

## Review Article

# Disparities in patients' understanding of cardiovascular disease management

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### Abstract

Non-communicable diseases, including cardiovascular disease (CVD), are some of the leading causes of mortality worldwide. Despite the effectiveness of early diagnostic and treatment options, patient screening, disease detection and disease progression remain a challenge, resulting in suboptimal outcomes. Consequently, cardiovascular diseases remain underdiagnosed and undertreated, particularly in developing countries. Several barriers, including paucity of recommended cardiovascular health information and low literacy levels, lead to a poor understanding of the importance of intervention in terms of modifiable risk factors as well as treatment adherence. This narrative review focuses on cardiovascular patients' understanding of their disease, and the need for compliance with their medication and lifestyle modifications. Low levels of perception and insufficient knowledge of CVDs among patients continue to be indispensably important factors in health behaviour. Increased awareness of these issues has the potential to improve the effectiveness of the multidisciplinary cardiovascular team and ultimately improve the care provided to these patients.

**Keywords:** lifestyle modifications, treatment adherence, macrovascular, microvascular, risk factors, complications, hypertension, diabetes, dyslipidaemia

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### Cardiovascular disease burden

Cardiovascular disease (CVD) is one of the leading causes of death worldwide<sup>1</sup> and the leading cause of disability-adjusted life years globally.<sup>2</sup> CVD is a lifestyle disease that is defined as

heart and blood vessel disease, and is related to atherosclerosis.<sup>3</sup> Each year, an estimated 17.9 million people will die from CVDs, mostly from coronary heart disease and stroke, and these are projected to remain the leading cause of deaths worldwide.<sup>1</sup> Of the cardiovascular-related deaths occurring worldwide, 80% of the deaths occur in low- and middle-income countries (LMICs) with an equal preponderance among men and women.<sup>4</sup> Despite improvements made to reduce cardiovascular mortality rates, one in every four deaths is caused by coronary artery disease in the United States.<sup>5</sup>

The World Health Organisation conducted a study on global ageing and adult health (SAGE Wave 1), and an analysis of this data carried out by Ruan *et al.*<sup>6</sup> described the prevalence of the two main CVDs (angina and stroke) and its association with behavioural and socio-economic risk factors. The datasets were obtained from six LMICs, including South Africa, and demonstrated that poor lifestyle choices contribute greatly to the risk of CVD.

In 2007, 41.7% of deaths due to ischaemic heart disease and 49.6% due to stroke in South Africans aged 30 years and older, were attributed to hypertension.<sup>7</sup> The high mortality rates related to hypertension are on an upward trend, and the prevalence of hypertension has doubled over the past two decades (24% in 1998 to 45% in 2016).<sup>8</sup>

The American Heart Association<sup>9</sup> emphasises that young adolescents and adults can live healthier lives by paying special attention to the following seven aspects of life: eating a healthy diet, engaging in daily physical activity, avoiding smoking and tobacco products, maintaining a healthy weight and favourable body mass index (BMI), as well as keeping cholesterol, blood pressure and glucose levels within the healthy recommended range.<sup>9</sup>

Lack of knowledge and awareness of CVD may impede preventative efforts as well as CVD treatment<sup>10</sup> and are associated with poor disease outcomes.<sup>11</sup> Non-adherence to treatment can result in detrimental consequences and markedly reduces the chances of optimal outcomes.<sup>12</sup> A study conducted among Toronto and Vancouver participants found that the main reasons for delay in patient presentation to the emergency room and therefore a delay in patient treatment was the inability of patients to identify the warning symptoms of a cardiovascular emergency.<sup>10</sup> Therefore, increasing knowledge of CVD warning signs and risk factors among communities is imperative to control the disease.<sup>13</sup>

### Modifiable and non-modifiable risk factors

Predisposing risk factors for CVD are categorised into

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non-modifiable risk factors such as age, gender, inherited lipoprotein disorders and family history of CVD; and modifiable risk factors such as smoking, diabetes mellitus, hypertension, obesity, dyslipidaemias, lack of exercise, sedentary lifestyle, psychosocial stress, poor oral hygiene and type A personality.<sup>14</sup> The most important risk factors related to an increased risk of coronary artery disease are smoking, followed by hypertension, abdominal obesity and diabetes.<sup>14</sup>

Dyslipidaemia, hypertension and diabetes are risk factors that have become pre-eminent targets for predisposing to CVD.<sup>3</sup> Therefore, treatment modification and the assessment and monitoring of these risk factors are the major focus of clinical care, research, treatment guidelines and measures of hospital performance. Emphasis must be placed on the underlying causes of hypertension, diabetes, and dyslipidaemia.

Lifestyle risk factors such as dietary habits, physical

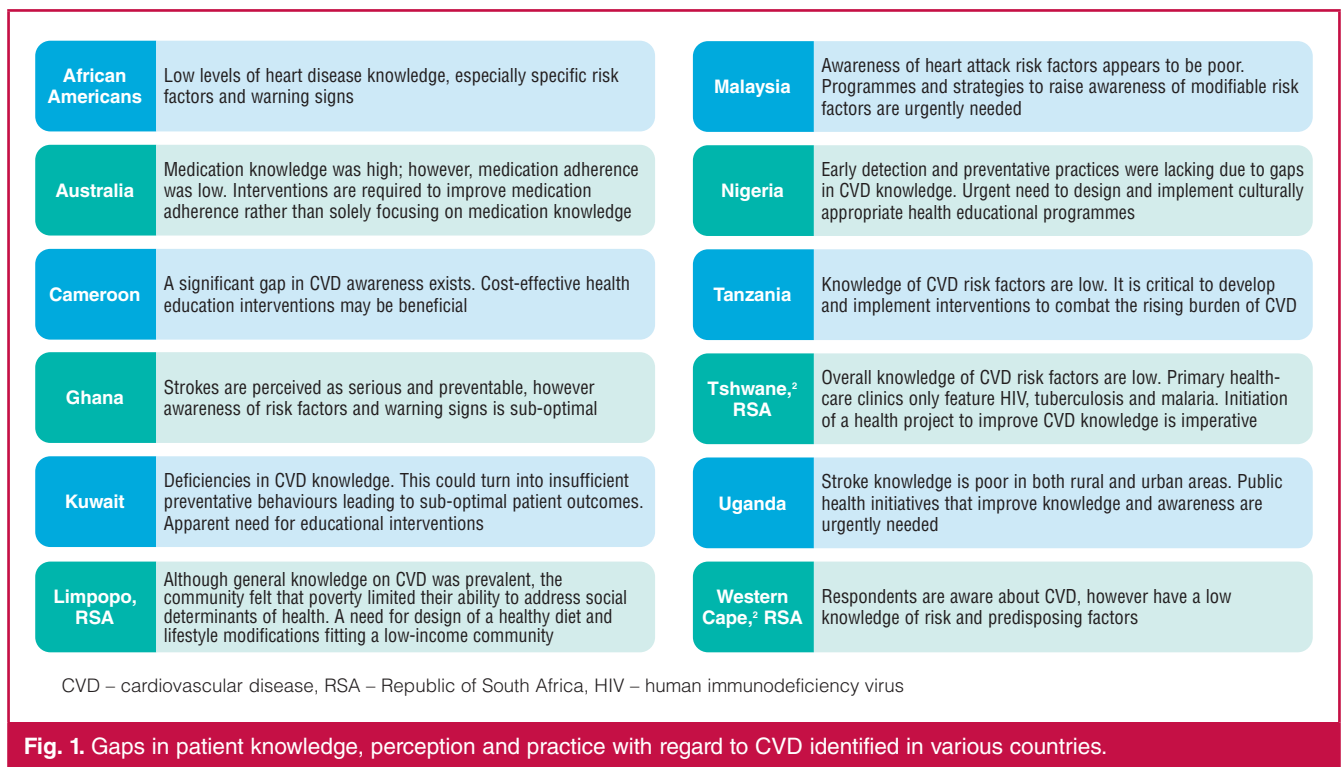
inactivity, obesity and smoking strongly influence the recognised cardiovascular risk factors and affect novel pathways of risk, such as inflammation, oxidative stress, vascular endothelial dysfunction, thrombosis-coagulation and arrhythmia.<sup>3</sup> Lifestyle modification may help to reduce age-related increases in aortic stiffness. Patient adherence to intervention measures is therefore crucial to ensure the prevention of deleterious consequences.

### Review of patient knowledge, understanding and perception of CVD and their risk factors

The assessment of CVD knowledge and awareness among the general public would provide realistic insights to advance public health policies toward modifiable risk factors for CVD.<sup>11</sup> Looking for novel methods to help cardiovascular patients adhere to their medication has tremendous potential to improve

**Table 1. Characteristics and findings of the studies included**

Author, country	Study design	Sample size (male:female)	Perception and awareness of cardiovascular health	Perception and awareness of risk factors and lifestyle modifications	Perception and awareness of signs and symptoms	Related factors
<b>CVD</b>						
Aminde <i>et al.</i> , <sup>16</sup> Cameroon	Community-based cross-sectional survey	1162 M = 445 F = 717	Low awareness	Cited risk factors: smoking, unhealthy diet, lack of exercise, obesity, stress and high blood pressure	Shortness of breath for heart attacks and sudden numbness for strokes	Level of education, income bracket and family history
Awad and Al-Nafisi, <sup>19</sup> Kuwait	Cross-sectional survey. Quantitative study (census sampling)	816 M = 330 F = 486	Low CVD knowledge	Well-cited risk factors: smoking, obesity, unhealthy diet and physical inactivity	Chest pain 50%, dyspnoea 48%, pain 41%, weakness 25%, confusion 36%	Females had a greater understanding than males
Muhihi <i>et al.</i> , <sup>2</sup> Tanzania	Randomised controlled study. Community-based face-to-face interviews	3000 M = 778 F = 2222	Low CVD knowledge	Cited risk factors: Stress, obesity, cholesterol and physical inactivity	Shortness of breath, loss of consciousness, headache, dizziness, vomiting	Geographical location (rural area) and level of education
Oladapo <i>et al.</i> , <sup>14</sup> Nigeria	Descriptive, cross-sectional survey	1585 M = 689 F = 896	Low awareness	Cited risk factors: stress, tobacco use, hypertension, diabetes	N/A	Level of education and demographic area
Surka <i>et al.</i> , <sup>15</sup> South Africa	Cross-sectional survey. Qualitative study (FGDs). Purposive sampling	28 M = 4 F = 24	Most respondents familiar with CVD terminology but lacked insight into CVD conditions	Cited risk factors: alcohol, smoking, stress and unhealthy diet	N/A	Geographical location (township)
Winham and Jones, <sup>20</sup> USA	Cross-sectional survey. Quantitative study	172 M = 62 F = 110	Low to moderate CVD knowledge	Cited risk factors: smoking, unhealthy diet, physical inactivity	N/A	Level of education
Yuqiu and Wright, <sup>21</sup> South Africa	Cross-sectional survey. Quantitative study (Census sampling)	551 M = 302 F = 249	Low CVD knowledge	Cited risk factors: obesity, alcohol, diabetes, stress, lack of physical activity	N/A	Lower education was associated with less knowledge
<b>Heart attack</b>						
Ahmed <i>et al.</i> , <sup>9</sup> Malaysia	Cross-sectional, observational study	Total = 393 M = 204 F = 189	Low awareness	Cited risk factors: smoking, obesity, diabetes, unhealthy diet, stress	N/A	Level of education and income bracket
<b>Heart failure and COPD</b>						
Gallager <i>et al.</i> , <sup>10</sup> Australia	Prospective, descriptive, interview-based survey	118	Adherent to medication. Low medication knowledge	Higher adherence among females, patients with concurrent conditions, younger age and taking fewer medicines	N/A	Younger patients had higher medication knowledge, gender, additional co-morbidities
<b>Hypertension</b>						
Jongen <i>et al.</i> , <sup>18</sup> South Africa	Mixed qualitative and quantitative study	451 M = 222 F = 229	Low-to-moderate CVD knowledge	Cited risk factors: stress, alcohol, salt intake, exercise, smoking, diet, family history	Elevated blood pressure makes you sick	Geographical location (rural area)
<b>Stroke</b>						
Donker <i>et al.</i> , <sup>11</sup> Ghana	Cross-sectional study	693 M = 374 F = 319	Low awareness	Cited risk factors: alcohol intake, hypertension, smoking, previous stroke, high cholesterol, heart disease, diabetes	Numbness (unilateral), slurred speech, severe headache, numbness on either side, weakness on either side and dizziness	Level of education and income bracket
Kaddumukasa <i>et al.</i> , <sup>17</sup> Uganda	Cross-sectional survey	377 M = 117 F = 260	Low awareness	Cited risk factors: old age, hypertension, diabetes, cholesterol, obesity, stress, unhealthy diet and lack of exercise	Dizziness, diplopia, headache, difficulty speaking, tiredness, fever, sweating, body weakness, paralysis, fainting and numbness	Demographic area, income bracket, age and level of education.



the quality of life of these patients as well as reduce the cost of healthcare.

This narrative review of studies on patient knowledge and perception of CVDs (Table 1) reveals low to moderate levels of knowledge and awareness of CVDs and associated risk factors. This was seen across different populations globally and there appears to be an incongruity in knowledge across the globe (Fig. 1). The knowledge gap is also apparent in the low perception rate of CVD-related deaths. Observations revealed that knowledge and perceptions were not necessarily practiced upon.

In the study conducted by Surka *et al.*,<sup>15</sup> respondents were hesitant and unsure in providing a clear definition of CVD. Some respondents were able to identify hypertension and diabetes as specific conditions related to CVD. Most respondents were uninformed due to poor communication from their respective healthcare providers.

Participants with a higher level of education and formal employment were found to be more knowledgeable about cardiovascular health, its risk factors and warning signs compared to those with lower levels of education. Educated individuals have an increased capability to comprehend information such as health messages delivered through various media channels. Similarly, studies have shown a greater knowledge among individuals residing in urban areas as opposed to those in rural settings (Table 1).<sup>2,15-19</sup>

Although participants were familiar with the terms used to describe CVD, they were found to have limited insight on what these terms mean, as patient knowledge of CVD was dependant on specific terminology<sup>15</sup> or limited to only one or two symptoms, such as shortness of breath as a symptom of a heart attack. Respondents from Cameroon, however, were found to be unaware of classical symptoms of myocardial infarction.<sup>17</sup> The overall knowledge of CVD was low among both the Kuwaiti and Cameroonian populations with 40.7 and 48.4%, respectively, not

recognising any symptoms. The most common CVD identified by Kuwaiti respondents was coronary heart disease (29%), followed by congenital heart disease, deep-vein thrombosis and pulmonary embolism.<sup>20</sup>

Young African Americans felt they were moderately well informed about CVD, however, knowledge of preventative behaviours and risk factors were variable and inconsistent.<sup>21</sup> There appears to be a lack of understanding among African American participants that high blood cholesterol levels are associated with consumption of dietary saturated fats. Observations revealed that although 76.6% of participants were aware that a high level of cholesterol is a major cause of heart disease, only 37.4% knew that reduction in animal products in their diet is a preventative behaviour.<sup>21</sup>

Acknowledgement of predisposing factors such as unhealthy diet, obesity, smoking and alcohol consumption were recognised as risk factors for CVD by various studies (Table 1), with stress being the most recognised risk factor in Ga-Rankuwa, South Africa. However, diabetes, high cholesterol level, sedentary lifestyle and hereditary factors were not recognised as risk factors by participants in both the Western Cape and Gauteng, South Africa.<sup>15,22</sup> Respondents in Buea, Cameroon recognised obesity and diabetes as risk factors for CVD, however up to 54.2% of participants thought that family history was unrelated to CVD,<sup>17</sup> and more than 99% of Nigerian participants were unaware that excess weight around the waistline increases the risk for CVD.<sup>16</sup>

Females in Ga-Rankuwa, South Africa were more aware and knowledgeable about risk factors, compared to males.<sup>22</sup> Similarly, CVD knowledge was significantly greater among females compared to males in Kuwait as well as in those aged 50 to 59 years.<sup>20</sup> Higher CVD knowledge among females could be attributed to less working time, and therefore more leisure time to watch and listen to mass media tools.<sup>20</sup> In contrast, Cameroonian

men were found to have an increased awareness of the different types of CVD compared to women,<sup>17</sup> and unexpectedly, the awareness of menopause, low oestrogen levels and hormone replacement therapy was higher in African American men than women<sup>21</sup>

Respondents in a peri-urban, low-income community in South Africa were familiar with the term hypertension yet could not provide a precise definition or an explanation, even those who were known hypertensives.<sup>15</sup> In Limpopo, South Africa, participants were unfamiliar with the term hypertension due to language barriers, and hypertension was referred to as 'high high' and was defined as 'a sort of stress'.<sup>19</sup> Only two-thirds of known hypertensives in Ga-Rankuwa, South Africa, were familiar with their preceding blood pressure measurement and the majority of Ga-Rankuwan respondents in all gender and age categories were unaware that a heart attack, angina, heart failure, stroke and kidney failure are complications of hypertension.<sup>22</sup>

In Limpopo, South Africa, genetic predisposition was not an easily accepted risk factor for hypertension due to lack of understanding of the concept of hereditary.<sup>19</sup> IsiZulu and Sepedi translators were used due to participants not being fluent in English, therefore there is a possibility that the translators could have influenced the participants' responses.<sup>19</sup> These findings reveal superficial knowledge of hypertension and more work needs to be done to enforce the dangers of hypertension being the silent killer in communities to raise awareness of the importance of participating in blood pressure screening events.

Only 10% of Nigerian respondents considered hypertension to be a major and potentially life-threatening condition. Approximately 5% knew that hypertension is considered a silent disease, more than half of the study population (59.7%) had never tested their blood pressure prior to the study and less than 1% of respondents knew which blood pressure values were considered high (> 140/90 mmHg).<sup>16</sup> This is most likely due to their blood pressure values not being disclosed to them at the time of measurement, and they were just informed whether the value was normal or high.<sup>16</sup> Other than not visiting the free clinics, the reasons for not testing their blood pressure were that the working hours of their farms coincided with the operating hours of the free clinics.<sup>16</sup> There is therefore an urgent need to make screening sites more accessible. This can be done by setting up screening stations after working hours at various places such as malls, schools, events and various other sites.

Although stroke is one of the leading causes of mortality and morbidity worldwide, with developing countries accounting for 85% of deaths globally, there is a lack of medical information and poor control of CVD risk factors, which contributes to the rising incidence of stroke.<sup>18</sup> Stroke was generally perceived as a serious illness among most respondents. Participants in the Western Cape, South Africa, were familiar with the term stroke and many had had personal encounters with patients who suffered from a cerebrovascular accident. They understood the link between stroke and high blood pressure and some respondents associated the stroke with emotional distress and stressful situations.<sup>15</sup> There was generally poor community awareness of the risk factors and warning signs of stroke, as the most important risk factor for stroke, namely hypertension, could not be recognised by respondents in Ghana.<sup>13</sup> In the cross-sectional survey conducted in Uganda, 76% of the participants did not recognise stroke as a disease related to the brain.<sup>18</sup>

Smoking was the most common risk factor identified by Malaysian respondents (69.9%).<sup>11</sup> On the contrary, in a cross-sectional study conducted in central and urban Uganda, none of the participants identified cigarette smoking as a risk factor for stroke.<sup>18</sup> Only a quarter of Tanzanian participants (25.5%) identified alcohol consumption as harmful for cardiovascular health,<sup>2</sup> whereas in peri-urban South African communities, the perception of harmfulness differed on the type of alcohol consumed: alcohol consumed in affluent areas was perceived as less harmful, as it was diluted, compared to alcohol consumed by individuals of other socio-economic backgrounds (without the addition of a diluent or mixer).<sup>15</sup>

In the Ga-Rankuwa study,<sup>22</sup> 30.1% of males and 61.8% of females were considered overweight, obese or severely obese (BMI 25 kg/m<sup>2</sup>). In the male cohort, 14.6% were aware of their obesity and the majority acknowledged a connection between obesity and CVD. In the female cohort, only 29.7% perceived that they were obese.<sup>21</sup> An alarming fact was that 59.3% of males and 51.4% of females of the overweight group perceived themselves to be underweight.<sup>22</sup>

Knowledge of certain important risk factors and lifestyle modifications were variable and inconsistent in different regions. In both Tanzania and Nigeria, the main sources of information were through friends, family members (females), radio and television (men).<sup>2,16</sup> Only 9% of Nigerian respondents reported to have obtained medical information from healthcare workers.<sup>16</sup>

The majority (93%) of respondents in the Western Cape, South Africa, did not comprehend the concept of risk, and 7% of respondents misunderstood and conveyed that poor adherence to medication, which placed them 'at risk' of having a stroke.<sup>15</sup> No clear trends in risk factors investigated with regard to educational level could be determined in Ga-Rankuwa, however, it was noted that there was a positive correlation between lack of awareness and increasing age.<sup>22</sup> Similarly in Kuwait and Malaysia, the participants were found to be more knowledgeable about CVD if they attended higher education centres,<sup>11,20</sup> compared to those with moderate and low levels of education.

The need for educational tools and cardiovascular awareness programmes is highlighted in the study by Ahmed *et al.*,<sup>11</sup> which confirmed that patients who received promotional materials, educational leaflets and social media advertisements showed more awareness of risk factors associated with heart attacks compared to those not receiving any promotional information.

The majority of Ga-Rankuwa respondents in all gender and age categories were unaware of the short-term complications of diabetes mellitus, such as hypo- or hyperglycaemia and diabetic keto-acidosis, as well as long-term complications such as cardiac disease, hypertension, kidney disease, eye disease and peripheral neuropathy.<sup>22</sup> Participants from China were found to be more aware of diabetes as a risk factor, as opposed to participants from Malaysia.<sup>11</sup>

As the burden of non-communicable diseases rises in sub-Saharan Africa, there is a need to develop new prevention strategies. These would include propagating accurate information related to the warning signs and risk factors, as better knowledge would lead to early recognition, prompt emergency reaction and a reduction in CVD morbidity rates. Knowledge, awareness and understanding are essential to motivate individuals to adopt lifestyle modifications and prevent CVD. Early intervention and changes to sedentary lifestyles are the best approaches, and



controlling modifiable risk factors is essential to preventing CVD.<sup>23</sup> Community attitudes and knowledge influence identification of risk factors and prevention of CVD.<sup>18</sup>

### Understanding the need for lifestyle modification

Population-based studies illustrate that individuals residing in LMICs are predisposed to an increased CVD risk due to their poor socio-economic circumstances. There is some awareness of behavioural factors among South African respondents, and their knowledge was predominantly on salt intake, consumption of fatty foods as well as tobacco smoking.<sup>15,19</sup> Almost three-quarters of Ga-Rankuwan participants enjoyed their food lightly salted and only one-third of participants knew the recommended daily salt allowance for cardiovascular health.<sup>22</sup>

Respondents in the Western Cape, South Africa, were aware that certain meal-preparation techniques made some meat products less unhealthy, such as trimming the fat off and grilling meat, as well as consuming smaller meal portions with decreased oil content.<sup>15</sup> Only a minority of respondents in a Ga-Rankuwa study were aware that at least five fruit and vegetable portions per day should be consumed.<sup>22</sup>

In Limpopo, South Africa, the cognisance of the need for a healthy diet for prevention of hypertension was recognised and the common factor preventing a healthy diet was poverty.<sup>19</sup> The need to consume more fresh fruit and vegetables and less fatty foods was not always possible in low-income communities due to cost factors and general poverty. Healthy living is not seen as affordable to the majority because larger volumes of less healthy products can be purchased for the same value as smaller quantities of the healthier substitutes.<sup>19</sup> On the other end of the spectrum, a group of Limpopo participants believed that even with alleviation of poverty, people will still maintain unhealthy eating habits.<sup>19</sup>

Lower educational level was associated with less knowledge about a healthy diet. The most frequent lifestyle modification suggested in the Ga-Rankuwa study was doing exercise, reducing stress and smoking cessation, however, only 12% considered hypertension control as fundamental and only 14.3% considered weight reduction as a fundamental lifestyle modification.<sup>22</sup> Stress- and anxiety-related factors in Limpopo were recognised as factors that promoted the development of hypertension. This revolved around family feuds, domestic problems and an inability to provide for their family due to unemployment.<sup>19</sup>

Variations in disease prevalence and obesity may be attributed to social inequalities between different ethnic groups. Studies have shown that certain cultural beliefs have led sub-Saharan Africans to believe that obesity is positively related to access to clean water and electricity as well as factors associated with good health and a more affluent lifestyle.<sup>24</sup> Religious and cultural beliefs such as 'dark spirits' or 'deity' were considered by certain communities in the Western Cape, South Africa, as the cause of CVD.<sup>15</sup> There is an urgent and pressing need to design and implement a culturally acceptable and appropriate community awareness, health educational and health promotional programme about CVD risk factors and CVD for the community, which can be modified and adapted for other rural populations.<sup>16</sup>

Men have been shown to be more physically active than women.<sup>25</sup> This could be due to cultural barriers regarding the acceptability of wearing tight-fitting clothing while exercising or

perceptions that participating in physical activity results in less time to complete household chores.<sup>24</sup> Physical activity was shown to be higher in South Africans residing in urban areas where crime was not perceived to be a problem. This was supported by a Nigerian study that also showed that safety, cleanliness and aesthetics were positively associated with physical activity.<sup>24</sup> Barriers to physical activity included lack of time, lack of discipline, as well as depression.<sup>25</sup>

Behavioural changes may be influenced by the perception and knowledge that certain actions may be detrimental and cause harm to their health. Implementing health initiatives will potentially enhance CVD knowledge and awareness, and engaging with healthcare workers to participate in these campaigns is especially important for low-income groups in whom sub-optimal knowledge was identified, yet who carry the largest disease burden.

### Understanding medication, the need for compliance and reasons for non-adherence

The consequences of poor adherence to cardiovascular medication have led to an increase in rates of morbidity and mortality, and the cost of healthcare.<sup>26</sup> Although limited in the number of studies available, Kronish and Ye<sup>27</sup> found that there was a lack of patient compliance with their prescribed medications, therefore only one out of every two patients achieved the blood pressure goals. This is limited to only a few studies; further studies on patient compliance are warranted.

Effective management of hypertension with medication is achievable, yet a substantial number of individuals remain untreated or have uncontrolled blood pressure.<sup>8</sup> Management of CVD is impacted on by multiple factors. These include decreased awareness of CVD, lack of motivation to attend clinic visits, lack of adequate screening and educational facilities, large patient numbers, and patients lost to follow up.<sup>28</sup> The high proportion of individuals with CVD highlights the need for surveillance programmes to raise awareness, educational campaigns to encourage patients to comply with and adhere to medical therapy, together with lifestyle modification and regular follow-up visits.

Many South Asian patients recognised the role of medication on a long-term basis and knew the importance of medication to treat CVD.<sup>29</sup> Other factors that have been identified in a few patients include patients taking medication purely as prescribed with no awareness as to why, and some respondents noted that poor adherence to anti-hypertensive medication could lead to a stroke.<sup>15</sup> Nigerian respondents only associated taking medication with when physical symptoms were present, and taking their medication only when they felt unwell.<sup>16</sup>

Patients' concerns of becoming dependant on their medication if taken regularly, as well as perception barriers that convey the notion that a reduction in or absence of physical symptoms is an indication that medication is no longer mandatory, emphasises the need to communicate with patients to overcome the misunderstanding.

Medication knowledge was low among Australian participants with known heart failure and chronic obstructive pulmonary disease (COPD), with only 47.6% of patients understanding what their medication does for them. However, the majority (75.2%) of participants were reported to be compliant with all

medication doses and frequencies.<sup>12</sup> Younger and middle-aged patients with an increased ability for self-management and more co-morbid conditions were found to have higher levels of medication knowledge as opposed to older participants who were taking more medication.<sup>12</sup> The latter could be influenced by impaired cognitive function associated with older age as well as increased complexity of medication regimes in the elderly. The increased knowledge of participants with more co-morbid conditions may have been attributed to the choice of the population group, as it focused on heart failure and COPD.

As medication taken for CVD prevention are intended for chronic use, it is extremely important to recognise and address factors that improve adherence to achieve maximum clinical effectiveness as well as cost effectiveness.<sup>30</sup> It is imperative that efforts are made to reduce the global CVD burden. The evaluation and treatment of diet, exercise and smoking should become a routine practice similar to blood pressure, cholesterol and glucose monitoring.

### Target areas for intervention

Misconceptions must be meticulously dealt with to avoid bias or cultural stigmatisation. Common themes and key aspects from various studies are summarised in Fig. 2.

There is a gap identified for the need for regular monitoring for cardiovascular health. The consequences that stem from failure to adhere to medical therapy can be addressed by increasing awareness through campaigns and educational programmes. Effective policy measures and surveillance, together with public awareness must be taken into consideration so that behaviours can be developed, enforced and easily implemented. There is a need for a paradigm shift that maximises healthcare workers' potential to increase public knowledge of CVD risk factors and warning signs, especially in rural areas.<sup>2</sup> Awareness programmes

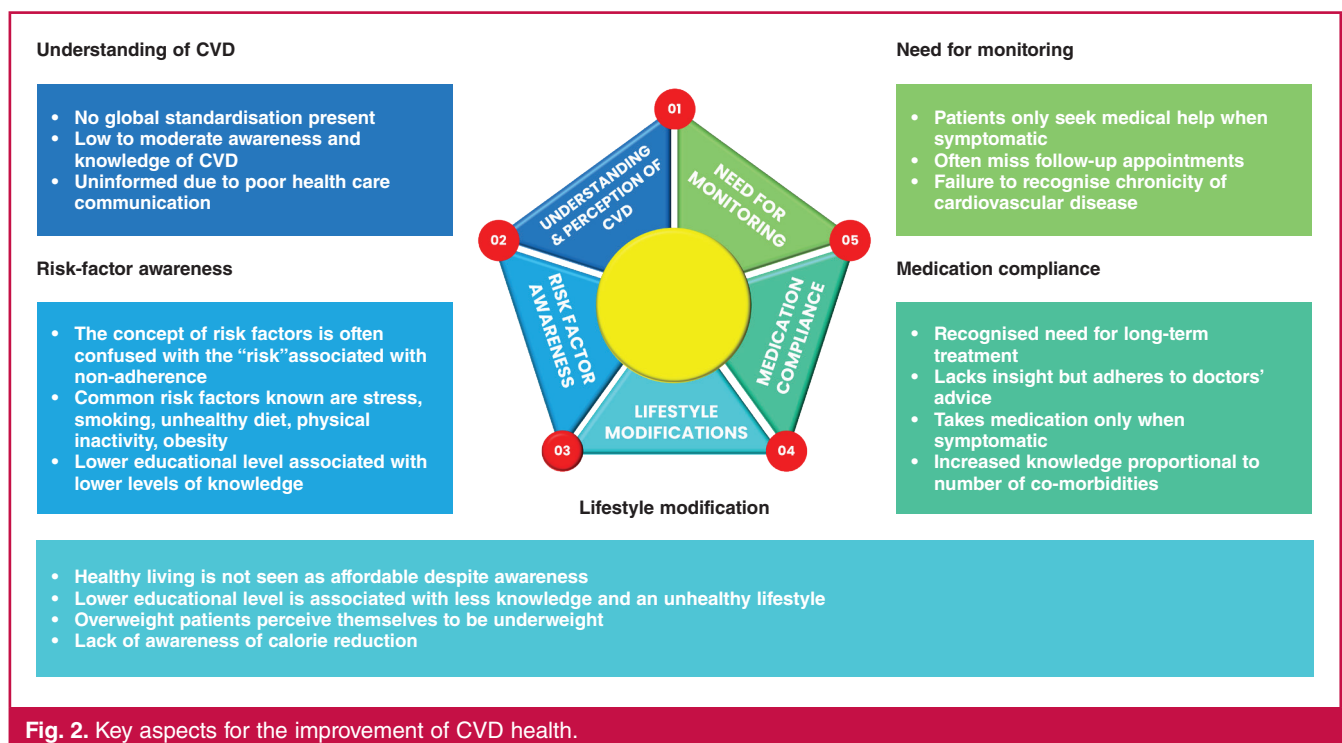
that highlight the implication of adverse risk factors relating to CVD cannot be over emphasised. Cost-effective community health educational interventions, taking into consideration socio-economic status and cultural beliefs, may be beneficial.<sup>17</sup>

Community understanding of CVDs has had significant positive consequences,<sup>31</sup> and studies have shown that increasing a patient's knowledge of CVD and its risk factors can lead to success in control and prevention.<sup>2</sup> CVD health programmes can be used to influence attitudes and practices towards a healthy lifestyle, improved treatment compliance and decreased risk of complications.<sup>24</sup> Understanding disparities in patients' perception, knowledge and practice is crucial for designing and implementing appropriate interventions to combat the rising burden of non-communicable diseases.<sup>2</sup>

### Conclusion

Overall, low perceptions and insufficient knowledge of CVDs continue to be indispensably important factors in health behaviour. Knowledge perceptions showed variations among different populations, and different ethnic groups were influenced by level of education, place of residence and type of employment. Different population groups require different educational material to improve their level of comprehension and understanding.

Meticulous understanding of the knowledge gaps and perceptions of CVD is critical to inform and lead to the development of appropriate targeted health awareness and promotional campaigns to prevent CVD events in high-risk populations in our setting. Future CVD awareness strategies should emphasise that end-organ damage is preventable, and assist individuals to comprehend and manage the risk factors. A focus on primary and secondary prevention is crucially important. Prompt treatment in improving patient outcome is vitally important during emergency situations, therefore advice must be given to individual



patients and their families as well as communities.

In order to combat the growing burden of CVDs, it is imperative to develop and implement interventions that will improve population knowledge of risk factors. Community outreach programmes by healthcare providers and community healthcare workers as well as media campaigns should be implemented to improve public awareness of CVD and its risk factors, empowering rural communities with knowledge so as to be informed regarding healthy lifestyles.

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