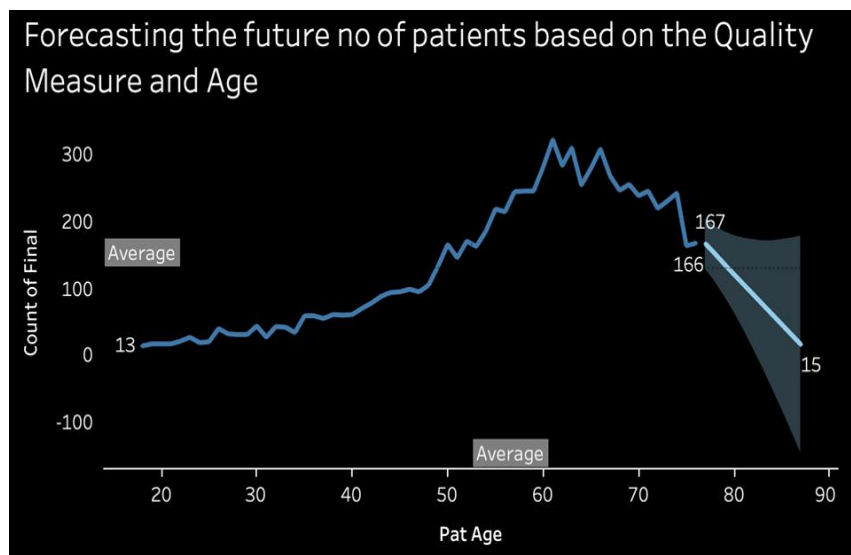


Fig 10. Future forecast of Blood Pressure

in the number of deaths linked to elevated BP than the most developed countries. The most significant percentage increase in deaths related to high BP occurred in low-middle countries.

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