Cardiovascular Disease (CVD)

Clyst Vale COMMUNITY COLLEGE
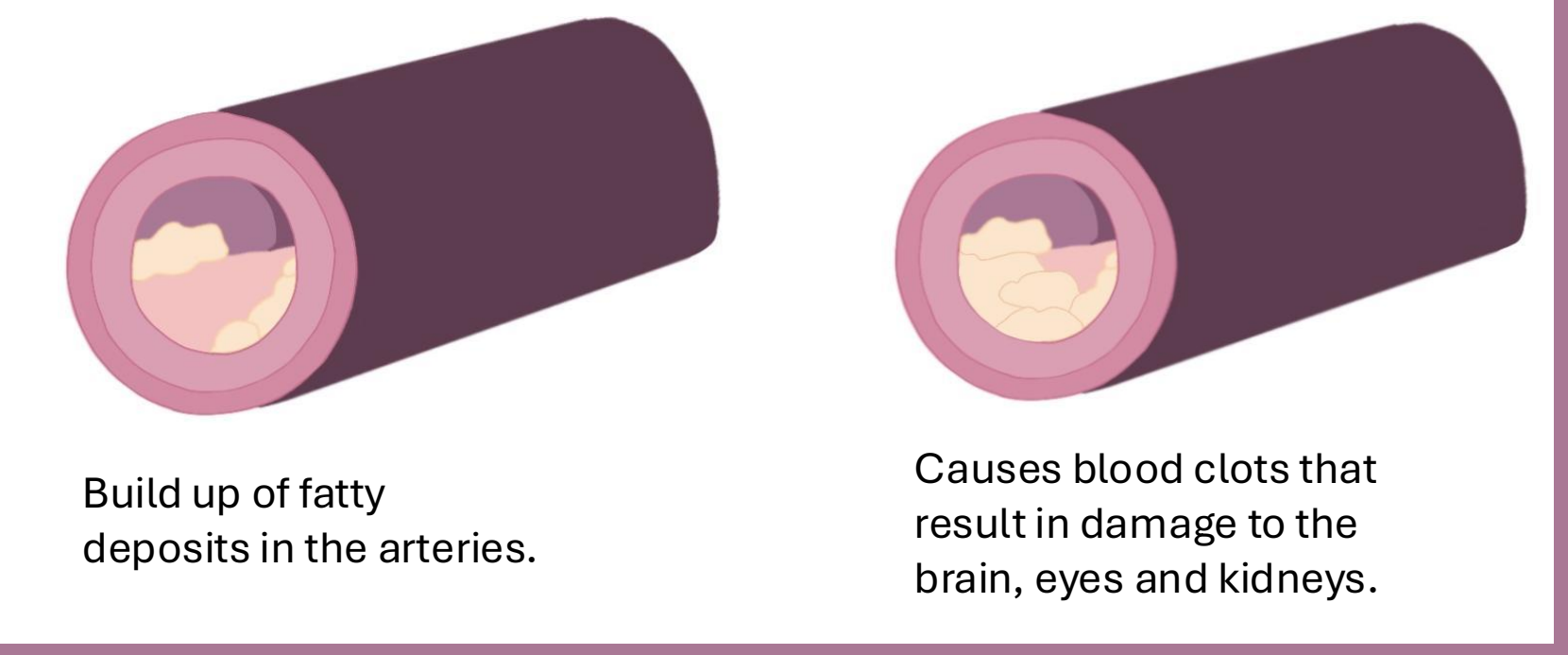
Factors contributing to development of CVD:

- High Blood Pressure (Hypertension)
  - damages blood vessels and promotes plaque buildup.
- High Cholesterol (Hyperlipidaemia)
  - leads to plaque formation.
  - increases strain on the heart.
- Lack of Physical Activity
  - causes physiological changes that weaken the heart and blood vessels.

Statistics:

- Heart and circulatory diseases cause nearly 1 in 3 deaths globally; an estimated 20 million deaths in 2021 - an average of 55,000 people each day (one death every 1.5 seconds).
- Estimated that heart failure affects at least 64 million worldwide.

Build up of fatty deposits in the arteries.

Causes blood clots that result in damage to the brain, eyes and kidneys.

Risk Factors of CVD:

- Angina
  - CVD puts extra strain on the heart resulting in angina.
  - chest pain due to restricted blood flow to the heart muscle.
- Heart Attacks:
  - CVD causes sudden blockages of blood flow to the heart muscle.
- Heart Failure :
  - where the heart struggles to pump blood effectively.
- Strokes:
  - causes a lack of blood supply to the brain.

Lifestyle Changes: Reducing Risk of CVD

Maintaining a Healthy Diet:

- A heart-healthy diet lowers LDL (low-density lipoprotein cholesterol) in the blood which if high, is a major risk factor for the development of atherosclerosis (the buildup of fats and cholesterol in and on the artery walls) which can lead to CVD.
- A heart-healthy diet also promotes the control of blood pressure.
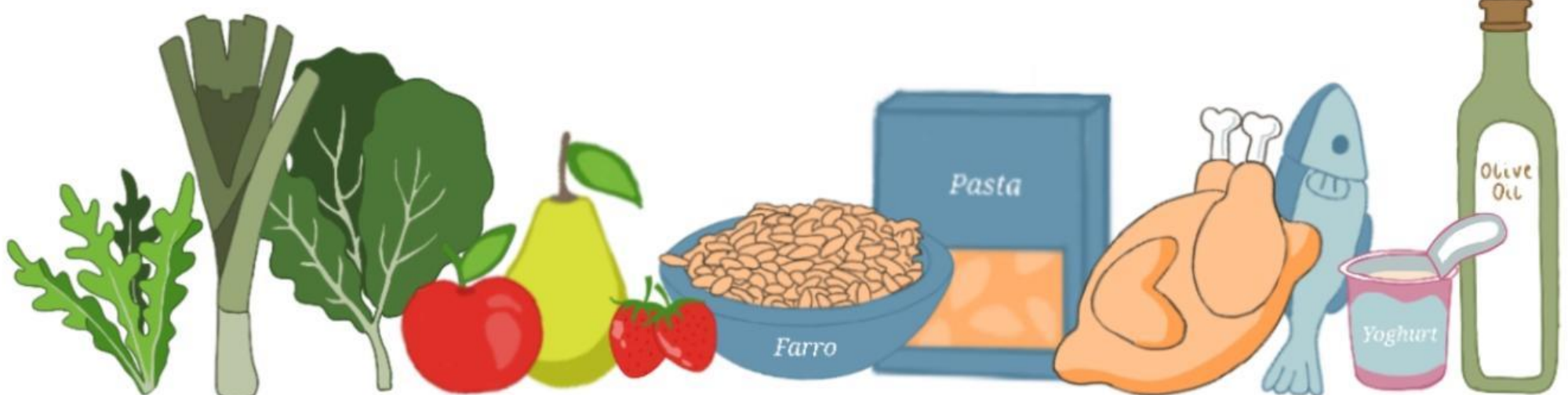
Committing to Regular Physical Activity:

- Helps lower blood pressure:
  - aerobic exercises (walking, cycling, or swimming) can decrease both systolic and diastolic blood pressure.
- Has anti-inflammatory effects:
  - reducing levels of inflammatory markers in the body
  - helps protect the blood vessels and lowers the risk of cardiovascular event
- Improves endothelial function:
- Promotes the release of nitric oxide, a substance that helps dilate blood vessels, improving blood flow and reducing the risk of blood clots and plaque formation.
- Contributes to weight management:
  - losing excess weight reduces the risk of heart disease, stroke, and type 2 diabetes.
- Improves insulin sensitivity, which is important for maintaining stable blood sugar levels
- Helps the body use insulin effectively, reducing the risk of insulin resistance, metabolic syndrome, and type 2 diabetes
- Improves the efficiency of the heart and blood vessels, reducing the strain on the cardiovascular system.

Quitting Smoking:

- Improves blood pressure
- Decreases blood clotting tendency
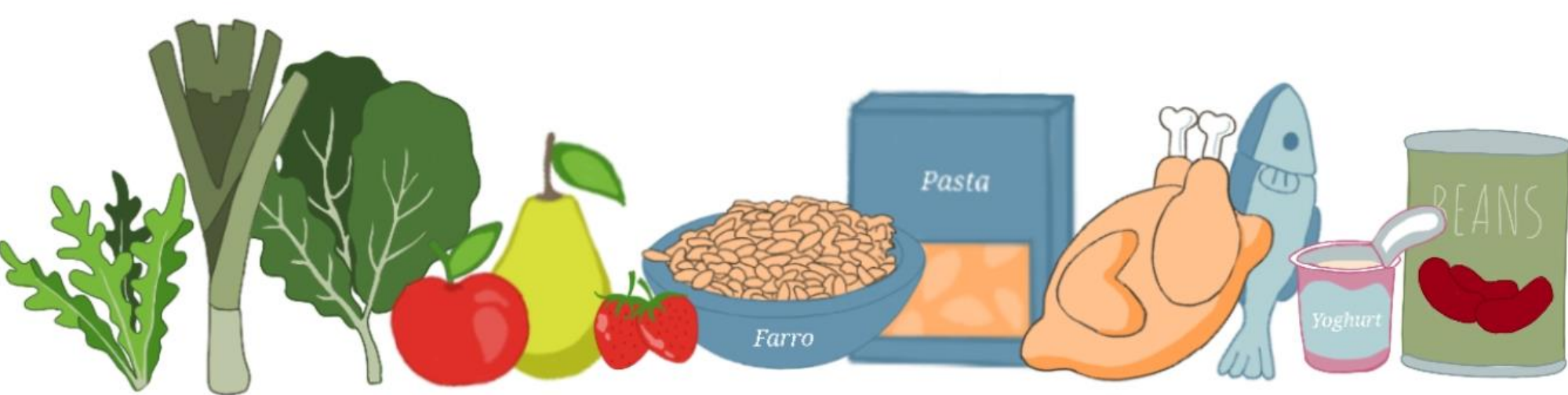- Reduces inflammation
- Improve endothelial function

Recommended Diets

The Mediterranean Diet:

- Leafy green vegetables
- Fruits
- Wholegrains
- Poultry
- Fish
- Low-fat dairy
- Extra-virgin Olive Oil

The DASH Diet:

- Leafy green vegetables
- Fruits
- Wholegrains
- Poultry
- Fish
- Low-fat dairy
- Beans
- Nuts

eat2beat

An App to Prevent Cardiovascular Disease

Our Solution: Cardiovascular Disease App

Our Solution:

We decided to make an app targeted at young women like us who wanted to look after their hearts to limit their chances of developing cardiovascular disease later in life – thus, Eat2Beat was born. The main aim of the lifestyle app is to encourage the user to think about how their diet will affect their heart. It offers healthy recipes, a weekly meal planner and a plethora of other features ranging from helpful quizzes, to establish which diets best suit you, to our revolutionary 'Snap a Pic' feature which offers personalized advice on how to improve the nutritional value of your meal based off a photograph the user submits to make it better for their heart. The prevention of cardiovascular disease is at the core of our design with useful features such as the CVD awareness page and healthy heart ratings on each of our recipes. With these, our aim is to raise awareness on how simple it is to choose the healthy options so the user can better care for their heart. We created this app using the online software Adalo which enabled us to create a more realistic representation of what our design could look like.

AI Integration:

- This requires a pretrained model. For example, ResNet or Inception. This is because petabytes of images and computational power is required to train the model from scratch and this costs a lot of money.
- We would pretrain the model using images of different amounts of food with different levels of nutrition and then we would train the model with augmentation (feeding the model with the same image in different rotations).
- Then we would finetune the pretrained model with specific parameters for our needs. For example, the calories of the food and the type of food in the image.
- The output result we want to have would be to count the calories from an image and give suggestions on how to improve the nutrition of the meal.
- For the suggestions for nutritious recipes, we would use a separate RAG model which queries a data base of nutritious recipes.
- This RAG model is activated when the prediction from the image is not nutritious.

How will it Work?

- The user is going to take a picture of their food.
- This image will be sent back to the model.
- The model will evaluate against the parameters and the trained data and send a prediction to the app.
- The prediction will consist of whether the food is nutritious or not. If the meal is not nutritious, it will explain why and how to improve, like giving suggestions on what to include or remove.

Sociology: Social and Cultural Factors

Factor 1: Academic Pressure and Sedentary Lifestyles
During A-levels young girls are under pressure to perform which can lead to:
- Prioritizing study over physical health
- Skipping exercise and meals due to "not having enough time"
- Emotional eating as a stress response

By putting immense amounts of pressure on young girls, society re-enforces the idea that academic success is more valuable than health or well-being leading to chronic stress and physical inactivity.

Factor 2: Class and Access
Girls from lower income families may face:
- less access to safe spaces to exercise
- Fewer healthy food options at home or school
- More stress at home (increases cortisol which is linked to your fat storage)

Obesity becomes not just a health issue but a social inequality issue.

Factor 3: Social Media and Body Image
- Girls are constantly exposed to unrealistic beauty standards e.g. thinness, toned bodies etc
- this pressure can make girls feel to self-conscious to exercise (especially in public or school settings) and make them feel guilty about food leading to things such as disordered eating and yo yo dieting
- This creates a toxic relationship with food and exercise which increases risk for both heart disease and obesity long term.

Factor 4: School Culture
- In many schools, sports and physical activity are still male dominated or competitive which can alienate girls who don't identify as "sporty" and make them avoid group exercise
- School food often isn't promoting healthy alternatives serving mostly what is known as "beige foods" e.g. pizza, burgers, chicken nuggets

Effects of our App on Social Structures:

Using an App for Empowerment not Comparison:
- By using motivational messages and group progress, our app can promote collective support rather than individual comparison.

Addressing Inequality:
- Our app helps reduce barriers to physical activity and healthy meals by:
  - promoting free accessible movement e.g. walking and stretching
  - gives meal suggestions which don't require expensive ingredients
  - makes it inclusive to all girls from whatever background.
- The apps school-based reward system levels the playing field by ensuring motivation and recognition aren't tied to money or privilege helping to promote equality.

Challenging Academia over Health Norms:
- Our app reframes physical activity as something positive that will support mental well-being and academic performance.
- Physical activity is now easier and is not confined to just PE lessons and clubs targeted towards the "sporty" people. In turn this could lead to a shift in school norms making movement apart from school identity and daily culture.

Impact on Heart Health:

Both diets have been linked to decreased risk of death from CHD Congenital Heart Disease (CHD) and CVD.

We know this because of research into:
- Each food component
- Psychosocial health
- Physiological pathways such as inflammation, oxidative stress, hypertension, and autonomic and endothelial dysfunction.

Things to Avoid:

- Red meats
- High fat dairy products
- Artificially/added sweeteners in products
- Overconsumption

App Screens

Login Screen
Offers sign up options to create distinct user profiles and daily facts about CVD.

Home Screen
Leads to our Snap a Pic and Meal of the Week features.

Planner Screen
A place to plan weekly meals and create a weekly shopping list to keep organised.

Inspiration Screen
Home to fun quizzes to narrow down diet options and different recipes inspired by these choices.

Recipe Screen
A specific recipe page for our Meal of the Week, Black Bean Chilli.

Health Screen
A page dedicated to the causes, development and consequences of CVD to raise awareness.

Goals Screen
Customisable feature where you can set aims and track your progress towards a healthier diet.

Meet the Team:

Meet the all-female team of friends behind our design. As we are the last group of students to go through our school's sixth form since it's closing, we're hoping to go out with a bang and make our school proud.

Eliz – Team Leader and Biologist – Kept everyone on task and helped to assign jobs in order to keep us organised. Also, has done a lot of research specifically linked to different diets, prevention methods and the Ai integration for our app.

Ella – Sociologist and Ideas Architect – Came up with our idea for Eat2Beat and has explored the social impact it would have.

Heidi – Artist and Designer – Used her creative skills to design the artwork and aesthetics of our poster, as well as creating the logo for Eat2Beat.

Lucy – App developer and Statistician – Combined a love for aesthetics, numbers and problem solving to create the framework behind our app and researched the statistics behind CVD.

Millie – Chef and Researcher – Completed lots of in-depth research into the causes of cardiovascular disease and the lifestyle factors behind it. Also collaborated with her twin sister Nina to create multiple delicious and nutritious recipes for our website.

Nina – Ideas Genius and Researcher – As creator of the name and brand behind our app as well as a key researcher into the issues surrounding cardiovascular disease, she also worked with her twin to create and photograph our unique recipes.