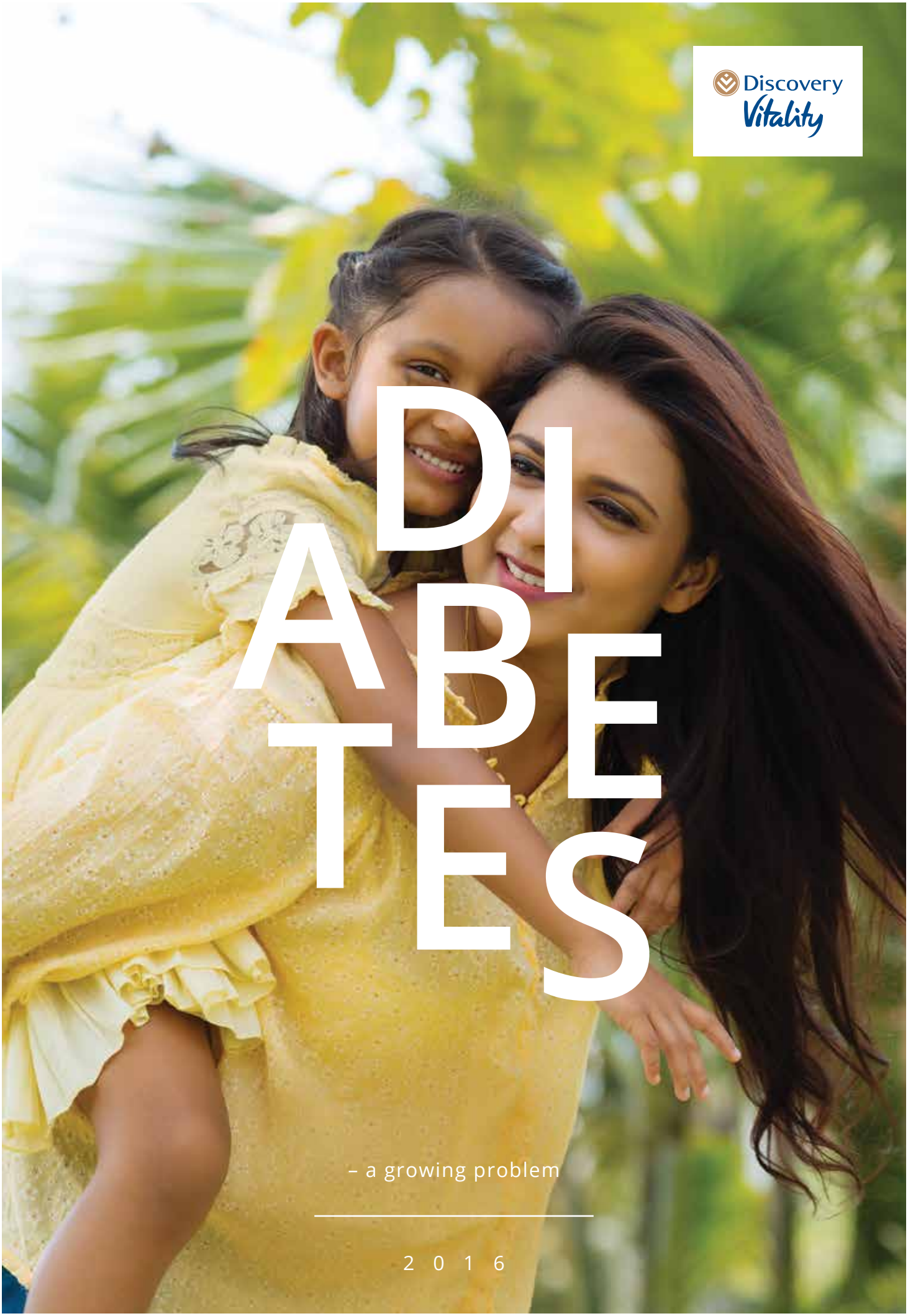
Discovery
Vitality
DIABETES
– a growing problem
2016

Diabetes – a growing problem

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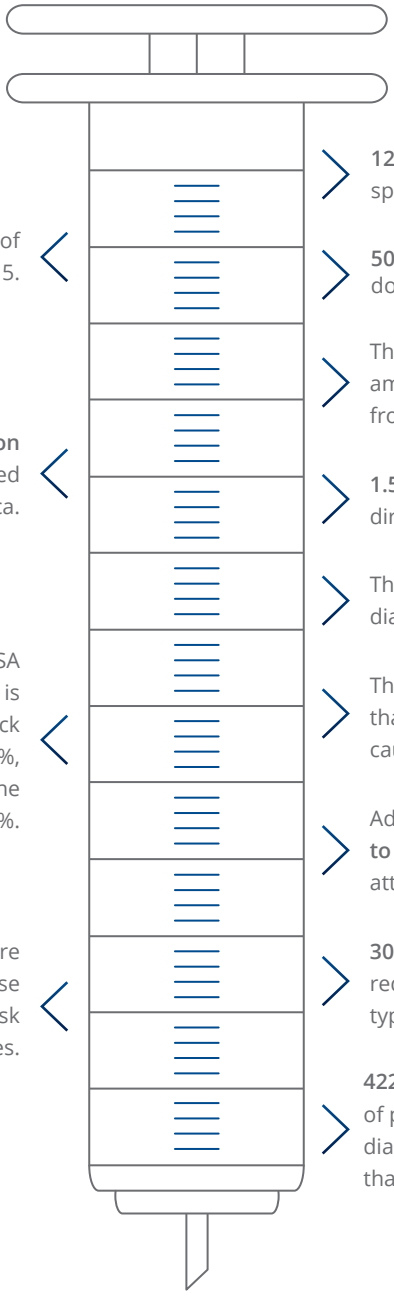
Diabetes dashboard



There were **2.28 million** cases of diabetes in South Africa in 2015.

There are an estimated **1.3 million** adults living with undiagnosed diabetes in South Africa.

Prevalence of diabetes in SA in Caucasian communities is around 4%. In the urbanised black population, it's double that at 8%, while it's highest amongst the Indian population at 13%.

1 in 2 South African adults are overweight or obese. Obese people have a **5 times** greater risk of developing diabetes.

12% of global health expenditure is spent on diabetes.

50% of people with type 2 diabetes don't know they have it.

The global prevalence of diabetes among adults over 18 years of age rose from **4.7%** in 1980 to **8.5%** in 2014.

1.5 million people died globally as a direct result of diabetes in 2012.

The number of people with type 2 diabetes is increasing in every country.

The World Health Organization predicts that diabetes will be the **7th** leading cause of death worldwide in 2030.

Adults with diabetes have a **2 to 3-fold** increased risk of heart attacks and strokes.

30 minutes of exercise a day can reduce your risk of developing type 2 diabetes by **40%**.

422 million is the estimated number of people worldwide who have diabetes, a number likely to more than double in the next **20 years.**

DIABETES BASICS

Learn how diabetes develops and more about the three main types of diabetes.

In a normal body, food is broken down into glucose, which provides energy. The hormone insulin, which is produced by the pancreas, enables the body to use glucose.

When the pancreas does not produce enough insulin or when the body is unable to respond normally to the insulin, glucose cannot get into the body's cells to use as energy.

Since your body can no longer use the glucose from your food as energy, it accumulates in your blood, causing blood glucose (blood sugar) levels to rise.

This leads to diabetes and serious health complications, such as heart disease, stroke, blindness, kidney failure, and nerve damage that can result in amputation.

Diabetes can be categorised in three ways.

Type 1 diabetes is genetic and occurs when the beta-cells (insulin-producing cells) of a person's pancreas are damaged. People with type 1 diabetes need insulin injections to control their blood sugar. Type 1 affects about 5% to 10% of the population with diabetes.

Type 2 diabetes is also genetic, but is often triggered by lifestyle factors, and so is preventable. In particular, if a person is inactive or overweight, the pancreas battles to produce enough insulin to control rising blood sugar levels. Most people with diabetes have type 2.

Gestational diabetes is when a high blood sugar level is first recognised during pregnancy. Usually, levels return to normal after the baby is born. Gestational diabetes can increase complications during labour and delivery. Women who have had gestational diabetes also have a higher risk of developing type 2 diabetes later in life.

SIGNS AND **SYMPTOMS**

Look out for these early symptoms:

- Extreme thirst
- Fatigue
- Blurry vision
- Excessive urination
- Recurrent infections
- Rapid weight loss

See your doctor immediately if you notice any of these signs.

Because the signs of diabetes are non-specific, many people live with the condition for years without knowing it. "It takes on average seven years for a person to be diagnosed with diabetes for the first time, worldwide. It's probably longer than that here in South Africa," says Professor Larry Distiller, founder and managing director of the Centre for Diabetes and Endocrinology in Johannesburg.

The result is that more than 30% of people with type 2 diabetes have already developed complications by the time they are diagnosed, he says.

Without urgent action, diabetes-related deaths will increase by more than 50% in the next 10 years. (There were 5 million deaths due to diabetes in 2015 according to the International Diabetes Federation).

GESTATIONAL DIABETES

Gestational diabetes is a condition in which pregnant women without previously diagnosed diabetes exhibit high blood glucose levels. It usually occurs during the second and third trimesters.

Gestational diabetes is caused by hormonal changes during pregnancy. Sometimes, the mother's body is not able to make and use all the insulin it needs for pregnancy. Without enough insulin, glucose cannot leave the blood to be changed to energy, so it builds up. The extra blood glucose enters through the placenta, transferring high blood glucose levels to the baby.

This causes the baby's pancreas to make extra insulin to get rid of the blood glucose. Since the baby is getting more energy than it needs to grow, the extra energy is stored as fat. This can lead to macrosomia, or a big baby. Babies with macrosomia face health risks – newborns may have very low blood glucose levels at birth and are also at higher risk for breathing problems.

In addition, babies with excess insulin often become children who are at risk for obesity, and then adults who are at risk for type 2 diabetes. Exclusive breast feeding from birth to 6 months can help prevent infants from becoming overweight or obese.

A diagnosis of gestational diabetes doesn't mean diabetes was present before conception, or that the condition will persist after the birth. It usually goes away after pregnancy. However, once a woman has had gestational diabetes, her chances are 2 in 3 that it will return in future pregnancies.

Untreated or poorly controlled gestational diabetes can be harmful to the baby. Following a doctor's advice regarding blood glucose levels while pregnant can help both mother and baby stay healthy.

How to treat gestational diabetes

Treatment includes special meal plans and scheduled physical activity. It may also include daily blood glucose testing and insulin injections.

Treatment helps lower the risk of caesarian section associated with the delivery of bigger babies. It also helps ensure a healthy pregnancy and birth, and may help the baby avoid poor health in the future.

While gestational diabetes is a cause for concern, by working with medical professionals, mothers-to-be can enjoy a healthy pregnancy and a healthy start to life for their baby.

Gestational diabetes – the future

In a few women, pregnancy uncovers type 1 or type 2 diabetes. These women will need to continue diabetes treatment after pregnancy.

Many women who have gestational diabetes go on to develop type 2 diabetes years later, but lifestyle changes can help prevent this. Regular exercise allows the body to use glucose without extra insulin. This helps combat insulin resistance.

Beside exercise, you can also lower risk by:

- Losing weight
- Eating a variety of nutritious foods, like fresh fruits and vegetables
- Limiting fat intake
- Watching portion sizes

DIABETES AND **CHILDREN**

Many South African adolescents – more than 30% of girls and nearly 10% of boys – are either overweight or obese, and primary school children show a similarly disturbing trend. While more children suffer from type 1 diabetes, growing obesity rates have dramatically increased the number of children diagnosed with type 2.

Type 1

The diagnosis of type 1 diabetes during childhood can at first be an alarming and overwhelming experience for a child and their caregivers. Simple things like going to a birthday party, playing sports, or staying overnight with friends need careful planning as every day, children with diabetes may need to take insulin. They also need to check their blood glucose several times during the day and remember to make correct food choices. For school-age children, these tasks can make them feel 'different' from their classmates.

Dealing with a chronic illness such as diabetes may cause emotional and behavioural challenges and managing the disease in children and adolescents is most effective when the entire family makes a team effort. Enlisting the help of qualified professionals, like a nurse educator and dietitian, may help a child or teen and their family adjust to the lifestyle changes needed to stay healthy.

With the help of a committed caregiver and experienced professionals, a child with diabetes type 1 can lead a happy and fulfilling life despite this condition.

Type 2

This condition is directly linked to sedentary behaviour and poor nutrition. On average, South African children and adolescents consume between 10 to 20 teaspoons of sugar a day, with sweetened cool drinks being a major contributor. Over two thirds of teens eat fast food at least thrice a week.

In addition, at least half of South African children are not active enough. In a survey of grades 1 to 12, the average South African child spends less than 20 minutes a day being active.

The recommended amount of physical activity for children with diabetes is 60 minutes every day. This includes vigorous-intensity aerobic activity and muscle-strengthening activities, as well as bone-strengthening activities on at least 3 of those days.

There is an urgent need to get children moving more and eating heathier through peer, parental and community support.

Keys to helping kids move more are:

- Choosing age-appropriate activities.
- Encouraging active play that is fun (cricket in the garden, swimming games, hula hoop). Kids won't do something they don't enjoy.
- Supportive parenting: turn up to watch kids play school sports, do a parkrun together or go hiking as a family.
- Half of South African children spend up to three hours a day watching TV, so limit their time for sedentary activities.

Educational and governmental interventions can also help.

DIABETES AND **CARDIOVASCULAR** DISEASE

People with diabetes are at high risk of cardiovascular disease and stroke.

People with diabetes are more likely to have high blood pressure, which is a major risk factor for cardiovascular disease. Diabetes can also affect the heart muscle, making it a less efficient pump. At least 68% of people age 65 or older with diabetes die from some form of heart disease, and 16% die of stroke.

Type 2 diabetics often have higher triglycerides (a type of fat), high levels of ('bad') cholesterol and lower levels of HDL ('good') cholesterol. High glucose levels affect the walls of the arteries, making it more likely for plaque to build on artery walls.

Women with diabetes are also more likely than men are to suffer heart failure.

Obesity is a major risk factor for cardiovascular disease and has been strongly associated with insulin resistance. Exercising and losing weight can prevent or delay the onset of type 2 diabetes, reduce blood pressure and help reduce the risk of heart attack and stroke. Any type of moderate or vigorous intensity, aerobic physical activity – whether sports, household work, gardening or work-related physical activity – can be similarly beneficial.

Diabetics can reduce their risk of heart disease or stroke by:

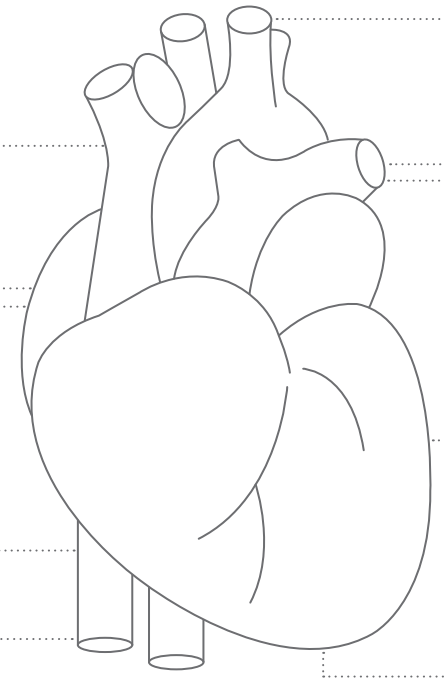
Taking medication (if necessary) to control blood sugar levels

Monitoring and checking blood glucose levels regularly

Eating a healthy, varied diet of small, regular meals (including fibre-rich starches, beans, pulses) and five portions of fruit and vegetables a day

Giving up smoking

Checking blood pressure regularly and keeping it below 140/90 mmHg



Limiting sugar, salt and alcohol intake

Being physically active for at least 30 minutes, at least 5 days a week

Checking and managing cholesterol levels:

aim for a total cholesterol under 5 mmol/l and an LDL cholesterol of less than 1.8 mmol/l

Maintaining a healthy weight with a BMI of less than 25 and a waist measurement of less than 80 cm for women and under 94 cm for men

Cutting down on total fat intake, especially saturated fats from animal products

TREATMENT

You may be diagnosed by your family doctor using recognised glucose tests and then referred to an endocrinologist.

An endocrinologist is a doctor who specialises in hormonal disorders. They treat people who have problems with endocrine glands, like the pancreas.

As your diabetes treatment is threefold – it consists of medicine, exercise, and a healthy eating plan – your healthcare team may also include:

- **A diabetes educator**: A healthcare professional who is certified to teach people with diabetes how to manage their condition.
- **A dietitian:** An expert in nutrition who helps people plan the type and amount of food to eat for special health needs.
- **A podiatrist:** A foot doctor who can tell if you have nerve damage in your feet, as you may not feel small wounds that need treatment. Poor blood flow can also slow healing.
- **An ophthalmologist:** An eye specialist, as diabetes can damage the blood vessels in the eyes, leading to serious problems like cataracts, glaucoma and retinopathy.

PREVENTION AND MANAGMENT

80% of type 2 diabetes can be avoided by following a healthy eating plan and exercising regularly.

There are three basic nutrition components that affect blood glucose levels:

1. **The timing of meals and snacks:** Three meals a day with snacks in between is the best way to keep blood glucose levels steady.
2. **The quantities consumed:** Portion sizes depend on a person's weight, activity levels, the type of medication used, gender, age and level of glycaemic control (blood sugar control). A dietitian can calculate a practical, nutritionally-balanced eating plan taking all of these factors into consideration.
3. **The types of foods and drink consumed:** High-fibre foods with a low Glycaemic Index (GI), such as whole grains, fresh fruit and vegetables should make up the bulk of the diet. A quarter of your plate should be filled with whole grains, a quarter with lean proteins and half with a variety of vegetables. At least five portions of fruit and vegetables are recommended daily.

Diabetics can also reduce their risk through regular exercise:

- Exercise is one of the three pillars of diabetes management, together with medication and a healthy diet.
- Regular exercise helps the body to lower blood glucose levels, improve insulin resistance and shed weight.
- Exercise also helps prevent foot ulcers, as physical movement improves blood flow to blood vessels that take oxygen and nutrition to muscles and tissue.
- For the best health benefits, at least 150 minutes a week of moderately intense physical activity is recommended, such as fast walking, lap swimming or cycling.
- Before starting an exercise plan, diabetics must

obtain their doctor's approval, especially if they have been inactive.

- Always consider the timing of exercise and how it impacts medication levels.
- To exercise safely, it's crucial for diabetics to track their blood sugar before, during and after physical activity. This is especially the case if you are taking insulin or medications that can cause low blood sugar (hypoglycaemia), as exercise draws on reserve sugar stored in the muscles and liver. As the body rebuilds these stores, it takes sugar from the blood.
- The more strenuous the workout, the longer blood sugar will be affected – even up to 4 to 8 hours after exercise.
- A slow-acting carbohydrate snack after a workout, such as nuts or trail mix, can help prevent a drop in blood sugar.
- Before exercising, the urine should also be tested for ketones – substances made when the body breaks down fat for energy. The presence of ketones indicates that the body doesn't have enough insulin to control blood sugar.
- Exercising with high levels of ketones may cause ketoacidosis, a serious complication of diabetes that needs immediate treatment.
- Exercise should only be continued once high blood sugar levels are corrected. Blood sugar must then be checked every 30 minutes, especially if the duration or intensity of the workout is increased.
- Exercise must be stopped if the blood sugar is 3.9 mmol/L (70 mg/dL) or lower.
- Eating or drinking something with 15 g to 20 g of fast-acting carbohydrate will raise blood sugar levels again.
- Blood sugar should be rechecked 15 minutes after the snack, and if still too low, another 15 g of carbohydrate should be eaten. This process must be repeated until the blood sugar reaches at least 70 mg/dL (3.9 mmol/L).

Exercise through the ages

Early years (Under-5s, not yet walking)

Physical activity should be encouraged from birth, through free play and water-based activities.

Pre-school (Under-5s, capable of walking)

180 minutes (3 hours) a day spread throughout the day is recommended.

Children and adolescents (5 to 18 years)

Do at least 60 minutes of moderate* to vigorous** -intensity exercise each day. Three days a week should include vigorous-intensity activities that strengthen muscle and bone.

Adults (19 to 64 years)

Do 150 minutes (2.5 hours) a week of moderate to vigorous-intensity physical activity. Include muscle-strengthening activity twice a week.

Older adults (65+)

As above for adults but post-65, additional health benefits include maintaining cognitive functions and reducing risk of falls.

Activity can be spread out through the day into bite-size chunks, such as 30 minutes, 5 days a week.

* Moderate-intensity activity raises the heart rate. Breathing becomes faster and temperature increases but talking easily is still possible.

** Vigorous-intensity activity raises the heart rate significantly and breathing becomes hard and fast. No more than a few words can be spoken without pausing for a breath.

How to become more active:

Choosing an activity you enjoy will encourage regular participation.	Make it social. Join your local parkrun [www.parkrun.co.za].	Set (realistic) goals. Variety is key.	Start slowly by making small changes to current activity levels.

DIABETES AND OBESITY

More South African adults now die from obesity than from poverty.

Being overweight is a major risk factor for developing type 2 diabetes. Being even slightly overweight increases diabetes risk by up to 5 times, according to research done by Harvard School of Public Health Professor Walter Willett, and being seriously obese increases it 60 times.

The World Health Organization offers the following definitions for adults:

- Overweight is a BMI greater than or equal to 25.
- Obesity is a BMI greater than or equal to 30.

Type 2 diabetes is growing rapidly among children and adolescents, so much that in some parts of the world, type 2 diabetes has become the main type of diabetes in children. The global rise of childhood obesity and physical inactivity is widely believed to play a crucial role. In Africa, the number of children who are overweight or obese has nearly doubled from 5.4 million in 1990 to 10.6 million in 2014.

Not all diabetes cases are linked to weight. Genetics also comes into play. People with diabetic family members are at higher risk. For them, even 2 or 3 extra kilograms can start a dangerous cycle leading to the disease.

In type 1 diabetes, the body directly attacks insulin-producing cells; in type 2, the body's tissues gradually become less sensitive to insulin. This causes beta-cells in the pancreas to work harder and eventually break down.

The fundamental cause of obesity and overweight is an energy imbalance between the calories consumed and calories spent. Globally, there has been:

- An increased intake of energy-dense foods that are high in fat.
- Increased consumption of soda and fruit juice. A 330 ml can of carbonated, sweetened soft drink contains approximately 40 g of sugar and the same size container of sweetened fruit juice close to 45 g of sugar.
- Decreased physical activity due to increasingly sedentary behaviour. The way we work, changing modes of transportation, urbanisation and urban planning all play a role.

Weight loss remains an important goal for type 2 diabetics. Studies show that losing just 7% of your body weight can increase insulin sensitivity by 57%.

Obese workers cost their employers 49% more in paid time off than their non-obese colleagues. Many workplaces are now introducing wellness programmes that encourage healthier living, such as more nutritious canteen menus, showers for those who run or cycle to work, in-house gyms, and team participation in fun runs and cycle races.

Not smoking, following a balanced diet, and maintaining a healthy weight (a body mass index of under 25) reduces the risk of diabetes by 90%. Moderate-intensity physical activity, such as walking 30 minutes a day, lowers the risk of type 2 diabetes by 30%.

OBESITY IS **PREVENTABLE**

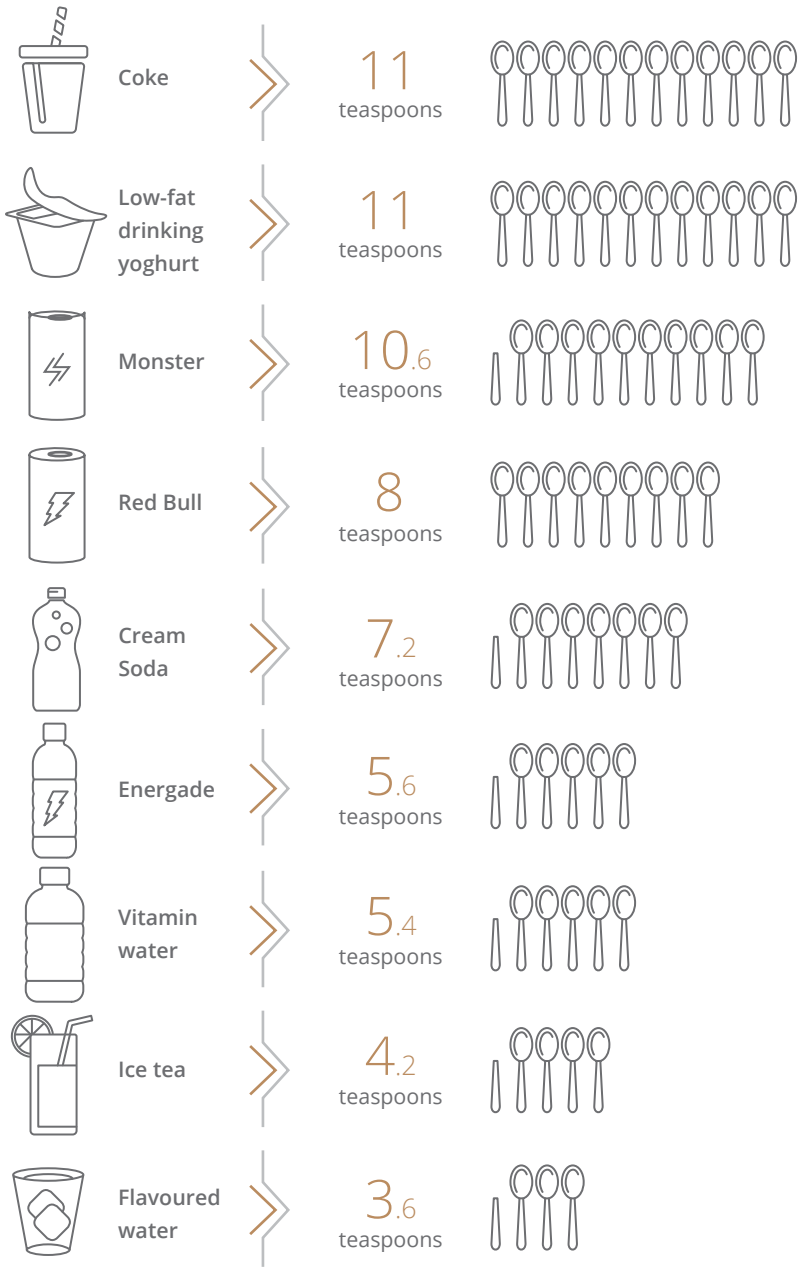
THE SUGAR TRAP

A review of research published in the journal Diabetes Care indicated that those who had one to two servings of soft drinks a day had 26% greater risk of developing type 2 diabetes than those who had no soft drinks or less than one a month.

Fizzy drinks are energy-dense (high in kilojoules) but low in nutrition, so it's easy to drink too many. "It's true that fruit is also high in sugar. However, whole, fresh fruit contains fibre. This generally makes you feel fuller before you can consume too much of it.

The same cannot be said for fruit juice, energy drinks and other sweetened drinks," says Dr Louise van den Berg of the department of nutrition and dietetics at the University of the Free State.

The amount of sugar in 1 bottle or can of:



DIABETES AND THE ECONOMY

Diabetes places a heavy burden on the economy. The accumulated losses to South Africa's gross domestic product between 2006 and 2015 from diabetes, stroke and coronary heart disease alone are estimated to have cost the country USD 1.88 billion.

There are several components to the cost implications of diabetes:

- The costs of organising and operating hospital services including accommodation, food, diagnostic tests and equipment, medicines, and the treatment of diabetes-related complications.
- Out-of-pocket expenses borne by the patients and their families, including health service provider consultation fees, medicines, tests and transport.
- Productive time lost due to morbidity (temporary disability and permanent disability). The morbidity-related component includes the productivity losses of time invested by patients (in outpatient department consultations, travel to and from hospitals, waiting for admission and during institutionalised treatment) and by relatives accompanying patients (during pre-admission consultations, accompanying patients to and from hospitals, waiting for patients to be admitted, and visiting patients after admission).
- Lost work-years due to premature death (i.e. retirement age minus age at death) times average remuneration per year.
- Welfare losses due to physical and psychological pain. Due to the stigma attached to chronic diseases, the related psychic and social costs to the affected families can be profound.
- Employers face additional costs in the form of high staff turnover and absenteeism.

In 2009, the average hospitalisation costs per patient with diabetes in SA were about R27 000 compared to R18 000 for non-diabetic patients. Health expenditure for diabetes in South African adults is projected to increase by approximately 50% between 2010 and 2030 – to between USD 1.1 to 2 billion.

In addition, the majority of diabetes deaths (about 76% in the sub-Saharan African region) occur in people younger than 60 years of age. This is the most economically active demographic segment of the population.

Preventing diabetes through lifestyle interventions, policy considerations, institutional co-operation and strategic planning, as well as improving access to affordable treatment, will considerably impact current economic losses.

DIABETES*CARE*

Diabetes*Care* is a programme that integrates Discovery Health's clinical tools and networks with Vitality's preventive screening and incentive structures. It is designed to achieve well-coordinated care for members with diabetes.

The programme also provides the information and motivation members need to manage their condition, and will be available in 2017. Managing diabetes well significantly reduces the risk of complications, while improving the health of members and prolonging their lives.

Key components of Diabetes*Care*

1. **Screening and detection**

   HbA1c testing for at-risk members significantly improves screening and the early detection of diabetes.

2. **Information and awareness**

   Members have access to real-time, clinically-verified information.

3. **Tailored pathways to support a healthy lifestyle**

   Members have access to Vitality Active Rewards, Vitality Weight Loss Rewards and the HealthyFood benefit.

4. **Care coordination and clinical decision support**

   Interactions with healthcare professionals are fully supported through HealthID, a digital platform that allows medical professionals to access their patients' Electronic Health Records quickly and easily.

5. **Adherence to medicine**

   Members are incentivised to collect and take their medicine on time.

Guiding members to effectively manage diabetes

Example case study: How Priya is rewarded for managing her health

Priya is a Discovery Vitality member on who goes for her yearly Vitality Health Check. Her Body Mass Index (BMI) is higher than the healthy range and her glucose registers at 11.1 mmol/L. The nurse does an HbA1c test, which results in the early detection of diabetes and referral to her doctor.

She joins Diabetes*Care*, which gives her access to clinically-verified information and coordinated care to help her manage her condition.

As a reward for taking care of herself, she earns 500 Vitality points for every GP visit and 100 Vitality points every time she collects her medicine.

In an effort to lose weight and get healthier, Priya also joins Vitality Weight Loss Rewards and starts buying HealthyFood. She gets 25% cash back on every HealthyFood item she buys at her preferred grocery partner, and earns Vitality points as she gets healthier.

Priya is managing her health well, and gets rewarded with up to 1 000 points every quarter, depending on her Diabetes Management Score.

After 12 weeks, she improves and lowers her BMI. She earns 2 700 Vitality points and, with Vitality Weight Loss Rewards, will enjoy 50% cash back for three months every time she buys HealthyFood.

GLOSSARY OF DIABETES TERMS

Autonomic neuropathy: Nerve damage to the part of the nervous system that we cannot consciously control. These nerves control our digestive system, blood vessels, urinary system, skin, and sex organs.

Basal rate: The amount of insulin needed to manage normal daily blood glucose fluctuations. Most people produce insulin continuously to manage normal glucose fluctuations during the day. In someone with diabetes, an insulin pump mimics this function.

Beta cell: A type of cell in an area of the pancreas called the islets of Langerhans. Beta cells make and release insulin, which helps control glucose levels in the blood.

Blood glucose monitoring or testing: A method of testing how much sugar is in your blood. You prick your finger with a lancet and put a drop of blood on a test strip. When you place the test strip into a glucose meter, your blood glucose level will be displayed on a screen. Blood sugar testing can also be done in a laboratory. Depending on your specific needs, glucose checks before meals, two hours after meals, at bedtime, in the middle of the night, and before and after exercise may be recommended.

Blood pressure: The measurement of the force of blood against the blood vessels. Blood pressure is written as two numbers: the top number (systolic) measures pressure when the heart beats and the bottom number (diastolic) refers to pressure in the arteries between beats. High blood pressure strains the heart, harms the arteries, and increases the risk of heart attack, stroke, and kidney problems. The ideal blood pressure for people with diabetes is 140/90 or less.

Coma: An emergency in which a person is not conscious; this can happen to people with diabetes when their blood sugar is too high or too low.

Diabetic ketoacidosis: A severe, life-threatening condition that results from hyperglycaemia (high blood sugar), dehydration and acid build-up. This needs emergency fluid and insulin treatment. Ketoacidosis happens when there is not enough insulin and cells become starved for sugars. Ketones become activated as an alternative source of energy. The system creates a build-up of acids. Ketoacidosis can lead to coma and even death.

Fasting plasma glucose test (FPG): This is the preferred method of screening for diabetes. The FPG measures a person's blood sugar level after fasting for at least 8 hours. A diagnosis of diabetes is made when the fasting blood glucose is over 7 mmol/l.

Glaucoma: An eye disease associated with increased pressure within the eye. Glaucoma can damage the optic nerve and cause impaired vision and blindness.

Glucagon: A hormone that raises the level of sugar in the blood by releasing stored glucose from the liver. Glucagon is sometimes injected when a person has lost consciousness from low blood sugar levels.

Glucometers: Portable machines used to measure blood glucose.

Glucose: A simple sugar found in the blood. It is the body's main source of energy.

Glycated haemoglobin test (HbA1c): This is an important blood test to determine how well you are managing your diabetes. Haemoglobin is a substance in red blood cells that carries oxygen to tissues. It can also attach to sugar in the blood, forming a substance called glycated haemoglobin or a Haemoglobin A1C. The test gives an average blood sugar measurement over an 8 to 12-week period. It is used along with home glucose monitoring to make treatment changes. The ideal range for people with diabetes is below 7%.

GLOSSARY OF DIABETES TERMS

Hyperglycaemia: High blood sugar. This condition is fairly common in people with diabetes. It occurs when the body does not have enough insulin or cannot use the insulin it has.

Hypoglycaemia: Low blood sugar. The condition also often occurs in people with diabetes. Most cases occur when there is too much insulin and not enough glucose in your body.

Insulin: A hormone produced by the pancreas that helps the body use sugar for energy. The beta cells of the pancreas make insulin.

Insulin pump: A small, computerised device – about the size of a small cell phone – that is worn on a belt or put in a pocket to help make insulin treatment more convenient. Insulin pumps have a small flexible tube with a fine needle on the end. The needle is placed under the skin of the abdomen and taped in place. A carefully measured, steady flow of insulin is released into the body.

Insulin resistance: When the effect of insulin on muscle, fat, and liver cells becomes less effective. This occurs with both insulin produced in the body and with insulin injections. Higher levels of insulin are then needed to lower the blood sugar.

Ketones: One of the products of fat-burning in the body. When there is not enough insulin, your body is unable to use sugar (glucose) for energy and your body breaks down its own fat and protein. When fat is used, acid ketones turn up in your urine and blood. A lot of ketones in your system can lead to the serious condition called ketoacidosis.

Kidney disease (nephropathy): Changes in the very small blood vessels in the kidneys cause scarring of the kidneys, which can eventually lead to kidney failure. People who have had diabetes for a long time may develop nephropathy. An early sign of nephropathy is when proteins can be detected in the urine.

Lancet: A fine, sharp needle for pricking the skin for blood sugar monitoring.

Neuropathy: Nerve damage. People who have had diabetes that is not well controlled may develop nerve damage.

Obesity: A term used to describe excess body fat. It is defined in terms of a person's weight to height ratio or body mass index (BMI). A BMI over 30 is classified as being obese. Obesity makes your body less sensitive to insulin's action. Extra body fat is a risk factor for diabetes.

Oral Glucose Tolerance Test (OGTT): A screening test for diabetes in which plasma glucose levels are measured after the patient consumes an oral glucose load.

Pancreas: An organ behind the lower part of the stomach that makes insulin so the body can use sugar for energy.

Periodontal disease: Damage to the gums and tissues around the teeth. People with diabetes are more likely to have periodontal disease.

Peripheral neuropathy: A result of damage to your peripheral nerves. This often causes weakness, numbness and pain, usually in your hands and feet.

Retina: The centre part of the back lining of the eye that senses light. Its many small blood vessels can be affected when a person has diabetes for a long time.

Retinopathy: A disease of the blood vessels in the retina.

USEFUL **CONTACTS**

The Centre for Diabetes and Endocrinology
www.cdcentre.co.za

Diabetes SA
www.diabetessa.co.za

Psychological Society of South Africa
www.psyssa.com

South African Depression and Anxiety Group (SADAG) **www.sadag.org**

The International Diabetes Federation (IDF)
www.idf.org

World Diabetes Foundation
www.worlddiabetesfoundation.org

Diabetes Care
www.diabetescare.net

American Diabetes Association
www.diabetes.org

Children with Diabetes (USA)
www.childrenwithdiabetes.com

SOURCES

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World Health Organization

Discovery Vitality Healthy Active Kids Report Card South Africa 2014

The Heart and Stroke Foundation South Africa

American Heart Association

Journal of the American Medical Association

American Diabetes Association

Mayo Clinic

South African Medical Journal

National Centre for Bio-Technology Information

US National Library of Medicine

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