

**BC3409 - AI in Accounting & Finance**

**Group Project – Data Dictionary**

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Group Number: 5

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# **Dataset Variables**

## Death\_event

Death event refers to if the patient had died during the follow-up period

## Age

Refers to the age of the patient.

## Anemia

Anemia refers to the reduced absolute number of red blood cells circulating in the body. However, due to the difficulty and cost in measuring blood volume, a low hemoglobin concentration is typically used as an indicator of Anemia[1]. The World Health Organisation defines the threshold for Anemia to be less than 13 and less than 12g/dL for men and women respectively[2].

Studies conducted have found association between Anemia and mortality amongst patients with heart failure[3, 4]. However, despite the association, these studies were not able to show that Anemia is a strong independent indicator of mortality rate.

## High Blood Pressure

Hypertension, also known as High Blood Pressure, is a prevalent condition locally. A study conducted in 2010 found that nearly three-fourths of all the elderly sampled have hypertension[5]. There are two stages of hypertension as defined in 2017 by the American Heart Association[6]:

* Stage 1 – Systolic 130 to 139 mmHg or diastolic 80 to 89 mmHg
* Stage 2 – Systolic at least 140mmHg or diastolic at least 90 mmHg.

Hypertension has been widely known to be a significant factor in contribution towards heart failure risk. A widely accepted explanation is that hypertension leads to an increase in the workload of the heart, which increases the size of the heart’s ventricles (Ventricular Hypotrophy)[7]. This leads to a decrease in the heart’s efficiency, which leads to a higher rate of heart failure[8]. The Framingham Heart Study found that the risk of heart failure of patients with blood pressure >160/100 mmHg was twice of that with <140/90 mmHg[9].

## Creatinine Phosphokinase (CPK)

CPK is the enzyme that is essentially in the storage and consumption of energy by the muscles. It is commonly used as an indicator to diagnose muscle diseases and injuries[10]. Hence, high levels of CPK may be observed when there are damages to the heart muscles. However, as CPK lacks specificity towards cardiac muscles, it is recommended to use cardiac troponin instead as it often is a more reliable indicator of heart failure[11]. Nonetheless, CPK may still add value in the prediction of mortality amongst patients with heart failure.

## Diabetes

Diabetes mellitus refers to the decreased body’s ability in metabolizing sugar. This is often caused by the body’s inability to produce insulin, a hormone necessary for the regulation of blood glucose level. Studies have found association between diabetes and coronary heart diseases[12, 13]. The Framingham Heart Study found that the presence of diabetes doubled the risk of cardiovascular disease in men and tripled it in women[13].

## Ejection Fraction

Ejection Fraction is the measurement, as a percentage, of the amount of blood that the left vertical pumps out with each contraction (LEVF). In general, the survival of patients is shorter in patients with lower LVEF[14]. In a 2004 Valsartan heart failure trial, 5010 patients were evaluated - patients at the fourth quartile (mean LVEF 17 percent) have twice the mortality rate of those at the first quartile[15].

## Sex

Gender does play a role in mortality risk as well. As mentioned above in Section 1.5, the morality risk of men and women varies. Andersson et. al developed a risk score for patients using Danish registry data on 16,827 patients[16]. This risk scored includes many variables, including sex. The model was able to identify the mortality risk of patients that undergo noncardiac surgery within 30-days postoperative.

## Platelets

Platelets are essential in the formation of blood clot to minimize blood loss. They work by adhering and aggregating to from a blockage at the site of the bleeding[17]. Thrombocytopenia refers to a platelet count below the normal limit of normal (<150,000/microL)[18] and is associated with an increased risk of excessive bleeding. On the other hand, Thrombocytosis refers to increased platelet count (>450,000/microL)[19]. This increases the risk of Thrombosis, the formation of blood cloth within the blood vessels. Both conditions are associated with a rise in mortality rate[20, 21].

## Serum sodium

Hyponatremia refers to a low sodium concentration relative to water. It could be due to impairment in the secretion of water or excessive water intake. The definitions of hyponatremia are as follows[22]:

* Severe Hyponatremia – serum sodium concentration <120 mEq/L
* Moderate Hyponatremia – serum sodium concentration between 120 to 129 mEq/L
* Mild Hyponatremia – serum sodium concentration between 130 to 134 mEq/L

Hyponatremia is a relatively common condition in patients hospitalized with heart failures. An ESCAPE trial has shown that patients with persistent hyponatremia has a higher mortality rate, indicating its potential as an independent predictor[23].

## Serum creatinine

Creatinine is a waste product produced muscles during metabolism. This is further filtered by the removed from the body via the kidneys. A high serum creatinine concentration symbolizes that the kidneys are not functioning properly, which may increase mortality rate[24, 25].

## Smoking

Smoking has been widely known to increase the risk of cardiac diseases[21]. The Jackson Heart Study surveyed 4129 black participants without a history of heart failure for a median of 8 years – it found that smokers were at a significantly higher risk to develop heart conditions than their counterpart[21, 26]. Smoking leads to the formation of plaque in the blood vessels, narrowing it. Heart failure occurs when the coronary arteries are heavily clotted, resulting in reduced blood flow to the heart[27].

## Time

Time refers to the follow up period of the patient.

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