

THE LANCET

Diabetes & Endocrinology

Supplementary appendix 2

This appendix formed part of the original submission. We post it as supplied by the authors.

Supplement to: Atun R, Justine I Davies JI, Gale EAM, et al. Diabetes in sub-Saharan Africa: from clinical care to health policy. *Lancet Diabetes Endocrinol* 2017; published online July 5. [http://dx.doi.org/10.1016/S2213-8587\(17\)30181-X](http://dx.doi.org/10.1016/S2213-8587(17)30181-X).

In Country Profile: Rwanda

The Context

Since the 1994 Genocide Against the Tutsi, which destroyed much of the country's health infrastructure, Rwanda has achieved remarkable, sustained progress in key health metrics, including decreases in maternal and under-5 mortality.¹ With a strengthened system and improved infectious disease management, Rwanda is now tackling the rising burden of non-communicable diseases (NCDs).²

Located in East Africa, Rwanda has the highest population density (434 people per km²) in mainland Africa, with 79% of its projected 11,533,446 population living in rural areas.^{3,4} As of 2014, Rwanda's GDP was US \$718 per capita, with 39.1% of Rwandans living below the national poverty line.⁴

Table 1

	2015 or nearest
Demographics	
Total population	11,533,446, projection, 2016 ^A
Life expectancy at birth	66.7, projection 2015 ^B
Total fertility rate (births per woman)	4.2, 2014–15 ^C
Age dependency ratio (% of working-age population)	79%, 2014 ^B
% Urban population	21%, 2015 ^D
Epidemiology	
HIV prevalence	3%, 2015 ^C
TB prevalence	2.9%, 2015 ^F
Malaria prevalence	2% in children 6–59 months, 0.6% among women aged 15–49 years ^C

High blood pressure prevalence	15,0% in total population, 40% among adults aged 55–64 years, 2015 ^C
Diabetes prevalence	Estimated 3% in adults aged 15–64, 2015 ^F
Economic	
GDP (current USD or constant 2005 US\$ billion)*	USD \$718, 2015 ^G
GDP Growth rate	8.0%, 2012 ^H
Poverty level (World Bank definition)	39%, 2013–14 ^B
Technology	
Mobile phone penetration	64%, 2013–14 ^I
Access to running water	84%, 2013–14 ^I
Human Development Index	0.483, 2014 ^J
Achievement of MDGs	All met ^H

See Appendix for References.

Rwanda's Health System

Rwanda's health system is comprised of public and private facilities, with the Ministry of Health (MOH), Rwanda Biomedical Center (RBC), and national referral hospitals at the public sector's central level (Appendix – Figure 1). Geographic equity lies at the forefront of the system's structure and national facility layout, allowing the population to reach the closest health center in an average of 56.5 min or less.^{3,5}

In 2004, the Rwandan Government introduced a public health insurance program, "Mutuelles de Sante." With a socioeconomic-determined premium, patients pay 10% for services at any point of care. To ensure that cost does not bar a person's right to healthcare, the Rwandan Government partners with NGOs to pay premiums and co-pays for the population's poorest quarter. Today, between Mutuelles and public and private coverage programs, more than 90% of the population is insured.⁶ However, Mutuelles must be strengthened to ensure future financial sustainability in light of decreasing external

international funding, rising costs associated with an ageing population, and insufficient involvement by the private sector.^{1,6}

Table 2

	2015 or nearest year
Financing	
Per-person health expenditure (present US\$)	\$39.10, 2010 ^K
Total Health Expenditure as % of GDP (%)	7.5%, 2009–10 ^L
Government General Health Expenditures as % of Total Health Expenditure (%)	18%, 2010 ^M
Out-of-pocket health expenditure (% of total)	45.4, 2014 ^N
Population coverage of health insurance	≥ 91.6% (81.6% covered by Mutuelle de Santé in 2015/2016. ^O At least 10% more covered by other types: RAMA, MMI, & private insurance) ^E
External financing (US\$)	\$287,000,000, 2014 ^P
Service Delivery	
Human resource density (doctors per 100,000 population)	9,95, 2015 ^Q
Human resource density (nurses per 100,000 population)	87,57, 2015 ^Q
Skilled-birth attendance* (% of total)	91%, 2015 ^Q
DPT coverage (% of children aged 12–23 months)	98%, 2014–15 ^C

See Appendix for References.

Diabetes Management

NCDs are woven into Rwanda's national development plans, represented in Vision 2020, the Health Sector Strategy III, and MOH's NCD strategic planning. Across facility levels, Rwanda is introducing a NCD clinical services package, as well as a NCD clinic model for district hospitals and health centers.^{2,7}

In order to use health professionals most effectively in the context of present shortages, NCDs management, including diabetes and its associated risk factors, is now integrated into the pre-service curriculum for all healthcare providers.^{7,8} This education aims to equip providers to accurately screen for diabetes, which creates stronger, sustainable continuity between diagnosis and chronic care management.²

Published in 2015, Rwanda's NCD Risk Factors Report documented the 2013 prevalence of diabetes-associated risk factors in the country, including highest levels for: unhealthy diet (consumption of <5 fruits/vegetables daily; 99.1% of the population), heavy alcohol consumption (23.5%), physical inactivity (21.4%) and use of tobacco (12.9%).⁹ In addition, 21% of women and 6% of men are overweight or obese (BMI \geq 25.0).¹

National health statistics collected through Rwanda's Health Management Information System (HMIS) vary, likely due to the program's nascent stage. Appendix Graphs 1-3 depict HMIS data showing current trends, which suggest an increase in diabetes service uptake.^{10,11} As the capacity of diagnostic techniques has improved in Rwanda, distinction between diabetes types in HMIS reporting has begun (Appendix Graph 3).

Beyond screening at health clinics through the NCD package, annual community level prevention campaigns and check-ups have also been implemented.² Hospital admissions due to diabetes have dramatically decreased, which may be associated with earlier diagnosis and treatment, better access to trained personnel, and decentralized services (Appendix, Graph 4).¹¹

Rwanda has recently improved its death reporting and autopsy system, which may account for the increase in diabetes as a classified cause of death (Appendix, Graph 5). However, to continue to decrease hospitalization and death rates, screening, early diagnosis, and service linkages are key.^{2,8} Such systematic provision of care is increasingly possible as equipment becomes readily available in all health facilities, from glucose meters to ophthalmoscopes, sphygmomanometers, and urine strips.

Vital diabetes medications have been added to Rwanda's List of Essential Medicines, allowing coverage by insurance and increased availability through NCD clinics at District Hospitals. Current available treatments include: oral hypoglycemic agents (glibenclamide, metformin) and insulin (regular, NPH/lente, and mix 70/30). As demand for services increases with awareness and screening, Rwanda will aim to strike a balance between the supply and demand of comprehensive care in order to ensure that the system sustainably provides efficient and effective support for patients.^{2,12}

As Rwandans gain access to services, the number of people living with this chronic illness and requiring follow-up will increase. This highlights the need for chronic disease management in the home setting, which improves quality of life by removing facility-based barriers.² A new layer of health professionals—Home Based Care Practitioners (HBCP)—will support NCDs, including diabetes, by providing community-based chronic disease management, allowing patients to remain at home and perform at their highest functional level throughout the course of their illness.

Rwanda's progress thus far could not have been possible without unified effort between public institutions and civil society. In collaboration with MOH and RBC, the Rwanda Diabetes Association contributes to advocacy for diabetes inclusion in policy, strategic planning, and treatment, while also offering financial and psychosocial patient assistance. As diabetes has been integrated into the public health system, local organizations and international support have also helped track and care for patients in the community, including children and youth with diabetes, whose numbers have risen over the last 10 years (Appendix Graph 1).¹⁰ Recently published clinical statuses and epidemiological work support these findings.¹¹

Although diabetes screening, diagnostic, and treatment programs continue to develop in Rwanda's strengthened, integrated system, much work remains.^{5, 2} Together with partners, Rwanda continues to look forward, aiming to develop a national, multisector diabetes program to improve care and the quality of life for patients.¹²

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We declare no competing interests.

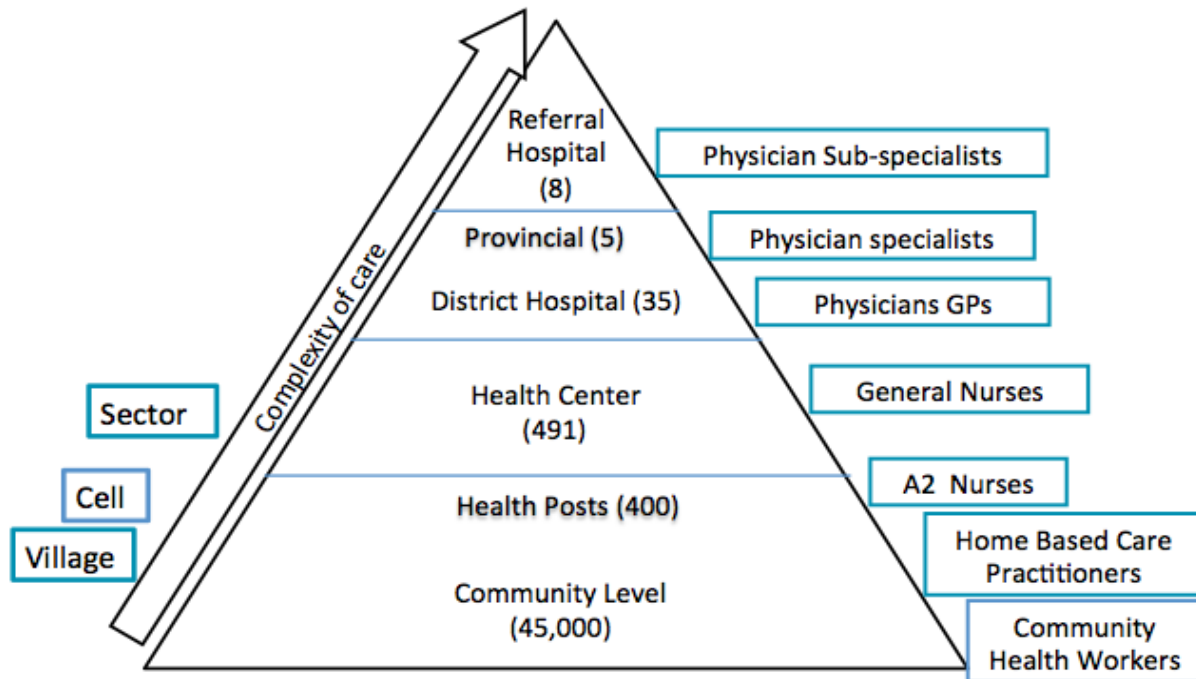
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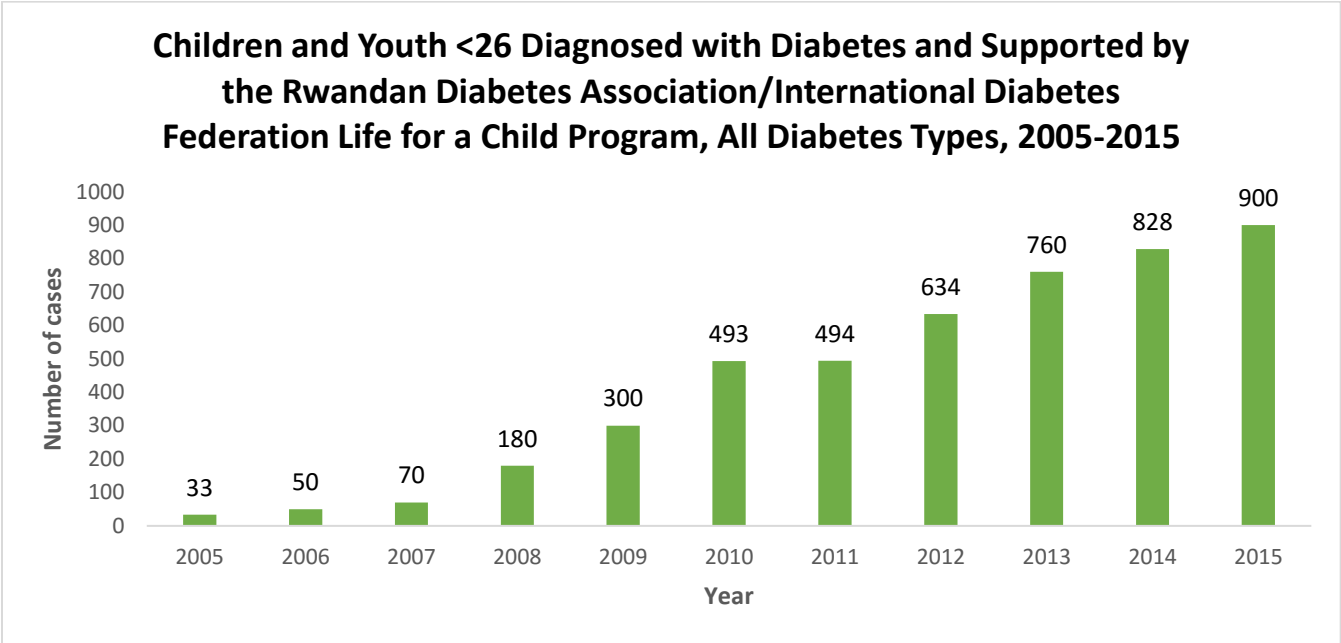
Appendix

Figure X: Rwanda's Health System



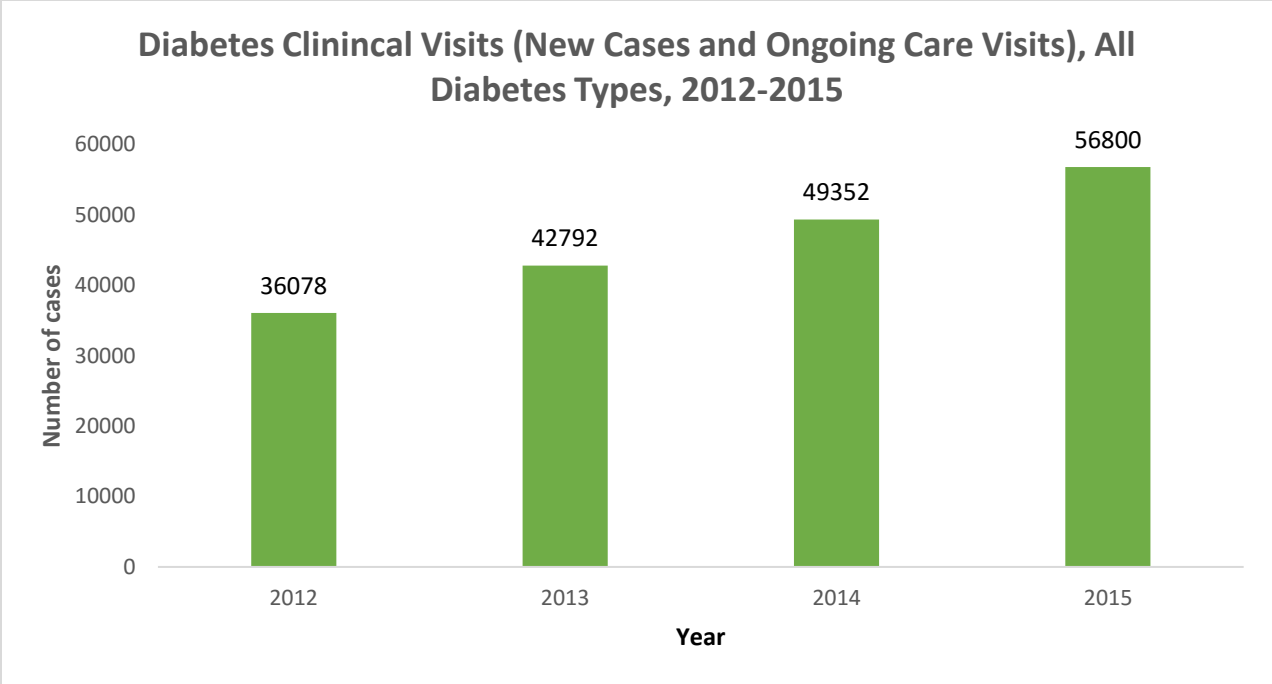
Source: Ministry of Health, Republic of Rwanda, 2016

Graph 1: Children and Youth <26 Diagnosed with Diabetes and Supported by the Rwandan Diabetes Association, All Types of Diabetes, 2005-2015



Source: Raw Data, Rwanda Diabetes Association/ International Diabetes Federation Life for Child Program, 2016

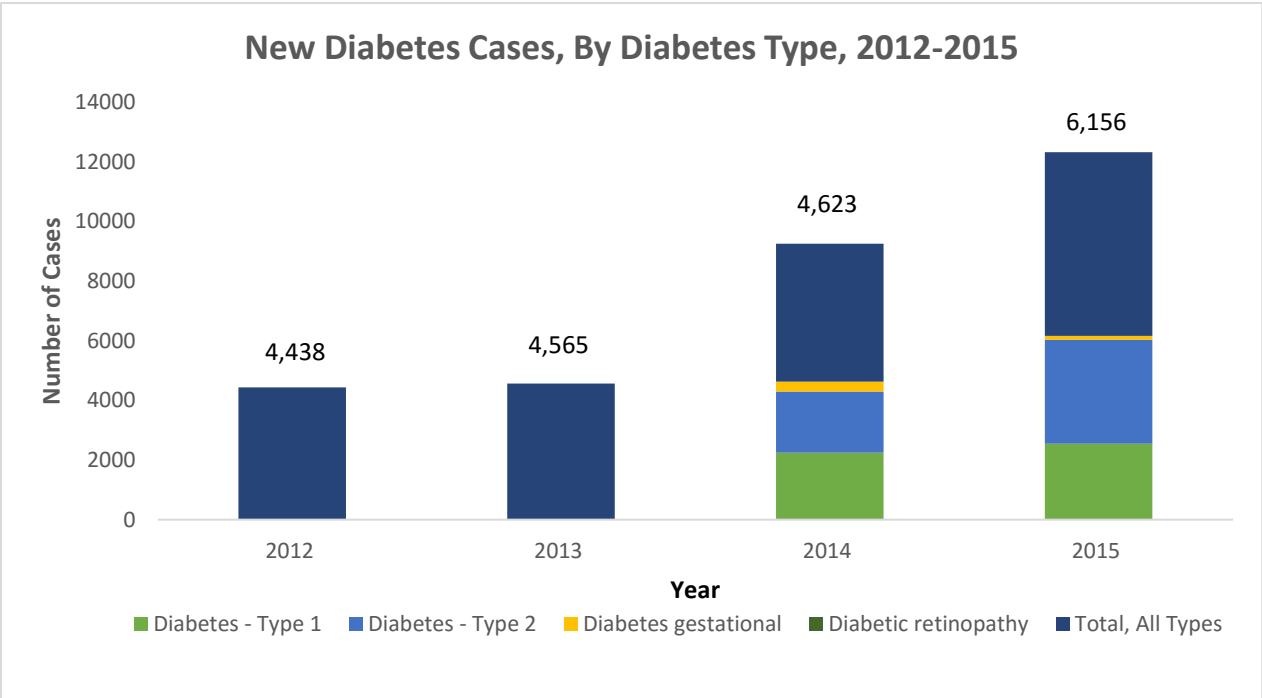
Graph 2: Diabetes Clinical Visits (New cases and Ongoing care visits), All Diabetes Types, 2012-2015



*Information not currently available across specific Diabetes types.

Source: Rwanda Ministry of Health, raw data

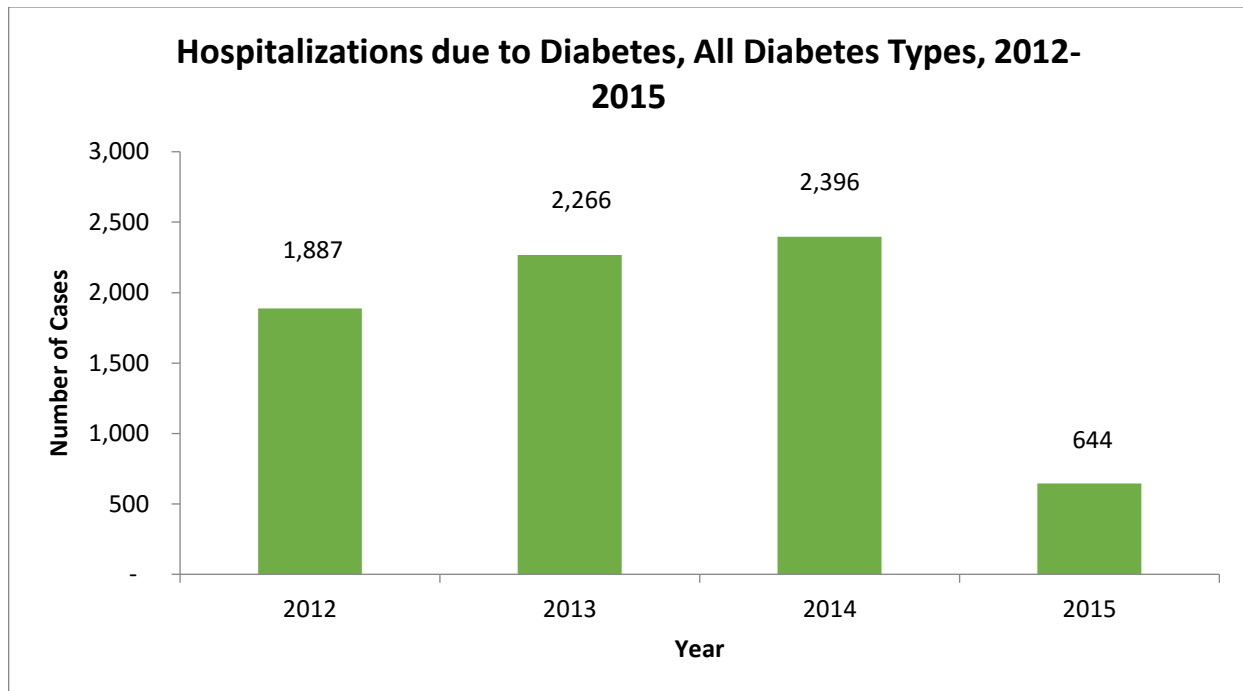
Graph 3: New Diabetes Cases, By Diabetes Type, 2012-2015



*Diabetes data by type was not available in 2012 and 2013.

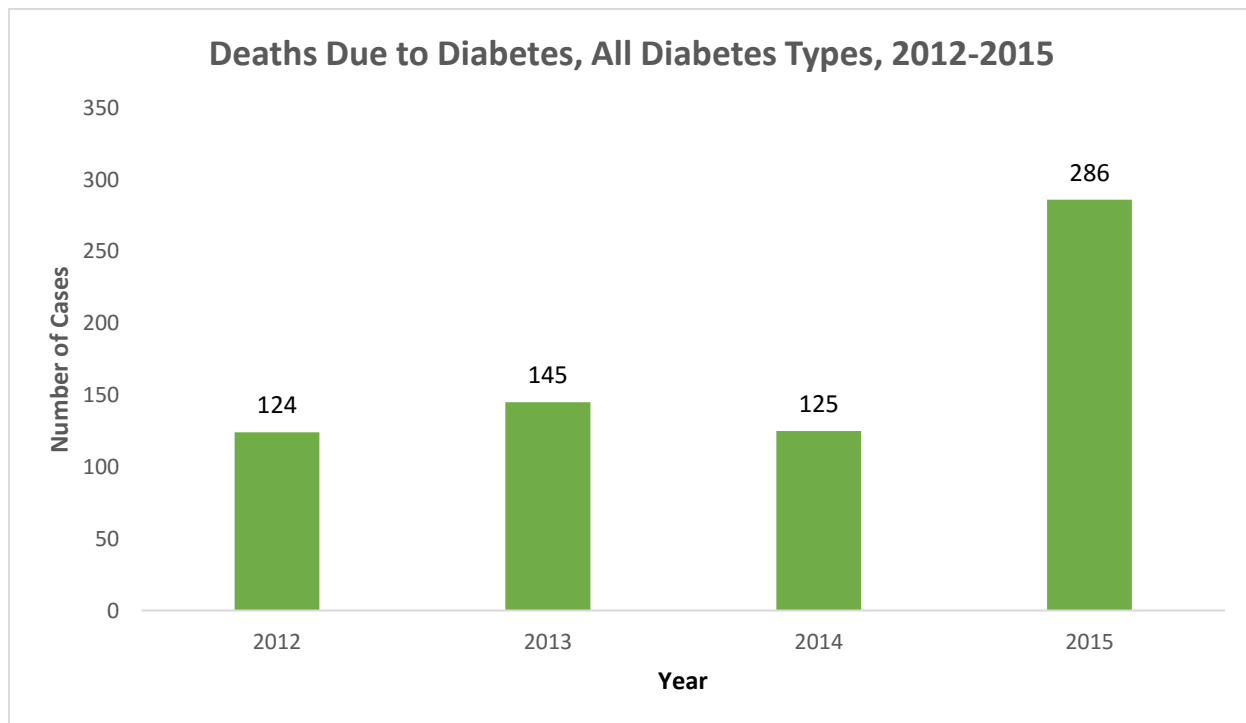
Source: Rwanda Ministry of Health, raw data

Graph 4: Hospitalizations due to Diabetes, All Diabetes Types, 2012-2015



* Information not currently available across specific Diabetes types.
Source: Rwanda Ministry of Health, raw data

Graph 5: Deaths Due to Diabetes, All Diabetes Types, 2012-2015



* Information not currently available across specific Diabetes types.
Source: Rwanda Ministry of Health, raw data

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