Submitted papers

MANAGING THE TIDAL WAVE OF DIABETES: BARRIERS TO EFFECTIVE MANAGEMENT OF THE DISEASE IN FIJI

Akisi Ravono, Jenny Carryer, Rochelle Stewart-Withers & Tracie Mafile'o

Corresponding author: Akisi Ravono
Email: akisir@unifiji.ac.fj

Diabetes, as a disease of global concern, has drawn an immense amount of literature. The present paper contains a review on what is known about diabetes among the iTaukei (Indigenous people) in Fiji. It also provides an explanation on how people living with diabetes in Fiji manage their status and highlights the barriers that affect how patients suffering from the disease self-manage their illness.

Keywords: non-communicable diseases, diabetes, Fiji

JEL Classification: I10; I12; O56

I. INTRODUCTION

Diabetes is a common worldwide progressive chronic metabolic disorder of multiple aetiology (Reed, Bain and Kanamarlapudi, 2021; Rintala and others, 2013; WHO, 2016) and is a significant cause of premature deaths and disability among poor communities (de-Graft and others, 2014; WHO, 2016). The consequences of diabetes affect individuals, families and societies in general(Palaya and others, 2018; Saeedi and others, 2019). Medical professionals often refer to the condition as diabetes mellitus (WHO, 2019), which can either be inherited or acquired, and disturbs carbohydrate, protein, and fat metabolism in the body. For this reason, diabetes is known to be a result of defects in insulin secretion, causing a deficit in insulin supply, insulin effectiveness or both (WHO, 2019). Insulin is a hormone produced by the pancreas that acts on blood glucose from carbohydrates in food. Deficiencies in insulin secretion often result in high blood glucose concentration, which harms the body's systems, blood vessels, and nerves (WHO, 2016).

Despite the voluminous literature on diabetes, little has been made available on the status of diabetes and how patients living with it in Fiji self-manage their health. There has been relatively scant health research literature into diabetes. These studies have partially addressed this paucity concerning care delivered to people living with non-communicable diseases (NCDs), including diabetes. A bibliographical database is used to assess diabetes issues in the case of Fiji. The present study begins with a review of how diabetes has become a disease of concern on global, Pacific and Fijian platforms. The next section presents an outline of the types and forms of diabetes, statistics from a global, Pacific, and Fijian perspective, and an overview of its affiliations as a non-commutable, lifestyle, and chronic disease. The paper includes a discussion of the literature on key causative factors that contribute to diabetes prevalence and the effects on persons living with it. The review highlights the barriers facing people living with diabetes and managing their conditions in Fiji.

II. TYPES AND FORMS OF DIABETES

The term diabetes originated from Aretus the Cappadocian, a Greek physician during the second century Anno Domini (AD). Its medical condition is called diabainein (siphon) due to polyuria. Diabainein was translated to diabetes from the English adoption of medieval Latin, and Thomas Willis added mellitus in 1675 to represent honey (Mel in Latin). Literally, “siphoning off sweet water” could be associated with diabetes mellitus, as it was also observed that ants were attracted to some people’s urine; hence the term “sweet urine disease” (Karamanou, 2016). Diabetes is characterized by intense thirst and hunger, polyuria, blurring of vision, unexplained weight loss or

weight gain, unhealed cuts and bruises, male sexual dysfunction, genital yeast infection symptoms, numbness and tingling sensations in hands and feet (Moini Johangir and others 2022). The two main types of diabetes are type 1 diabetes (T1DM) and type 2 diabetes (T2DM). Its most severe clinical manifestation is ketoacidosis (DKA) or a non-ketotic hyperosmolar state, which results in dehydration, coma, or death (WHO, 2019). A common form of T2DM symptoms often progresses at a slow pace, causing pathological and functional changes that result in complications. People living with diabetes needs are not only limited to adequate glycaemic control, but must also prevent complications and deal with disability limitation, and rehabilitation (Haltbakk, 2019).

T2DM is a global pandemic significantly affecting human health and economic development (Budreviciute, 2020; Katsarou, 2017; De Ferranti and others, 2019). In addition, T2DM is known as non-insulin-dependent due to the body's inability to respond appropriately to insulin, resulting in hyperglycaemia (WHO, 2016). Approximately 90 per cent of all diabetes cases worldwide have T2DM, making it a more common type, affecting mostly adults, but it has been increasingly noted in younger people (WHO, 2019). Hyperglycaemia develops gradually, causing T2DM to go undiagnosed for many years until the diabetic person develops classic symptoms or encounters complications from the disease. In Fiji, T2DM is the leading cause of premature deaths and disability (Pablo and others, 2018). A temporary form of diabetes is Gestational Diabetes Mellitus (GDM), which is most common in medical pregnancy complications (Osuagwu and others, 2020). Higher and increasing rates of obesity and T2DM diabetes among non-pregnant individuals in Fiji suggest a high prevalence of GDM and associated adverse pregnancy outcomes in which maternal obesity and T2DM are risks of GDM (Fuka and others, 2020). The broader classification of diabetes allows clinicians to assign and treat the type of diabetes during patient consultations (WHO, 2019).

III. DIABETES STATISTICS IN FIJI

Globally, an estimated 463 million people were diagnosed with diabetes in 2019, compared to 422 million in 2014 and 108 million in 1980 (WHO, 2016; Saeedi and others, 2019; WHO, 2019). Statistically, the global figures for diabetes prevalence have nearly doubled since 1980, particularly in low and middle-income countries, over the past decade (WHO, 2016). However, based on the World Bank income group, diabetes prevalence is higher in high-income countries and urban areas (Saeedi and others, 2019). The Western Pacific region, which Fiji is part of, had an estimated 136 million people with the disease in 2019, and by 2045, the estimate for the region is that the number of cases will reach 164 million (Saeedi and others, 2019).

An estimated 56,000 people in Fiji have diabetes, one in every three adults (V. Qio, personal communication, 15 September 2018). Fiji has the highest diabetes-related mortality rates on a global comparison (Gounder, 2020; Morgan, 2015). This prevalence indicates risks and impacts on people living with diabetes in Fiji that are far greater than the initial estimates (Mataitini 2013). During the period 2013–2018, Fiji registered 10,312 new cases of diabetes, predominantly for people over 30 years of age (Fiji, Ministry of Health and Medical Services, 2019).

3.1 Diabetes: non-communicable disease

Due to its causative factors, WHO classifies diabetes as a non-communicable disease. Similar to other non-communicable diseases, diabetes is non-infectious and results from several factors, including genetic, environmental, physiological, and behavioural effects (Budreviciute, 2020). The term "non-communicable disease" is confusing, as it involves social interactions (Torres and Atkinson, 2018). Non-communicable disease occurs in comorbidity with other diseases; additional conditions co-occur with the primary disorder. Management of diabetes as a non-communicable disease must focus on key factors of illnesses, medications, blood pressure, lipids, glucose, viruses, obesity, and stress. Other dietary factors are the consumption of meat and sugar-sweetened beverages linked to the development of non-communicable diseases.

3.2 Non-communicable disease in the Pacific

The Pacific region has incorporated non-communicable disease prevention and control programmes. Despite this, there is scope for a more coordinated approach to developing policies that build a healthier environment and promote healthier choices (Waqa and others 2013). Non-communicable diseases have become a priority health and development issue for the Western Pacific region (Tolley, Hilary 2016). Despite these efforts, the complications from non-communicable diseases continue to adversely affect the livelihood, social, and economic aspects of the people of the Pacific island countries and territories (Walker, 2017). Reports from the Pacific island countries and territories show a high incidence of incapacities due to non-communicable diseases, with a member country reporting one in ten people with diabetes have undergone amputations (WHO, 2016). In 2015 the average premature mortality from non-communicable diseases was more than five times more for Pacific island countries and territories, which resulted in several commitments at various levels to address these types of diseases within the region (WHO, 2017).

The quest to achieve healthier populations among Pacific island countries and territories has led to a robust framework for the Healthy Islands vision (WHO, 2017; Tolley and others, 2016). The Yanuca Declaration of Healthy Islands concept was announced at the first meeting of health ministers representing Pacific island

countries and territories, which was held in Yanuca Island, Fiji in 1995. However, the burden of non-communicable diseases in Pacific populations has been a significant barrier to achieving the vision (WHO, 2017). Given the reversible state of the non-communicable disease crisis, interventions taken by Pacific island countries and territories in response to such diseases must be in line with the WHO objectives (Piukala and others, 2016). The urgent need for change requires health-care systems to reinforce prevention programmes and ensure that control of non-communicable diseases is integrated into primary health care (WHO, 2009).

3.3 Non-communicable diseases in Fiji

The most prominent health-care concern in Fiji is the high incidence of non-communicable diseases (Wiseman and others, 2017) despite the public health concern of the Covid-19 pandemic. Similar to other Pacific island countries and territories, an alarming advancement of the non-communicable diseases crisis remains a challenge for the health system of Fiji (Chand and others, 2020; Snowdon and others, 2013). Non-communicable diseases in Fiji have caused many premature deaths and permanent disabilities, and have led to shattering complications (Wiseman and others, 2017; Mialon and others, 2016). It places a significant economic burden on the country's health-care system, which is associated with high medical costs (Chand and others, 2020; Snowdon and others, 2013). The chronicity of non-communicable diseases relates to weighty long-term costs and a burden on affected persons, often requiring a significant amount of funding allocations by the Ministry of Health and Medical Services of Fiji (Snowdon and others, 2013; Kontis and others, 2014).

Diabetes in the Fijian *iTaukei* language is translated as *mate surety*, namely invited disease – non-communicable diseases, suggesting that people are responsible through lifestyle by inviting or bringing the disease onto themselves. However, the increasing impact of changing lifestyles on health has led to the implementation of several important public health initiatives in non-communicable diseases by the Ministry of Health which has become a triple burden to communicable diseases and injuries (Wiseman Virginia and others, 2017). Due to increasing prevalence, of the commitment and recognition of the scale of the non-communicable diseases is at a high level, supported by WHO (Snowdon, Wendy and others, 2013). From the perspective of WHO, Fiji has the world's highest proportion of deaths from diabetes and cardiovascular diseases on record.

Despite the adversities in addressing the consequences of rapidly evolving non-communicable diseases, there is a marked improvement in managing diabetes complications in Fiji. Foot care clinics operate at the subdivisional level and are manned by nursing personnel with foot care training to address diabetes problems (M. Leong, personal communication, 6 January 2020). This new initiative has shown

marked improvement in reducing the number of limb amputations from occurring every eight to every12.5 hours (Fiji, Ministry of Health and Medical Services, 2019; 2020). Other complications of diabetes, such as kidney diseases, appear to substantially drain health-care resources and productivity. The latter has forced the Ministry of Health and Medical Services to re-orientate health-care services and systems to develop various prevention strategies (Snowdon and others, 2013).

3.4 Diabetes: a lifestyle and chronic disease

Diabetes is documented as a lifestyle disease (Morgan, 2015). In Fiji, lifestyle is strongly influenced by urbanization factors, a move away from the traditional living system with a combination of a highly refined diet, physical inactivity, genetics, and increasing obesity rates that contribute to diabetes (Gounder, 2020). Similar to tobacco and alcohol misuse, several other factors have been linked to the development of certain medical conditions (Budreviciute, 2020; Francis, 2017). Chronic conditions immensely drain the health-care system yet they receive less attention (Mills and others, 2017). The escalating burden of chronic non-communicable diseases prevents low and middle-income countries from obtaining universal health coverage (de-Graft and others, 2014). A target has been set by WHO to reduce premature non-communicable disease-related mortality by 25 per cent by 2025 (Santosa and others, 2015). The Millennium Development Goals and Sustainable Development Goals included targeted prevention and treatment of non-communicable (see Sustainable Development Goal target 3.4) (WHO, 2017).

Disparities in socioeconomic conditions, knowledge, attitudes, and government reforms related to health inequalities lead to delayed consultations to attain proper health care, leading to hyperglycaemia (Egen and others, 2017). Diabetes in the form of ineffective use of insulin in non-communicable diseases is often associated with a combination of epigenetics, lifestyle and environmental factors, and the effect of the intrauterine environment (Akbar, 2018). In Fiji, most people walk barefoot, or in most instances do not wear properly fitted shoes. They tend to have foot blisters and ulcers, and suffer from chronic foot sepsis in which amputation is the only option in advanced cases (Morgan, 2015). Other factors that increase risk are unhygienic living conditions, which are worsened by delayed visits to health-care facilities.

IV. THE SOCIOCULTURAL-ECONOMIC INDICATORS OF DIABETES

Health depends on economic status. So, income inequality highlights the prevalence of diseases (Gravelle and Sutton, 2009). The sociocultural constructs include spirituality, attitude, stigma, denial, self-identity and environmental challenges (Akbar, 2018). In Fiji, many studies have noted that sociocultural and economic factors contribute

to high rates of diabetes. Tukana (2013) identified culture, poverty, and political and socioeconomic status as indicators of diabetes in Fiji. Mataitini (2013) noted failure to take the disease seriously and prioritize it over other illnesses are among the contributing factors to the high diabetes-related limb amputation rates in Fiji. Snowdown and others (2013) indicated the role of nutrition in incidences of non-communicable diseases and Wate and others (2013) mentioned the prevalence of obesity among adolescents and how it was a predicament of non-communicable diseases. Waqa (2017) and Hendriks and others (2015) noted the perspectives of policymakers and policies around the nutrition-obesity nexus in Fiji.

4.1 Urbanization

In 2011 and 2012, most of the Governments of Pacific island countries and territories focused on reforms to promote economic growth by creating employment opportunities for young people, which encouraged urbanization and, in turn, had significant impacts on the ability of these countries to deal with associated health challenges, such as the burden of non-communicable diseases (WHO, 2016). Urbanization and the lack of Pacific peoples' involvement in physically demanding farming activities have led to a more sedentary lifestyle (Hawley and McGarvey, 2015). A steady transition from a community-style living to a more urban and westernized individualistic setup has contributed to the non-communicable diseases burden (Mataitini, 2013). More people are choosing to live in towns, use public or private transport, and find employment in sedentary jobs.

4.2 Influences of culture

Health practitioners often view a patient's culture as a barrier to care (Tripp-Reimer and others, 2001). Literature has shown that cultural factors among the *iTaukei* (Indigenous people in Fiji) have also contributed to the causes and complications of diabetes (Akbar, 2018). Hendriks, and others (2015) highlighted the *iTaukei* cultural context of fat, which means that policymakers must carefully frame obesity. Cultural and environmental factors associated with Fijian health-seeking behaviours have contributed to the high number of undiagnosed population and delayed consultations at a health-care facility, often resulting in amputations (Akbar, 2018). The *iTaukei* people are known for their profound share and care attitudes in which people often look out for another person's needs (Ravuvu, 1983; Meo-Sewabu, 2016). When receiving care, people are informe about the "cultural" causes of their diseases and "cultural" solutions (Tukana, 2013).

4.3 Poverty in economic status

Poverty in financial terms affects health significantly (Beatty and others, 2020; World Bank, 2015). Lack of financial means creates severe limitations for patients'

ability to manage diabetes due to the high costs associated with the disease (Tripp-Reimer and others, 2001). Poverty is rampant in Fiji, as 40 per cent of the population lives below the poverty line. Most families with a sole breadwinner who barely earns enough to sustain their family needs at the mandated minimum wage rate of 2.32 Fiji dollars (F$) (US$1.06) per hour are affected. The 2017 census recorded the lowest unemployment rate in Fiji in twenty years (Fiji, Bureau of Statistics, 2018). The gap widens between when considering those who can afford to pay for medical services and those who cannot, especially for expensive, unsubsidized services, such as renal dialysis (Phillips, 2020). The lack of resources further enhances poverty for individuals living with diabetes, affecting communities and countries (Gounder, 2020). In Fiji, despite the Government's initiative to free up taxation on imported fruits and vegetables, supermarket prices remain the same, making the affordability of such foods an issue (Bell and others, 2020).

Neoliberal discourses have been blamed on economically poor *iTaukei* people living with diabetes leading to their careless treatment choices and compliance with medications (Phillips, 2020). Economic barriers often lead to a late diagnosis of the disease progression when the patient is highly symptomatic, resulting in poor outcomes and more treatment costs (Hawley and McGarvey, 2015). Patients in Fiji in a lower economic status tend to disregard biomedical advice and undertake risky behaviours, which that approach is the cheaper ethnomedical care model (Phillips, 2020). Those with amputations have difficulty finding employment and are financially deprived (Gounder, 2020). Hendriks and others (2015) note the inability of the Ministry of Health and Medical Services to prohibit the sale of sweets in front of a school by a family whose income depends on selling sweets. The existence of poverty within an environment that needs to adopt healthier choices disregards all efforts to promote such changes. There is a need to integrate health priorities with economic priorities and enable the sharing of resources in Fiji (Hendriks and others, 2015).

4.4 Transport

Issues related to service availability and accessibility can become care system barriers when health-care systems fail to prioritize them (Tripp-Reimer and others, 2001). For primary health care to be effective, the delivery of it must be made accessible (Tukana, 2013). Travelling to a clinic for follow-up care has been an expensive alternative, forcing people further into the ethnomedical paradigm. People living with an amputation need special transportation to visit clinics and partake in other activities outside their communities. For example, bus stairs are very steep, making them inaccessible for people with a physical disability. The accessibility of government health-care services is vital in Fiji as people do not have many options (Phillips, 2020).

4.5 Social determinants

Culture, lifestyle and food have been identified as social determinants of ill health (Tripp-Reimer and others, 2001). Cultural factors have been noted to contribute to diabetes among Fijian people (Morgan (2015); Dearie and others, 2019). *iTaukei* functions are customarily associated with food (Ravuvu, 1983). Being "fat" is viewed positively in Fiji, as it connotes wealth, goodness, upright nurturing, and decent family character. Women in Fiji are notably more overweight than men (Hendriks and others, 2015), but the association of the cultural explanation of this issue to health has not been explained.

Globalized trade of cheaper, unhealthy food exposes socioeconomically deprived people to more risks (Hendriks and others, 2015; WHO, Western Pacific Regional Action Plan for Non-Communicable Diseases, 2009). Reducing the risks associated with unhealthy food consumption requires a multisectoral response (WHO, 2016). Fresh and healthy food have become unaffordable in Fiji, forcing people to consume unhealthy imported food associated with sedentary habits (Dearie and others, 2019). While politics play an essential role in determining food prices and control, the shift of the focus of the Ministry of Health and Medical Services has been on health promotion programmes aimed at changing people's lifestyles (Phillips, 2020).

4.6 Nutrition: the abnormal food environment

Many Pacific island countries and territories have experienced a rapid nutrition transition from subsistence crops to imported foods (Waqa and others, 2013). Unhealthy dietary intakes relate to sedentary lifestyle patterns and contribute to contracting diabetes and being affected by its complications (Hendrik and others, 2015). The built food environment makes health-care providers' work difficult in terms of dietary education (Torres and Atkinson, 2018). The disconnect appears around how patients find it challenging to navigate healthier food choices in the "built food environment". Patients find it challenging to follow health advice, and health professionals assume that patients do not care about their health. The disconnect damages patient trust in the system and causes burnout and indecisiveness among health professionals. Abnormal food environments have become commonplace among ordinary people and contribute to the hype in type 2 diabetes (Torres and Atkinson, 2018).

Traditional foods and indigenous fruits and vegetables are substituted by cheaper, imported, or processed foods that are calorie-dense (Hendriks and others, 2015). The high costs of fresh local foods have become a more potent driver of nutritionally poor food choices (Hawley and McGarvey, 2015). Most Fijians live by growing food only for their own needs and are not commercially orientated. More readily available food in the current built food environment in cafeteria outlets with high salt and

sugar content are unhealthy food options (Morgan, 2017). Even strong-willed people struggle to live in the current built food environment (Torres and Atkinson, 2018). In Fiji, supermarkets sell fresh fruits and vegetables at a high price, while it is difficult for people living with a lower limb disability to access vegetable markets due to lack of proper structural support, such as footpaths and wheelchair ramps.

4.7 Obesity

Overweight and obesity are significant public health issues globally, including among Pacific populations (Hendriks and others, 2015; Waqa and others, 2013). Obesity has been a globally recognized cause of diabetes and there is a global effort to halt the steady rise in diabetes and obesity and reduce premature mortality tied to non-communicable diseases by 2025 (Mialon and others, 2016; Santosa and others, 2015). Overweight and obesity are risk factors for many diseases, while hyperglycaemia and diabetes have direct clinical sequelae of cardiovascular disease and the long-standing kidney disease of chronic renal failure (Zibran and Mohammadnezhad, 2019). The lack of data in the Pacific islands has made it difficult to tackle diabetes and obesity appropriately.

Pacific islanders have been stricken by obesity and diabetes, with the prevalence of these diseases developing more rapidly in the Pacific subregion than in the rest of the world (Hawley and McGarvey, 2015). Hendriks and others (2015) found a heavily burdened age-related trend of obesity and overweight among Pacific islanders, which is more prevalent in females than males. In Fiji, the high prevalence of obesity among adolescents and the obesogenic dietary patterns are vital indicators for health promotion activities (Hendriks and others, 2015; Wate and others, 2013).

4.8 Lack of health-care specialists

Effective health-care systems depend on a sufficient supply of people to run them. The varying availability of health-care workers in Fiji contributes towards serious health system challenges (Wiseman and others, 2017). Staff shortages slow the progress of the efforts taken by the Ministry of Health and Medical Services to achieve the Sustainable Development Goals. The Ministry is facing pressure to become more efficient and boost resource allocations to the health-care system (WHO, 2017). Despite the provision of foot-care nurses' training (Hjorth and others, 2012), there are no specialized diabetes nurses, nor is formal podiatry education offered in Fiji (M. Leong, 2020). In Fiji, nursing institutions have not offered a specialized diabetes nurse education programme, while foot-care nurses perform podiatrist-related work (M. Leong, 2020). The country’s minimum nurse-patient ratio is below the doctors' ratio as per the WHO health worker density per population (Wiseman and others, 2017). This means that there is a shortage of nurses in Fiji.

4.9 Medication shortages

In Fiji, frequent shortages of medications occur, which has severe consequences (Raikabakaba and others, 2022; Walker and others, 2017), and force patients to purchase prescription medicines even though the health-care service arrangement is supposed to be free. Ravono (2021) has highlighted that the consistent shortages of oral medication supplies in Fiji has resulted in some patients being deprived of medications for long periods and succumbing to more disease complications.

4.10 Health messages

Health messages reinforce a particular discourse about risk and focus on being preventative and vigilant about health, saving lives (Hörnsten and others, 2008). The language of communication is an essential factor for effective facilitation of health messages to ensure patients' understanding. In Fiji, health messages are available in pamphlets and charts, which are mostly in English and provide information on disease complications. Health messages assume that biomedical, and pharmaceutical knowledge and technology are always available when in reality, patients experience the opposite (Phillips, 2020). Most of the health policies adopted in Fiji are based on those from countries with relatively older populations. These policies do not fit well with Fiji, which has a young population (Hendriks and others, 2015); accordingly, health messages must target young people.

4.11 Denial

Impaired illness awareness or denial diminishes one's capacity to become consciously aware of their illness. At the same time, it is a homeostatic psychological response to avoid confrontation with the disease's intolerable feelings (Kim and others, 2020). Denial is the typical reaction from people when they receive information that confirms the diagnosis. To deny that diabetes is a health problem, among other factors, leads to poor glycaemic control for people with T2DM (Khan and others, 2014). Even though the period varies among different individuals, the longer it takes for patients to accept their diagnosis delays treatment plans and raises the likelihood of encountering disease complications (V. Qio, personal communication, 5 September 2018). Denial or having reduced illness awareness of having T2DM is a common yet understudied construct that undesirably contributes towards clinical outcomes and further disease complications (Kim and others, 2020).

V. EFFECTS OF DIABETES

Diabetes and its immense effects on human health has been a topic of a lot of literature. In this section, some of the effects are explained in three forms: the health

and physiological effects; the sociocultural economic effects; and the clinical and infrastructural impacts.

5.1 Health and physiological effects

The long-term specific effects of diabetes include, among many other complications, neuropathy and retinopathy, (WHO, 2019). People living with diabetes are also at risk of other diseases and ailments, such as heart, peripheral arterial, and cerebrovascular disease, cataracts, erectile dysfunction and non-alcoholic fatty liver disease (Lal and others, 2022). They are also at increased risk of some infectious diseases, such as tuberculosis (WHO, 2019). The most common diabetic complications in Fiji are foot sepsis, which mostly is discovered in the newly diagnosed patients, blindness, cardiovascular diseases and end-stage renal disease (Lal and others, 2022). Research evidence shows a high prevalence of complications from diabetes among the *iTaukei* population compared to other ethnic groups living in Fiji (Mataitini, 2013).

Most foot ulcers result in amputations and are the main macrovascular complications associated with diabetes (Delea and others, 2015). Delayed consultations for an untreated wound at health-care facilities increases amputation risks for people living with diabetes. Poor glycaemic control leads to blindness and affects the cardiovascular system (Weledji, and Fokam, 2014). In Fiji, diabetes-related amputation rates remain high due to the delays in attaining medical interventions (Fiji, Ministry of Health and Medical Services, 2015). Amputations are linked with increased morbidity and mortality rates, and Fiji is recording the uppermost amputation rates in the Western Pacific Region (Morgan, 2015). Kumar and others (2014) mentioned that poor glycaemic control resulted in high amputation rates among *iTaukei* men in Fiji, a finding that was supported by Phillips (2020).

Diabetes also affects the kidneys, potentially leading to widespread kidney disease with high-cost implications. More effective intervention measures are key for diabetes management strategies (Morgan, 2015). The increasing prevalence of diabetes in Fiji has led to an increased number of people who need renal dialysis due to kidney disease (Morgan, 2015). Medical insurance is not affordable to everyone in Fiji, and renal dialysis costs approximately $250.00 per cycle – an amount beyond patients' means (Morgan, 2015). The Ministry of Health and Medical Services has signed an agreement with the National Kidney Foundation to pay for several free dialysis treatments before patients pay for their own (Snowdown and others, 2013).

At an advanced stage, diabetes comorbid with other diseases and is positively associated with an increased likelihood of retinopathy progression and poor outcomes. For example, in terms of eye care, the burden estimate is that 56,000 Fijian people will need to have annual screening for diabetic retinopathy. More than 22,000 people have diabetic retinopathy. Getting a screening for retinopathy and a referral to an

eye department in Fiji averages approximately seven years, due to, for example, lack of awareness or failure to take the disease symptoms seriously. This delay, in turn, contributes to worsened outcomes for people with diabetes (Damato and others, 2014). Presently, treatment options for patients with diabetic retinopathy are limited; however, laser treatment is free, and its success depends on patients' compliance. Patients who require further surgeries araie referred overseas, which is affordable for only a few people (Damato and others, 2014).

5.2 Sociocultural effects

Diabetes affects a person's sociocultural function in several way, including how they relate to the community and family life (Rintala and others, 2013). Living with diabetes means a change in a person's cultural orientation that pressures the cultural system due to emerging health needs and disrupted relationships. Among the *iTaukei* group in Fiji, being sick has negative affiliations, and healing warrants cultural protocols through *isoro*, (traditional apology) to make peace with one another (Tomilson and Bigitibau, 2016; Jones, 2015; Ryle, 2016). Family members provide the most support for the illness, emotions, and everyday living activities for those with long-term conditions (Rogers and others, 2016). Family support could affect disease management positively and negatively. It can significantly assist with treatment adherence and metabolic control. Alternatively, family interactions can deter commitment to self-management behaviours (Rintala and others, 2013). The latter occurs when family members who do not have diabetes become overprotective or unsupportive.

5.3 Economic effects

This section includes a discussion on the socioeconomic effects of diabetes, including sociocultural and economic disparities. Sufferers of non-communicable diseases in Fiji likely experience financial stress despite the free government-provided health services (Snowdown and others, 2013). Diabetes inflicts a hefty economic liability on the global health-care system and the broader global economy (Fernandes and others, 2016). Measured through direct medical expenses, indirect costs associated with productivity loss and premature mortality, the disease burden has negatively affected countries' gross domestic product (GDP) (WHO, 2016). An adverse impact is high when people living with diabetes and associated conditions cannot find employment. Diabetes-related disabilities and being unemployed decrease individuals' and their families' earning capacities, increasing dependency and marginalization, thereby lowering their quality of life, and exacerbating economic poverty and social isolation (Gounder, 2020). Specifically, diabetes-related amputations have far-reaching effects on patients, families and communities (Delea and others, 2015), and cause drastic impacts on patients' socioeconomic status through increased health bills and unemployment.

5.4 Clinical and infrastructural effects

The increasing prevalence of people with diabetes requires the redesigning of the health-care work environment and establishing changes to improve the structure. The changes will increase the number of health-care personnel to support the workforce needs of the Ministry of Health and Medical Services (Wiseman and others, 2013). As the nurses encounter high patient volumes, they are likely to have less time to attend to patients' needs, which leads to missed nursing care and worsened patient outcomes (Yu, and others, 2019; Hessels and others, 2019) and/or substandard nursing care (Leach and Tucker, 2018). In 2010, inpatient costs were approximately F$88.56 a day from the country's two leading divisional hospitals, Lautoka Hospital and Colonial War Memorial Hospital in Suva. Outpatient services cost the Ministry of Health an average of F$51.31 (Irava and others 2012). These inpatient costs are separate from other laboratory and radiology expenses (Irava and others, 2012). It is noteworthy to point out that factors influencing these costs have changed (which is an estimate). The costs can be matched against the increasing costs of services, such as increases in nurse's and doctors' salaries (Asante and others, 2017). Regarding diabetes, a patient's services also differ when a patient requiring amputation may require ward admission for a few weeks. Depending on the wound healing processes, a patient may require another amputation or discharge for follow-up at a nearby health-care facility.

VI. CONCLUSION

The authors of this study explored issues on diabetes, causative factors and its effects on people living with the disease. The statistics on diabetes in Fiji, which is classified as a non-communicable disease, highlight that diabetes is a lifestyle and chronic disease that filters through eleven sociocultural and economic indicators. In identifying the care enablers and care barriers, some of the many challenges and complexities that patients living with diabetes face include coping with daily living, particularly with how patients self-manage. Findings for *iTaukei* peoples indicate factors, such as poverty and rural-urban drift, contribute to the high number of people living with diabetes facing various health-linked complications. The Indigenous people living with diabetes in Fiji also encounter other similar challenges and complexities in managing their conditions compared to people in other developing countries in their communities.

ACKNOWLEDGEMENTS

The authors would like to express thanks to anonymous reviewers for their suggestions which considerably improved the paper. However, authors alone are responsible for any remaining shortcomings.

NOTES ON AUTHORS

Akisi Ravono is a qualified nurse and an associate professor at the University of Fiji. She has completed a PhD from Massey University New Zealand. Her research area is on nursing, indigenous health and diabetes issues in Fiji.

Jenny Carryer is a professor of nursing at Massey University. She holds a PhD from Massey University. The topics of her research, supervision, and publications are primary health services, long-term conditions, and the development of the nurse practitioner role. Her reports have been published in nursing, medical and health journals. She is heavily involved in health policy and professional consultative work at the national level in New Zealand.

Rochelle Stewart-Withers is a professor and Head of Programme for the Institute of Development Studies at Massey University. She is a convenor for the Massey University PhD Oral Exam, and her research is linked to Indigenous peoples with a focus on the Pacific region.

Tracie Mafile'o is the Associate Professor/Associate Dean - Pacific at Massey University. Her teaching and research include the advancement of Pacific-Indigenous cultural knowledge and ways within social work and social development regionally and internationally. Her areas of focus are cultural humility, anti-racist practices, indigenous practices, youth development and community development.

REFERENCES

Akbar, Heena (2018). Socio-cultural context of managing type 2 diabetes in Australian Pacific Islander women living in Queensland, PhD thesis, Queensland University of Technology, Brisbane, Australia. Available at https://eprints.qut.edu.au/119162/.

Asante, Augustine, and others (2017). Financing for universal health coverage in small island states: evidence from the Fiji Islands. *BMJ Global Health*, vol. 2, No. 2, e000200.

Beatty, Kate, and others (2020). Poverty and health in Tennessee. *Southern Medical Journal*, vol.113, pp. 1–7.

Bell, Colin, and others (2020). Fruit and vegetable import duty reduction in Fiji to prevent obesity and non-communicable diseases: a case study. *Public Health Nutrition*, vol. 23, No. 2, pp. 181–188.

Budreviciute, Aida (2020). Management and prevention strategies for non-communicable diseases (NCDs) and their risk factors. *Frontiers in Public Health*, vol. 8, p. 574111.

Chand, Shamal, Baljeet Singh, and Sanjesh Kumar (2020). The economic burden of non-communicable disease mortality in the South Pacific: Evidence from Fiji. *PloSone*, vol. 15, No. 7, e0236068.

Damato, Erika, and others (2014). Sight-threatening diabetic retinopathy at presentation to screening services in Fiji. *Ophthalmic epidemiology*, vol. 21, No. 5, pp. 318–326.

Dearie, Cathirine, and others (2019). A qualitative exploration of Fijian perceptions of diabetes: identifying opportunities for prevention and management. *International Journal of Environmental Research and Public Health*, vol. 16, No. 7, p. 1100.

De Ferranti, Sarah, and others (2019). Cardiovascular risk reduction in high-risk pediatric patients: a scientific statement from the American Heart Association. *Circulation*, vol. 139, No. 13, e603-e634.

de-Graft, Aikins, and others (2014). Chronic non-communicable diseases and the challenge of universal health coverage: insights from community-based cardiovascular disease research in urban poor communities in Accra, Ghana. *BMC Public Health*, vol. 14, No.2, pp. 1–9.

Delea, Sarah, and others (2015). Management of diabetic foot disease and amputation in the Irish health system: a qualitative study of patients' attitudes and experiences with health services. *BMC Health Services Research*, vol. 15, No. 1, pp. 1–10.

Egen, Olivia, and others (2017). Health and social conditions of the poorest versus wealthiest counties in the United States. *American Journal of Public Health*, vol. 107, No. 1, pp. 130–135.

Fernandes, Joao da Rocha, and others (2016). IDF Diabetes Atlas estimates of 2014 global health expenditures on diabetes. *Diabetes Research and Clinical Practice*, vol. 117, pp. 48–54.

Fiji, Bureau of Statistics (2018). Fijian Government – Fiji Bureau of Statistics Releases 2017 Census Results. Available at https://www.statsfiji.gov.fj/

Fiji, Ministry of Health and Medical Services. (2015). *Annual Report 2014*. Parliament of Fiji Paper No. 47.

_____(2019). Diabetes Cases Reported from Public Health Information System (PHIS). Ministry of Health. Health Information Unit.

_____(2020). Dietetics and nutrition. Available at www.health.gov.fj/dietetics-and-nutrition/

Francis, Hellen (2017). How do people with multiple long-term health conditions experience the self-management approach to health care? PhD thesis, Massey University, Palmerston North, New Zealand. Available at https://mro.massey.ac.nz/items/855da988-cf2e-4f11-be36-449eff4519e1.

Fuka, Falahola, and others (2020). Factors associated with macrosomia, hypoglycaemia and low Apgar score among Fijian women with gestational diabetes mellitus. *BMC Pregnancy and Childbirth*, vol. 20, No. 1, pp. 1–14.

Gounder, Farzana (2020). Suva residents' views on cancer, diabetes and HIV in the Fiji Times. *The Journal of Pacific Studies*, vol. 40, No. 1, pp. 81-101.

Gravelle, Hugh, and Matt Sutton (2009). Income, relative income, and self-reported health in Britain 1979–2000. *Health economics*, vol. 18, No. 2, pp. 125-145.

Haltbakk, Johannes (2019). Integrative review: patient safety among older people with diabetes in home care services. *Journal of Advanced Nursing*, vol. 17, No. 11, pp. 2449–2460.

Hawley, Nikola, and Stephen McGarvey (2015). Obesity and diabetes in Pacific islanders: the current burden and the need for urgent action. *Current Diabetes Reports*, vol. 15, No. 29, pp. 1–10,

Hendriks, Anne-Marie, and others (2015). Perspectives of Fijian policymakers on the obesity prevention policy landscape. *BioMed Research International*, No. 1.

Hessels, Amanda (2019). Impact of patient safety culture on missed nursing care and adverse patient events. *Journal of nursing care quality*, vol. 34, No. 4, pp. 287–294.

Hjorth, Katie, Gillian Shaw, and Shan Bergin (2012). Diabetic foot ulcers: a key focus area for the Fiji Health Service Improvement Program. *Wound Practice & Research: Journal of the Australian Wound Management Association*, vol.20, No. 4, pp. 206–208.

Hörnsten, Åsa, and others (2008). Improvements in HbA1c remain after 5 years–a follow up of an educational intervention focusing on patients' personal understandings of type 2 diabetes. *Diabetes Research and Clinical Practice*, vol. 81, No. 1, pp. 50–55.

Irava, Wayne, Martina Pellny, and Idrish Khan (2012). Costing Study of selected health facilities. Suva: Ministry of Health and Medical Services.

Jones, Edwin (2015). 'Mountains of Israel': Fijians' Judaic Origins and the use of the Old Testament in Highland Viti Levu. *Oceania*, vol. 85, No. 3, pp. 271–282.

Joseph-Williams, Natalie, Glynn Elwyn, and Adrian Edwards (2014). Knowledge is not power for patients: a systematic review and thematic synthesis of patient-reported barriers and facilitators to shared decision making. *Patient Education and Counseling*, vol. 94, No. 3, pp. 291–309.

Karamanou, Mariana (2016). Milestones in the history of diabetes mellitus: the main contributors. *World Journal of Diabetes*, vol. 7, No. 1, p. 1.

Katsarou, Anastasia (2017). Type 1 diabetes mellitus. *Nature Reviews Disease Primers*, vol. 3, No. 1, pp. 1–17.

Khan, Nazir, and others (2014). Current challenges to overcome in the management of type 2 diabetes mellitus and associated neurological disorders. *CNS & Neurological Disorders-Drug Targets (Formerly Current Drug Targets-CNS & Neurological Disorders)*, vol. 13, No. 8, pp. 1440–1457.

Kim, Julia, and others (2020). The diabetes awareness and insight scale. Diabetes & Metabolic Syndrome: *Clinical Research & Reviews*, vol. 15, No. 3, pp. 189–194.

Kontis, Vasilis, and others (2014). Contribution of six risk factors to achieving the 25×25 non-communicable disease mortality reduction target: a modelling study. *The Lancet*, vol. 384, No. 9941, pp. 427–437.

Kumar, Kishan, and others (2014). Descriptive analysis of diabetes-related amputations at the Colonial War Memorial Hospital, Fiji, 2010–2012. *Public Health Action*, vol 4, No. 3, pp. 155–158.

Lal, Anchal, and others (2022). Comparison of experiences and preferences following non-invasive cardiovascular risk procedures: a cross-sectional survey in participants with and without diabetes mellitus. *Journal of Diabetes & Metabolic Disorders*, vol. 12, No. 1, pp. 463–474.

Leach, Matthew, and Basil Tucker (2018). Current understandings of the research-practice gap in nursing: a mixed-methods study. *Collegian*, vol.25, No. 2, pp. 171–179.

Mataitini, Latileta (2013). Diabetes crisis in Fiji. *Australian Nursing Journal*, vol. 20, No. 7, p. 37.

Meo-Sewabu, Litea (2016). Na marama iTaukei kei na Vanua: culturally embedded agency of Indigenous Fijian women-opportunities and constraints. *New Zealand Sociology*, vol. 31, No. 2, pp. 96–122.

Mialon, Melissa, and others (2016). Analysis of the corporate political activity of major food industry actors in Fiji. *Globalization and Health*, vol. 12, No. 1, pp. 1–14.

Mills, Susan, and others (2017). Toward consensus on self-management support: the international chronic condition self-management support framework. *Health Promotion International*, vol. 32, No. 6, pp. 942–952.

Moini, Johangir, Matthew Adams and Anthony LoGalbo (2022). *Complications of Diabetes Mellitus: A Global Perspective*. Boca Raton, Florida: CRC Press.

Morgan, Heather, and others (2017). We need to talk about purpose: a critical interpretive synthesis of health and social care professionals' approaches to self-management support for people with long-term conditions. *Health Expectations*, vol. 20, No. 2, pp. 243–259.

Morgan, Jules (2015). Country in focus: turning the tide of diabetes in Fiji. *The Lancet: Diabetes and Endocrinology*, vol. 3, No. 1, pp. 15–16.

Osuagwu, Uechukwu, and others (2020). Adverse maternal outcomes of Fijian women with gestational diabetes mellitus and the associated risk factors. *Reproductive Sciences*, vol. 27, No 11, pp. 2029–2037.

Pablo, C., and others (2018). Socio-demographic determinants of poor glycaemic control among type 2 diabetes mellitus (T2DM) patients attending clinics at the three selected health facilities in Suva, Fiji in 2011-2016. *Journal of Diabetic Complications & Medicine*, vol. 3, No. 1.

Palaya, Joshua, Sue Pearson, and Tony Nash (2018). Perception of social support in individuals living with a diabetic foot: a qualitative study. *Diabetes Research and Clinical Practice*, vol. 146, pp. 67–277.

Phillips, Tarryn (2020). The everyday politics of risk: Managing diabetes in Fiji. *Medical Anthropology*, vol. 39, No. 8, pp. 735–750.

Piukala, Saia, and others (2016). Turning the tide on non-communicable diseases in the Pacific region. *The Lancet Global Health*, vol. 4, No. 12.e899–e900.

Raikabakaba, Asaeli (2022). Drug shortages and its effects on service delivery among key informants (KIs) in Fiji. *Global Journal of Health Science*, vol. 14, No. 5, p. 1.

Ravono, Akisi (2021). Nursing care for people living with diabetes and associated conditions in Fiji: an iTaukei community context. PhD thesis, Massey University, Palmerston North, New Zealand.

Ravuvu, Asesela (1983). Vaka i Taukei: The Fijian way of life. Institute of the Pacific Studies. University of the South Pacific.

Reed, Josh, Stephen Bain, and Venkateswarlu Kanamarlapudi (2021). A review of current trends with type 2 diabetes epidemiology, aetiology, pathogenesis, treatments and future perspectives. Diabetes, *Metabolic Syndrome and Obesity*, pp. 3567–3602.

Rintala, Tuula-Maria (2013). Interrelation between adult persons with diabetes and their family: A systematic review of the literature. *Journal of Family Nursing*, vol. 19, No. 1, pp. 3–28.

Rogers, Anne, and others (2016). Brief encounters: what do primary care professionals contribute to peoples' self-care support network for long-term conditions? A mixed methods study. *BMC Family Practice*, vol. 17, No. 1, pp. 1–9.

Ryle, Jacqueline (2016). My God, my land: interwoven paths of Christianity and tradition in Fiji. Routledge.

Saeedi, Pouva, and others (2019). Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: results from the International Diabetes Federation Diabetes Atlas. *Diabetes Research and Clinical Practice*, vol. 157, p. 107843.

Snowdon, Wendy, and others (2013). Non-communicable diseases and health system responses in Fiji. Working paper for Health policy & health finance knowledge hub. No. 34, August. Available at https://catalog.ihsn.org/citations/51881.

Santosa, Ailiana, and others (2015). Achieving a 25% reduction in premature non-communicable disease mortality: the Swedish population as a cohort study, *BMC Medicine for Global Health*, vol 13, pp. 65–73.

Torres, Braulio, and Elena, Atkinson (2018). Dear medicine: diabetes prevention is not your battle to fight. *Harvard Public Health Review*. Fall (15).

Tolley, Hilary (2016). Monitoring and accountability for the Pacific response to the non- communicable diseases crisis. *BMC Public Health*, vol. 16, No. 1, pp. 1–12.

Tomlinson, Matt and Bigitibau, Sekove (2016). Theologies of Mana and Sau in Fiji. In New Mana: Transformations of a Classic Concept in Pacific Languages and Cultures, Matt Tomlinson and T. P. K. Tengan, eds, Canberra: Australia National University Press.

Tripp-Reimer, Toni (2001). Cultural barriers to care: inverting the problem. *Diabetes Spectrum*, vol. 14, No 1, pp. 13–22.

Tukana, Isimeli (2013). The "new primary health care" in Fiji: its impact and implications on the practitioner in an indigenous setting – A case study. *Fiji Journal of Public Health*, vol. 2, No. 1, pp. 1-26.

Waqa, Gade, and others (2013). Knowledge brokering between researchers and policymakers in Fiji to develop policies to reduce obesity: a process evaluation. *Implementation Science*, vol. 8, No. 1, pp 74–85.

Walker, Josephine (2017). Medicine shortages in Fiji: a qualitative exploration of stakeholders' views. *PLoS One*, vol. 12, No. 6, e0178429.

Waqa, Gade (2017). Factors affecting evidence-use in food policy-making processes in health and agriculture in Fiji. *BMC Public Health*, vol. 17, pp.1–10.

Wate, Jilian, and others (2013). Adolescent dietary patterns in Fiji and their relationships with standardised body mass index. *International Journal of Behavioral Nutrition and Physical Activity*, vol. 10, No. 1, p. 45.

Weledji, Elroy, and Pius Fokam. (2014). Treatment of the diabetic foot–to amputate or not? *BMC Surgery*, vol. 14, pp. 1–6.

Wiseman, Virginia and others (2017). Measuring inequalities in the distribution of the Fiji Health Workforce. *International Journal for Equity in Health*, vol. 16, No. 1, pp. 1–8.

World Health Organization (WHO). Western Pacific Regional Action Plan for Non-Communicable Diseases (2009) *A Region Free of Avoidable NCD Deaths and Disability*.

_____(2016). *Global Report on Diabetes*. Geneva

_____(2017). WHO Country cooperation strategy 2018-2022: Pacific island countries and areas (No. WPRO/2017/DPM/027). World Health Organization. Regional Office for the Western Pacific. Available at https://iris.who.int/bitstream/handle/10665/259913/WPRO-2017-DPM-008-fji-eng.pdf?sequence=1.

_____(2019). *Classification of diabetes mellitus*. Geneva.

World Bank (2015). Country engagement note for the Republic of Fiji for the period 2015-2017. Washington, D. C.

Yu, Fiona, and others (2019). Personal and work-related factors associated with nurse resilience: a systematic review. *International Journal of Nursing Studies*, vol. 93, pp. 129–140.

Zibran, Mohammad, and Masoud Mohammadnezhad (2019). Management of type 2 diabetes and chronic kidney disease in Fiji in 2018: knowledge, attitude, and practice of patients. *Review of Diabetic Studies*, vol. 15, No. 1, pp. 26–34.