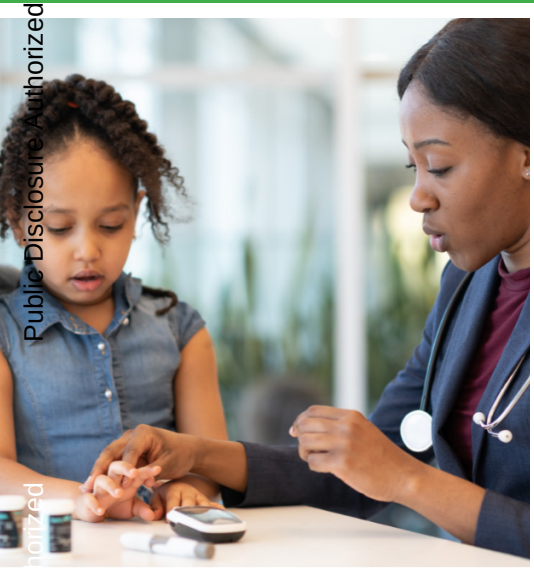
ASSESSING THE CARE CASCADE FOR DIABETES AND HYPERTENSION IN GRENADA

Mixed Methods Study Utilizing Qualitative and Quantitative Data from Health Professionals and Service Users



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Attribution – Please cite the work as follows: Khan, Alyssa; Hentschel, Elizabeth; Mussini, Micaela; Bonyadian, Behnaz; Shelton, Carolyn. 2023. Assessing the Care Cascade for Diabetes and Hypertension in Grenada. Washington DC: World Bank.

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Mixed Methods Study Utilizing Qualitative and Quantitative Data from Health Professionals and Service Users

MAY 2023

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Acknowledgements

This report was prepared under the guidance of Carolyn Shelton (Senior Health Specialist) and Behnaz Bonyadian (Operations Officer). The report was written by Alyssa Khan (Health Specialist Consultant), Elizabeth Hentschel (Data Analyst Consultant), and Micaela Mussini (Health Specialist Consultant). Data collection and initial data analysis were carried out by Dr. Emmanuel Keku, Dr. Abidemi Fasanmi, Dr. Prakash Ramdass, Ava McIntyre, Nikita Cudjoe, and Marva Primus-Joseph. The team is grateful for the peer review and guidance provided by Dr. Nicole Fraser-Hurt (Senior Monitoring and Evaluation Consultant) and Thulani Matsebula (Senior Economist, Health).

The team that created the report acknowledge with gratitude the leadership and technical support of the Ministry of Health, Wellness and Religious Affairs (MOHWRA), in particular, Permanent Secretary Ms. Desiree Stephen and Permanent Secretary Ms. Naomi Jeremiah, Dr. Shawn Charles, Chief Medical Officer, Ms. Camille St. Louis, Chief Planner, Ms. Carol Telesford-Charles, Chief Community Health Nurse, and Ms. Ann-Denise Ashton-Ramkhelawan, Health Information Officer. We would also like to thank the focus group and interview participants for their time and thoughtful inputs.

The study methodology draws extensively on the existing World Bank publication, *Improving Health Services and Redesigning Health Systems: Using Care Cascade Analytics to Identify Challenges and Solutions, Volume 1. Population-level Cascade Analytics*[1], and would not have been possible without the work of these previous authors. In particular, we would like to thank Dr. Nicole Fraser-Hurt for her helpful inputs and guidance on the study methodology and analyses.

Finally, we would like to gratefully acknowledge the Access Accelerated Trust Fund for the generous funding provided toward the Assessing the Care Cascade for Diabetes and Hypertension study and this Interim Study Report.

[1] *Fraser-Hurt, Nicole, Shubber, Zara, and Katherine Ward. 2022. Improving Health Services and Redesigning Health Systems : Using Care Cascade Analytics to Identify Challenges and Solutions, Volume 1. Population-level Cascade Analytics. Washington, DC: World Bank.* https://openknowledge.worldbank.org/handle/10986/36993

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LIST OF ABREVIATIONS

ABC	A1C, blood pressure, and cholesterol
DMO	District Medical Officer
EMR	Electronic Medical Records
FBG	Fasting Blood Glucose
FGD	Focus Group Discussion
FDC	Fixed-Dose Combination
GDP	Gross Domestic Product
KII	Key Informant Interview
IGT	Impaired Glucose Tolerance
MOHWEA	Ministry of Health, Wellness and Elderly Affairs of Saint Lucia
NCD	Noncommunicable Disease
NEML	National Essential Medicines List
NHI	National Health Insurance
POC	Point-of-Care
RBG	Random Blood Glucose

Executive Summary

According to World Health Organization (WHO) Noncommunicable Diseases Progress Monitor 2022, 83 percent of deaths in Grenada are from noncommunicable diseases (NCDs) and there is 23 percent probability of premature mortality from NCDs. Given these epidemiological challenges faced in Grenada, the World Bank in collaboration with the Ministry of Health, Wellness and Religious Affairs (MOHWRA), has conducted a study to analyze the care cascades for NCDs—specifically, type 2 diabetes and hypertension—in Grenada. The care cascade is a series of connected service delivery steps that cover a client's needs through four main points of care: screening, diagnosis, treatment initiation, and treatment maintenance. This report summarizes study findings and presents recommendations based on these findings, with the aim of informing improvements to country-level responses to NCD management in Grenada.

The methodology of the study is based on the care cascade analytical approach, as outlined by Fraser-Hurt and colleagues[2], which aims to systematically assess service delivery bottlenecks and barriers across the care continuum. The study utilized a mixed methods approach with the following components:

- Quantitative data extraction from medical records at ten health centers and medical stations.
- Five focus group discussions (FGDs) with the following: (i) doctors; (ii) nurses; and (iii) clients [with hypertension only; both hypertension and diabetes; and diabetes only].
- Two key informant interviews (KIIs) to obtain further insights from healthcare policy makers.

Quantitative data from the medical record review were used to build care cascade frameworks for type 2 diabetes and hypertension, while qualitative data were used to describe each stage in the care cascade and identify potential factors contributing to losses across the care continuum.

Quantitative analyses focused on the study sample and developed cascades following the patients in treatment who achieved disease control. Monitoring practices and time between visits for the study sample were also examined. Key quantitative findings for the study sample were the following:

- Disease control—Among those receiving treatment for only hypertension, 59 percent experienced hypertension control. Among those receiving treatment for type 2 diabetes (with test results in either of their last two visits), 55 percent experienced glucose control.
- Treatment patterns—Among all individuals being treated for only hypertension, 62 percent were receiving two or more hypertension drugs. Almost 90 percent of patients in treatment for type 2 diabetes were receiving pharmacological treatment (of which 14 percent was on insulin), while the remaining 12 percent of the study sample with diabetes received only lifestyle and diet advice
- Monitoring—Among those receiving treatment for only hypertension, 26 percent had their blood pressure measured in the last six months. Although almost everyone who has diabetes has had their fasting blood glucose (FBG) and/or random blood glucose (RBG) tested, only 7 percent had their A1c tested at any of the three patient visits recorded for the study.
- Time between visits—For the total quantitative study sample, approximately 50 percent of patients had less than six months between their last two visits, while the average time between the last two visits was 1.5 years. Individuals with hypertension control were more likely to have a shorter period between visits compared to those without control.

[2] *Fraser-Hurt, Nicole, Shubber, Zara, and Katherine Ward. 2022. Improving Health Services and Redesigning Health Systems : Using Care Cascade Analytics to Identify Challenges and Solutions, Volume 1. Population-level Cascade Analytics. Washington, DC: World Bank* https://openknowledge.worldbank.org/handle/10986/36993

Qualitative findings identified individual, programmatic, and system level strengths and weaknesses at each stage of the diabetes and hypertension care cascades. Key qualitative findings emerging from participants are as follows:

- Team approach—A team approach (consisting of a nurse, a physician, a social worker, and a dietician) is used to treat NCDs, with each team member having distinct roles.
- Quality of service—While professionals acknowledge using guidelines for the treatment of diabetes and hypertension, there is no standardized approach to service delivery for both conditions, which is likely a contributing factor to the large proportion of patients who have not achieved disease control. Doctors typically follow treatment guidelines based on where they receive their training. Clinical practices for diagnosing hypertension and diabetes appear to differ to some extent from commonly used guidelines in the region.
- Treatment adherence—Nonadherence to prescribed medicines was described to be linked to side effects (particularly, erectile dysfunction and decreased libido), high costs of medicine, stockouts, preference for traditional remedies, patient complacency, and insufficient patient education. Insufficient patient responsibility for routine follow-ups was also highlighted.
- NCDs prevention—There are ongoing prevention activities by medical professionals in the community, but they are limited and can be strengthened. A need for targeted prevention activities for youth were emphasized.

The results of this study are important to the continued improvement of NCDs management in Grenada. The following table outlines key recommendations based on the quantitative and qualitative study findings, as well as a review of literature on international standards, best practices, and evidence-based programs.

Summary of Recommendations

1. Improve the quality of NCD services through the adoption/development of standardized clinical guidelines, decision-support tools, recall mechanisms, and a patient-centered approach.

1.1 Formally adopt standardized national guidelines for the treatment of NCDs, train health professionals on standardized guidelines, and establish routine mechanisms to assess adherence to guidelines.

1.2 Implement standardized decision-support tools (such as algorithms, clinical pathways, flowsheets, or standard hospital order sets) to remind healthcare professionals of the steps to be followed in different clinical situations.

1.3 Establish a standard process for ensuring follow-up of patients (that is, phone call, text message, email, or home visit).

1.4 Create an enabling environment (including the setting of relevant quality standards, training plans for healthcare professionals, and aligned regulatory and financial systems) for the delivery of person - or patient - centered care in primary care.

2. Strengthen the national health information system to increase the availability of reliable information for clinical management of NCDs, disease surveillance, and evidence-informed policy development.

2.1 Establish a minimum dataset of NCD-related indicators that is routinely collected, analyzed, and disseminated at the national level to monitor and evaluate progress.

2.2 Assess and address challenges with the digital health information system (HIS) that impede full-scale adoption and routine use in the clinical care of NCDs.

2.3 Collect data at the national level on NCD risk factors at least every five years to inform targeted prevention efforts.

3. Strengthen the availability and timely access to NCD-related services, including testing and specialty services.

3.1 Increase availability and access to affordable diagnostic testing, including point-of-care (POC) testing (especially HbA1c testing), at the lower-level facilities.

3.2 Establish and regularly update a health workforce registry to ensure the availability of an adequate number of health professionals, including specialists for NCD-related complications to provide service coverage based on current and projected population health needs.

3.3 Strengthen equipment maintenance and management protocols and procedures to improve equipment functionality and accuracy of results.

4. Ensure consistent availability of safe and affordable medications and supplies for NCD care.

4.1 Strengthen supply chain management to reduce stockouts of medicines and POC diagnostic tests and other laboratory supplies and to improve quality control of medicines and supplies.

4.2 Review and update the national essential medicines list (NEML) at least every two years.

5. Building upon the existing National Chronic Non-Communicable Disease Policy and Multisectoral Plan for Grenada (2013–17), develop a medium-term work plan specifically focused on NCD prevention activities (including primary and secondary prevention strategies, such as reducing modifiable risk factors and implementing screening programs).

5.1 Adopt primary prevention strategies aimed at reducing tobacco use, harmful alcohol use, unhealthy diets, and physical inactivity.

5.2 Establish national screening programs for NCDs.

1. Background

Grenada is a small island developing state located in the Eastern Caribbean. It is classified as an upper middle-income country[4] and is a member of the economic union of the Organisation of Eastern Caribbean States (OECS). From 2000 to 2021, the total population of Grenada increased by approximately 16 percent from 107,432 inhabitants to 124,610 inhabitants.[5] Over the same period, life expectancy at birth increased from 72.8 years to 74.9 years.[6] Current health expenditure as a percentage of gross domestic product (GDP) was 4.97 percent in 2019,[7] while out-of-pocket expenditure as a percentage of current health expenditure was 54.42 percent in the same year.[8] The government finances health through general taxation,[9] but the country has been exploring a national health insurance (NHI) program and a NHI Secretariat was established along with human resource arrangements in 2019.[10] Appendix 5 provides a table of selected health indicators in Grenada and three other OECS countries in comparison to the region.

The Ministry of Health, Wellness and Religious Affairs (MOHWRA) is responsible for spearheading the health service delivery and policy formulation and regulations, including services and policies related to noncommunicable diseases (NCDs). The National Health Sector Strategic Plan (2016–25) was adopted in 2015 to serve as a guide on all interventions related to the national health system in Grenada.[11] The Plan refers to the draft National Chronic Non-Communicable Disease Policy and Multisectoral Plan for Grenada (2013–17) that outlines strategies specifically for the prevention and control of NCDs. A cabinet-appointed Grenada National Commission on Non-Communicable Diseases (which has representatives from government, private sector, and civil society) was established in 2010 to play an advisory role, especially related to policy recommendations for NCDs and NCD risk factors.

Within the public sector, there are five hospitals, six health centers, and 30 medical stations across six health districts.[12] Each health district is managed by a District Medical Officer and has one health center. Health centers provide more specialized services than medical stations, such as pediatrics, dentistry, and psychiatry.[13] Medical staff conduct monthly chronic disease clinics at health centers and medical stations. The five hospitals include three district hospitals (providing secondary care), one psychiatric hospital (Mt. Gay Hospital), and one main referral hospital (St. George's General Hospital). Private healthcare also plays a large role in Grenada, consisting of more than 30 private physician practices, three hospitals, three laboratories, and 33 pharmacies. Citizens may receive drugs at public pharmacies at subsidized prices, but private pharmacies play a large role in the supply of medicines. According to the PAHO Health in the Americas+ (2017) report, the OECS through its Pharmaceutical Procurement Service facilitates the procurement of pharmaceutical products at lower prices with better quality assurance for Grenada.

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[3] United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States. n.d. "List of SIDs."
[4] World Bank. 2023. "Grenada." World Bank Data.
[5] Health in the Americas+ PAHO. 2022. "Grenada Country Profile."
[6] United Nations Department of Economic and Social Affairs, Population Division. 2022. "Revision of World Population Prospects. Life expectancy at birth - Grenada." Data Portal.
[7] World Bank. 2022. "Current health expenditure (% of GDP) - Grenada." World Bank Data.
[8] World Bank. 2022. "Out-of-pocket expenditure (% of current health expenditure) – Grenada." World Bank Data.
[9] WHO. 2018. "WHO country cooperation strategy at a glance: Grenada."
[10] United Nations Office for South-South Cooperation. 2019. *IBSA Fund Annual Report- Grenada.*
[11] Ministry of Health and Social Security, Government of Grenada. 2016. *Grenada Strategic Plan for Health 2016-2015*.
[12] Grenada NHIP Secretariat. *IBSA Concept Note for the National Health Insurance Project for Grenada.*
[13] Hatt, Laurel, Altman, Danielle, Chankova, Slavea, Narcisse, Carol, Peña, Donna-Lisa, Riley, Pamela, Tuchman, Jordan, Williamson, Taylor, and Andrew Won. 2012. *Grenada Health Systems and Private Sector Assessment 2011*. USAID.

The national health information system has been undergoing upgrades in recent years, with the introduction of electronic systems and new structures that aim to improve the accuracy, completeness, and timeliness of data collection. The Epidemiology Information Unit within the MOHWRA monitors national data collection instruments and processes and collects data mainly from health centers, medical stations, hospitals, the Registrar General Department, the private health sector, and the Central Statistical Office. In May 2017, the District Health Information System (DHIS-2) was introduced in Grenada.[14] Oslo University developed the DHIS-2, which is designed to strengthen disease surveillance by identifying, reporting, and mapping disease trends. During the initial introduction in 2017, a team of healthcare providers and managers was trained on using the system, which was installed in health centers across the island. Currently, utilization of the health information system varies among health centers. For NCD surveillance, a paper-based general registry for adults is used to capture information about NCDs in each health center, but the registry includes limited variables (see example of form in use in Appendix 1).

The National Health Sector Strategic Plan (2016-2025) identified NCDs as the leading cause of morbidity and mortality in Grenada and the most common reason for admission to the General Hospital. According to World Health Organization (WHO) Noncommunicable Diseases Progress Monitor 2022,[15] 83 percent of deaths in Grenada are from NCDs and there is a 23 percent probability of premature mortality from NCDs. In the WHO Country Diabetes Profile 2016, the total prevalence of diabetes in Grenada was estimated to be 9.8 percent, while NCD risk factors (obesity and physical inactivity) were estimated to be at a prevalence of 24.6 percent and 30.2 percent, respectively.[16] Given the heavy burden of NCDs in Grenada, improving NCD care remains a critical priority and this study, therefore, aims to generate insights to inform targeted improvements along the NCD care cascade. While data on the burden of specific NCDs in Grenada are limited, the WHO 2018 country profile for Grenada estimated that diabetes and cardiovascular diseases were among the top three NCDs responsible for all deaths. Given the estimated high mortality associated with these diseases, as well as the high burden of related risk factors, this study focused on type 2 diabetes and hypertension.

[14] German Federal Ministry for Economic Cooperation and Development. March 2021. “Improving Grenada’s health information and disease surveillance system.” Healthy Developments.
[15] WHO. 2022. “Noncommunicable diseases progress monitor 2022.”
[16] WHO. May 2016. “Diabetes Grenada 2016 country profile.”

2. Methodology

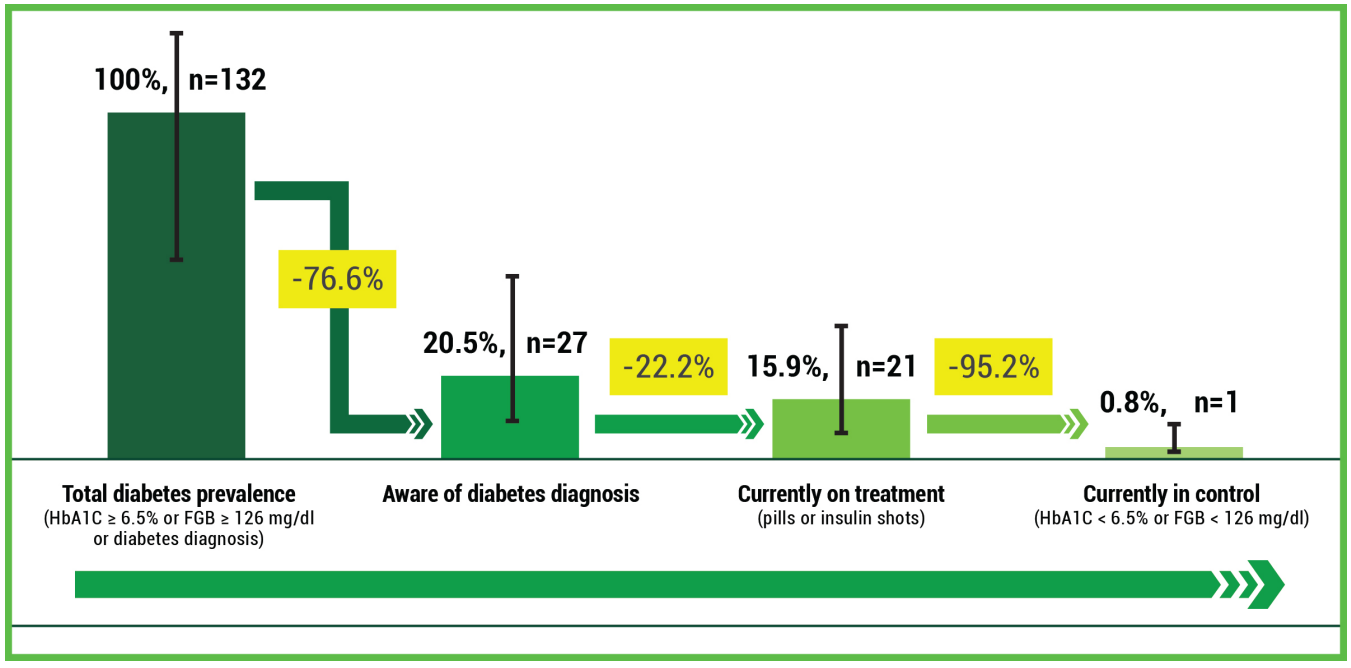
2.1 Study Design

The study design was based on the care cascade analytical approach, as outlined by Fraser-Hurt and colleagues.[17] A mixed methods study design was utilized with the following components:

1. Quantitative data extraction from medical records at 10 health centers and medical stations.
2. Five focus group discussions (FGDs) with the following: (i) doctors; (ii) nurses and (iii) clients [with hypertension only; both hypertension and diabetes; and diabetes only].
3. Two key informant interviews (KIIs) to explore specific issues from FGDs and obtain further insights from healthcare policy makers and providers.

Quantitative data from component 1 were used to build care cascade frameworks for type 2 diabetes and hypertension. Figure 1 presents an example of a care cascade framework for diabetes. Qualitative data collected from both patients and health professionals through components 2 and 3 were used to describe service delivery at each stage in the care cascade, propose explanations for individuals "lost" across each stage of care, and inform potential solutions to minimize the losses across the care continuum.

Figure 1. Example of a Care Cascade Framework for Diabetes (Adapted from *Cascades of diabetes and hypertension care in Samoa: Identifying gaps in the diagnosis, treatment, and control continuum – a cross-sectional study)* [18]



[17] Fraser-Hurt, Nicole, Shubber, Zara, and Katherine Ward. *2022. Improving Health Services and Redesigning Health Systems : Using Care Cascade Analytics to Identify Challenges and Solutions, Volume 1. Population-level Cascade Analytics.* Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/36993

[18] LaMonica, L, McGarvey, S., Rivara, A., Sweetman, C., Naseri, T., Reupena, M, Kadiamada, H., Kocher, E., Rojas-Carroll, A., DeLany, J. and N. Hawley. 2022. "Cascades of diabetes and hypertension care in Samoa: Identifying gaps in the diagnosis, treatment, and control continuum – a cross-sectional study." *The Lancet Regional Health - Western Pacific,* Volume 18, 100313, ISSN 2666-6065, https://doi.org/10.1016/j.lanwpc.2021.100313.

2.2 Quantitative Study Component

For the quantitative study component, a cross-sectional study among adults (20 years and older) with diagnoses of type 2 diabetes and/or hypertension was carried out at 10 randomly selected public health centers and medical stations (see Appendix 2 for list of facilities), between the period of August 2022 and November 2022. Health facilities were stratified according to parish to ensure inclusion of all seven parishes in Grenada, and then 10 facilities were randomly selected using Excel random number generation. Quantitative data were obtained by two research assistants from the electronic medical records and from patients' files stored in the cabinets reserved for the files of patients in chronic disease clinics. The target sample sizes were 300 patients with hypertension and 300 patients with type 2 diabetes. Appendix 3 contains the list of variables used in data extraction. No personally identifiable information was extracted. Research assistants entered the data into a password-protected Excel sheet, which was secured on a password-protected SGU One Drive account of the Principal Investigator and/or Co-investigator.

Descriptive statistics were generated for four categories of patients: (1) total sample; (2) hypertension only; (3) diabetes and hypertension; and (4) diabetes only. The variables that were analyzed included gender, age, health center region, and disease control. In addition, disease control was compared to no disease control for gender, age, and health center region. Care cascades were analyzed for two categories of patients: (1) those with hypertension only; and (2) those with diabetes (with and without hypertension). Ideally, those with diabetes only would also be analyzed, but because of a small sample size (n=69), all patients with diabetes were included.

For both categories of care cascade analyses, data were only available for persons who were in treatment, given that data were extracted from the medical records of patients who had already been enrolled in chronic disease clinics. As a result, the cascades presented in Section 3 only focus on those currently in treatment and those who were in treatment and achieved disease control (that is, the last two stages of the example cascade shown in Figure 1). While estimates of the national burden of diabetes and hypertension are available through different global publications, the data were insufficient to extrapolate statistics from the study sample to the general population so the burden stage could not be included in the cascade analyses. Notably, data were available at the national level on the number of persons who were screened at public health facilities, but there was insufficient available information to allow this data to be extrapolated to the population level or interpolated to the sample level, so the screening stage also could not be included in the cascade analyses. Additionally, the sample of individuals in treatment was not comparable to that of all persons with positive screens.

The hypertension care cascades that were developed include information on the type of treatment and hypertension control. The diabetes care cascades that were developed include information on the type of treatment, glucose control, glycemic control, ABC control (A1C, blood pressure, and cholesterol), and all four complication screens. Patients were classified as on "pharmacological treatment," if their medical record indicated that they were prescribed or already using an oral hypoglycemic or insulin.

For all care cascade analyses, control was defined using the cut-offs shown in Table 1 and based on the most recent measurement available. In the collected data, three dates were included (date of first measurement, date of penultimate measurement, and date of final measurement), but there was a high level of data missing at each date. For example, in terms of diabetes treatment, although 280 individuals had data collected on the level of pharmacological treatment, only 19 individuals had HbA1C data, and only 11 individuals had cholesterol data, at any time period.

Table 1. Definitions for Glucose, Glycemic, Hypertension, and ABC Control

TYPE OF CONTROL	DEFINITION
Glucose Control	FPG 79.2-129.6 mg/dL or RPG<199.8 mg/dL[19]
Long-term Glucose (glycemic) Control	HbA1C<7%
ABC Control	HbA1C<7% and BP<140/90 and cholesterol<200 mg/dL
Hypertension Control	SBP <140 and/or DBP <90 mmHg[20]

All analyses were performed with IBM Corp or Stata V17 (released 2021), IBM SPSS Statistics for Windows (Version 28.0. Armonk, NY: IBM Corp). Charts were created with Microsoft Corporation, (2018) Microsoft Excel.

2.3 Qualitative Study Component

For the qualitative study component, two key informant interviews (KIIs) were conducted with health policy makers and five focus group discussions (FGDs) were conducted with healthcare professionals and patients with type 2 diabetes and hypertension. The eligibility criteria for FGD participants are shown in Table 2.

Table 2. Eligibility Criteria for FGD Participants

CRITERIA FOR PATIENTS	CRITERIA FOR HEALTHCARE PROFESSIONALS
• Between ages 20 to 79. • Have a diabetes or hypertension diagnosis previously made by a health professional. • Previous or current use of public health services for treatment.	• Doctor or nurse who has been working in their field and in the public health system for at least three years.

Purposive sampling was used for participant selection. Participants were recruited at health facilities and via flyers. Prior to participating in FGDs or KIIs, each participant was required to sign an informed consent form, which included information on the study, the focus group/interview, and potential risks and benefits of their participation. Key Informant Interviews (KIIs) and focus group discussions (FGD) were conducted via Zoom for 45 to 60 minutes. FGD participants were assigned identification codes and asked to not self-identify by their names during the discussions. Audio recordings from all sessions were stored in an encrypted form on the SGU One Drive. Each FGD and KII recording was assigned a unique code for identification and analysis. Each recording was transcribed using software and then verified by research assistants. Participants' names are not included in the transcripts, analysis, or reporting.

Each transcript was analyzed based on selected deductive codes and inductive codes. The selected deductive codes were related to the care cascade framework (that is, prevention screening, diagnosis, treatment, and long-term management). The inductive codes were identified based on emerging themes and common issues raised by participants and identified in the transcript (such as governance, accessibility of services, barriers to obtaining medications, stigma, patient-centered care, and patient readiness for treatment). All transcribed data were stored on a password protected SGU One Drive account of the Principal Investigator and/or Co-investigator. The final analysis of all interviews was conducted using Dedoose 9.0.62. web-based application.

2.4 Ethical Approval

Institutional Review Board approval for the study was obtained from St. George's University (IRB #22034) Grenada. In addition, the MOHWRA granted permission to conduct the study.

[19] Badiu C. 2019. "Evidence-based Endocrinology." Acta Endocrinol (Buchar). 15(4):549. doi:10.4183/aeb.2019.549
[20] Based on the European Society of Cardiology/European Society of Hypertension (ESC/ESH) guidelines for definitions and cutoffs.

3. Results

3.1 Quantitative Study Component

The results from the quantitative study component include a description of the study sample, followed by the hypertension treatment cascades (overall and stratified by gender), and then the diabetes treatment cascades (overall and stratified by gender). Combined hypertension and diabetes treatment cascades are then presented for comparison. Finally, examinations of the time between the last and penultimate visit (comparing those who achieve disease control to those who do not achieve control) for patients with hypertension and diabetes are presented.

STUDY SAMPLE

The study sample consisted of a total of 607 patients: the sample size for the hypertension cascade was 291 (47.9 percent) patients and the sample size for the diabetes care cascade was 316 (52.1 percent) patients. Table 3 summarizes the descriptive statistics for the total sample, patients with hypertension only, patients with both diabetes and hypertension, and patients with diabetes only.

For the total sample, there were 428 (70.5 percent) females and 179 (29.5 percent) males in the total sample. Age ranged from 25–104 years. Of the 12 age categories, the majority of patients were in the 65–69 years age category (18.1 percent), followed by the 70–74 years age category (14.4 percent). The mean age of the total sample was 64.5 years, with a standard deviation of 13.7 years. Most patients were from Grand Bras (19.3 percent), followed by patients from Woburn (14.0 percent). A total of 106 (18.3 percent) patients achieved disease control.

Table3. Characteristics of Study Participants

STUDY VARIABLES	TOTAL SAMPLE	HYPERTENSION ONLY	DIABETES*	DIABETES ONLY
Sample size (n, %)	607 (100)	291 (47.9)	316 (52.1)	94
Gender (n, %)				
Male	179 (29.5)	95 (32.6)	84 (26.6)	29 (30.9)
Female	428 (70.5)	196 (67.4)	232 (73.4)	65 (69.1)
Age (min-max)	25-104	25-93	30-104	30-94
Age (n, %)				
25-29	2 (0.3)	2 (0.7)	0 (0.0)	0 (0.0)
30-34	13 (2.2)	6 (2.1)	7 (2.2)	5 (5.3)
35-39	15 (2.5)	10 (3.5)	5 (1.6)	2 (2.1)
40-44	30 (5.0)	16 (5.6)	14 (4.4)	8 (8.5)
45-49	21 (3.5)	11 (3.8)	10 (3.2)	4 (4.3)
50-54	52 (8.6)	27 (9.4)	25 (7.9)	11 (11.7)
55-59	62 (10.3)	27 (9.4)	35 (11.1)	12 (12.8)
60-64	85 (14.1)	43 (14.9)	42 (13.3)	14 (14.9)
65-69	109 (18.1)	58 (20.1)	51 (16.2)	9 (9.6)
70-74	87 (14.4)	39 (13.5)	48 (15.2)	11 (11.7)
75-79	49 (8.1)	11 (3.8)	38 (12.1)	10 (10.6)
≥80	78 (12.9)	38 (13.2)	40 (12.7)	8 (8.5)

STUDY VARIABLES	TOTAL SAMPLE	HYPERTENSION ONLY	DIABETES*	DIABETES ONLY
Age (mean + SD)	64.5 + 13.7	63.3 + 14.0	65.5 + 13.4	61.1 + 14.7
Health Center (n, %)				
Crochu	33 (5.4)	19 (6.5)	14 (4.4)	4 (4.3)
Grand Anse	83 (13.7)	27 (9.3)	56 (17.7)	13 (13.8)
Grand Bras	117 (19.3)	45 (15.5)	72 (22.8)	13 (13.8)
Grand Roy	45 (7.4)	23 (7.9)	22 (7.0)	4 (4.3)
Carriacou	30 (4.9)	9 (3.1)	21 (6.6)	7 (7.4)
Sauteurs	59 (9.7)	45 (15.5)	14 (4.4)	2 (2.1)
St. George	50 (8.2)	8 (2.7)	42 (13.3)	32 (34.0)
Victoria	33 (5.4)	29 (10.0)	4 (1.3)	2 (2.1)
Westerhall	72 (11.9)	41 (14.1)	31 (9.8)	8 (8.5)
Woburn	85 (14.0)	45 (15.5)	40 (12.7)	9 (9.6)
Diabetes Medication				
Metformin				
Yes	208 (66.5)		207 (66.8)	51 (54.8)
No	105 (33.5)		103 (33.2)	42 (45.2)
Sulfonylureas				
Gliclazide	78 (25.1)		78 (25.4)	21 (22.8)
Glyburide	25 (8.0)		25 (8.2)	6 (6.5)
Glibenclamide	12 (3.9)		12 (3.9)	4 (4.4)
Chlorpropamide	1 (0.3)		1 (0.3)	1 (1.1)
No	195 (62.7)		191 (62.2)	60 (65.2)
Insulin (Novolin)				
Yes	79 (25.4)		79 (25.7)	22 (23.9)
No	232 (74.6)		228 (74.3)	70 (76.1))
Hypertension Medication				
ACEI/ ARB				
Lisinopril	255 (49.7)	145 (49.8)	110 (49.5)	
Enalapril	4 (0.7)	2 (0.7)	2 (0.9)	
Losartan	46 (9.0)	17 (5.8)	29 (13.1)	
Irbesartan	2 (0.4)	0 (0.0)	2 (0.9)	
No	206 (40.2)	127 (43.6)	79 (35.6)	
Diuretics				
Bezide	225 (44.0)	135 (46.4)	90 (40.7)	
Furosemide	23 (4.5)	11 (3.8)	12 (5.4)	
Hydrochlorothiazide	2 (0.4)	2 (0.7)	0 (0.0)	
Indapamide	1 (0.2)	1 (0.3)	0 (0.0)	
No	260 (50.9)	141 (48.5)	119 (53.9)	
Calcium-Channel				
Blockers				
Amlodipine	195 (37.9)	119 (41.0)	74 (33.3	
Nifedipine	15 (2.9)	9 (3.1)	6 (2.7)	
No	304 (59.2)	162 (55.9)	142 (64.0)	
Beta-blockers				
Atenolol	22 (4.4)	9 (3.2)	13 (5.9)	
Bisoprolol	1 (0.2)	0 (0.0)	1 (0.5)	
Carvedilol	13 (2.5)	4 (1.4)	9 (4.1)	
Metoprolol	1 (0.2)	0 (0.0)	1 (0.5)	
No	468 (92.7)	271 (95.4)	197 (88.0)	
Time between visits (n,%)**				
<6 months	274 (48.8)	113 (42.0)	161 (55.1)	48 (56.5)
6-12 months	87 (15.5)	40 (14.9)	47 (16.1)	14 (16.5)
1-2 years	82 (14.6)	43 (16.0)	39 (13.4)	10 (11.8)
2-3 years	44 (7.8)	29 (10.8)	15 (5.1)	3 (3.5)
3-4 years	22 (3.9)	11 (4.1)	11 (3.8)	5 (5.9)
4-5 years	19 (3.4)	12 (4.5)	7 (2.4)	2 (2.4)
>5 years	33 (5.4)	21 (7.8)	12 (4.1)	3 (3.5)
Min-max (years)	0.01 – 22.8	0.01 – 22.8	0.01 – 18.7	0.01 – 8.06
Mean + SD (years)	1.5 + 2.6	1.8 + 3.0	1.2 + 2.1	1.02 + 1.60

*** Diabetic patients with or without hypertension.** **** Time between last and penultimate visits.**

Of the sample of 291 patients with hypertension only, 196 (67.4 percent) were female, whereas 95 were male (32.6 percent). Their age ranged from 25–93 years, with most of them being in the 65–69 years age category (20.1 percent), followed by the 60–64 years age category (14.9 percent). Most of the patients were from Grand Bras (15.5 percent), Sauteurs (15.5 percent), and Woburn (15.5 percent).

Of the sample of 316 patients with diabetes, 94 (29.7 percent) had diabetes only, and 222 (70.3 percent) had both diabetes and hypertension. However, the team analyzed all patients with diabetes as one group, regardless of their hypertension status. There were 232 (73.4 percent) females and 84 (26.6 percent) males. These patients were between the ages of 30–104 years, with most of them, similar to those with hypertension only, in the 65–69 years age category (16.2 percent). This was followed by the 70–74 years age category (15.2 percent). Most patients were also from the Grand Bras region (22.8 percent), followed by the Grand Anse region (17.7 percent).

HYPERTENSION CARE CASCADES

Figure 2 illustrates the care cascade for hypertension using percentages. Among all individuals currently being treated for hypertension, 62 percent are on multidrug treatment. Additionally, among those receiving treatment, only 26 percent had their blood pressure measured in the last six months, and only 59 percent had achieved hypertension control at any visit.

Figure 2. Hypertension Treatment Cascade

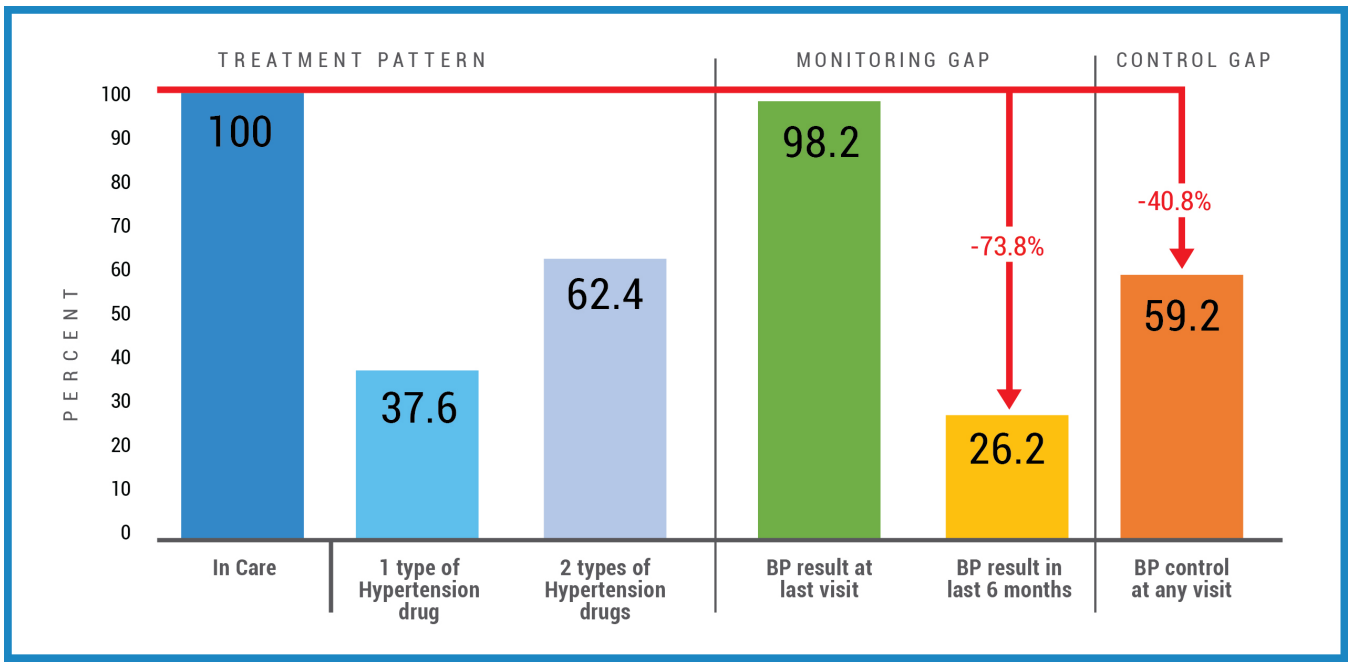
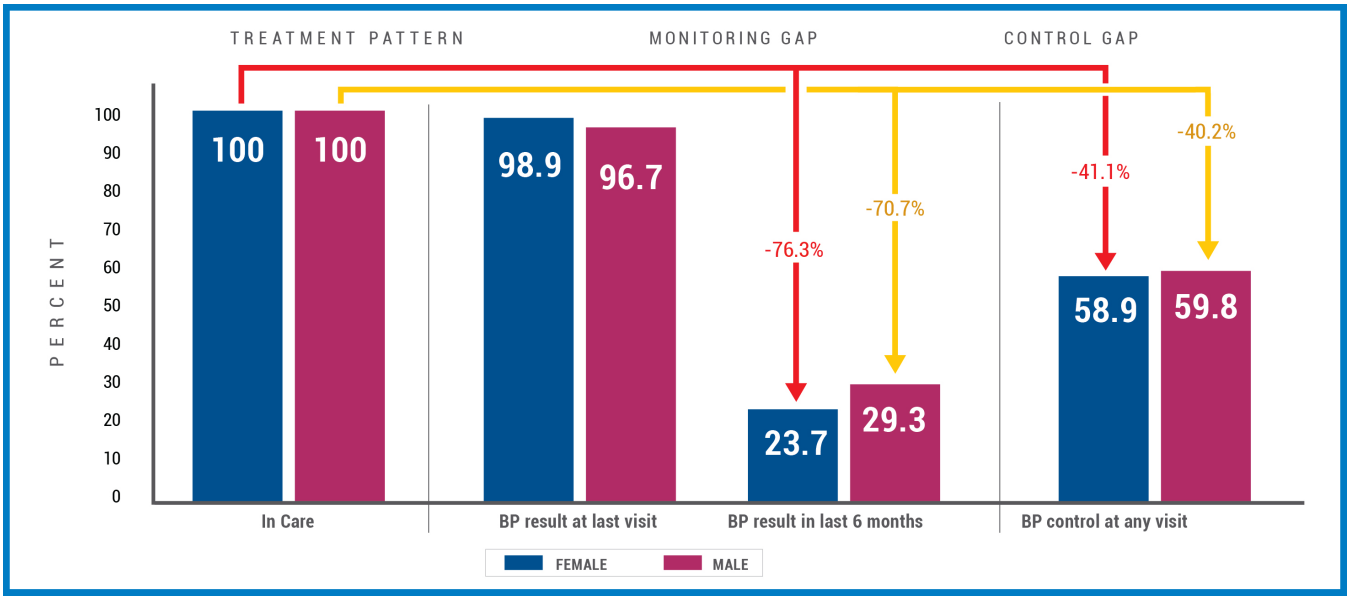


Figure 3 compares the cascade for hypertension according to gender. As illustrated, a higher percentage of males had their blood pressure monitored in the past six months compared to females (29 percent and 23 percent, respectively). Similarly (but to a lesser extent), a higher percentage of males experienced hypertension control compared to females (60 percent and 59 percent, respectively).

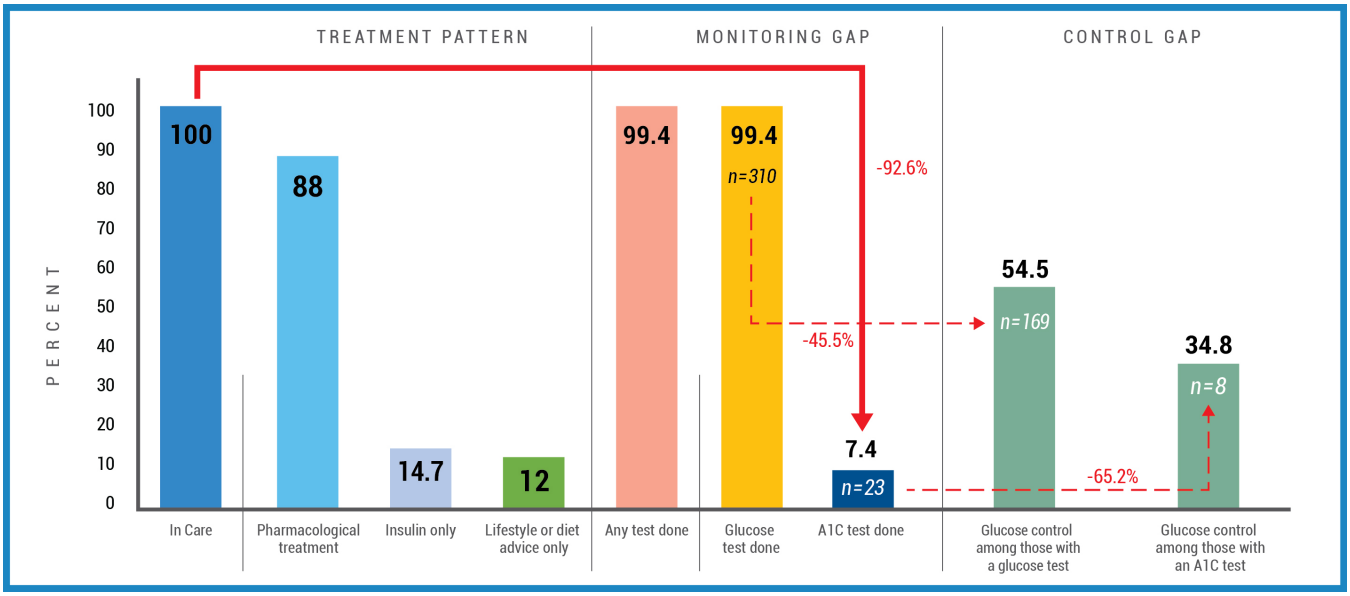
Figure 3. Hypertension Treatment Cascade by Gender



DIABETES CARE CASCADES

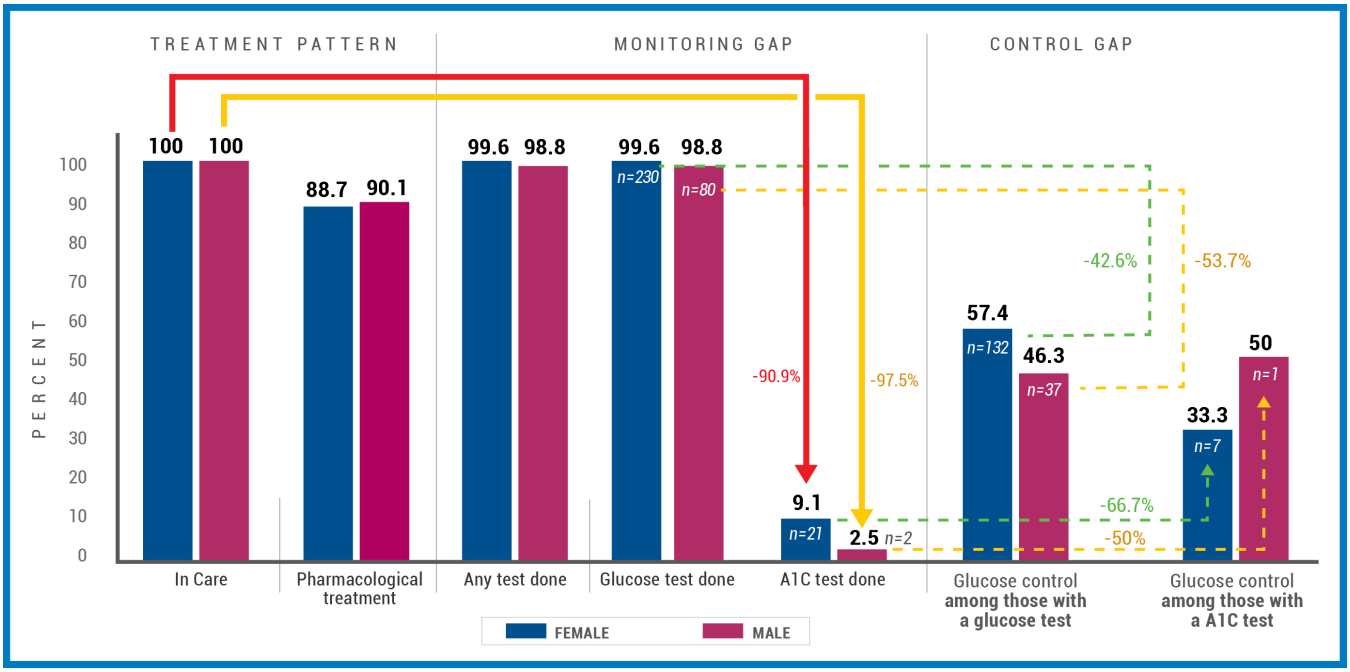
The care cascade for diabetes is shown in Figure 4. Among those receiving diabetes treatment, the majority are receiving pharmacological treatment (88 percent). Among those receiving pharmacological treatment, 14.7 percent receive only insulin. The remaining 12 percent of the population positive for diabetes only receives lifestyle and diet advice. Although almost everyone who has diabetes has had their fasting blood glucose (FBG) and random blood glucose (RBG) tested, only 7 percent had their A1c tested in any of the recorded visits. Of those with any glucose test done, 55 percent experience glucose control. Among those few patients with their A1c tested, 35 percent experience glycemic control. No individuals in this sample experienced ABC control or all four complication screens.

Figure 4. Diabetes Treatment Cascade



The gender distribution of the diabetes care cascade is shown in Figure 5. A slightly higher proportion of males experienced pharmacological treatment compared to females (90 percent to 89 percent, respectively). However, a higher proportion of females had their A1C tested at any time point (9 percent to 3 percent, respectively), and experienced glucose control compared to males (57 percent to 46 percent, respectively). Proportionately, more males than females experienced glycemic control (50 percent to 33 percent, respectively), but since only two males had their A1C tested, the sample size is extremely small.

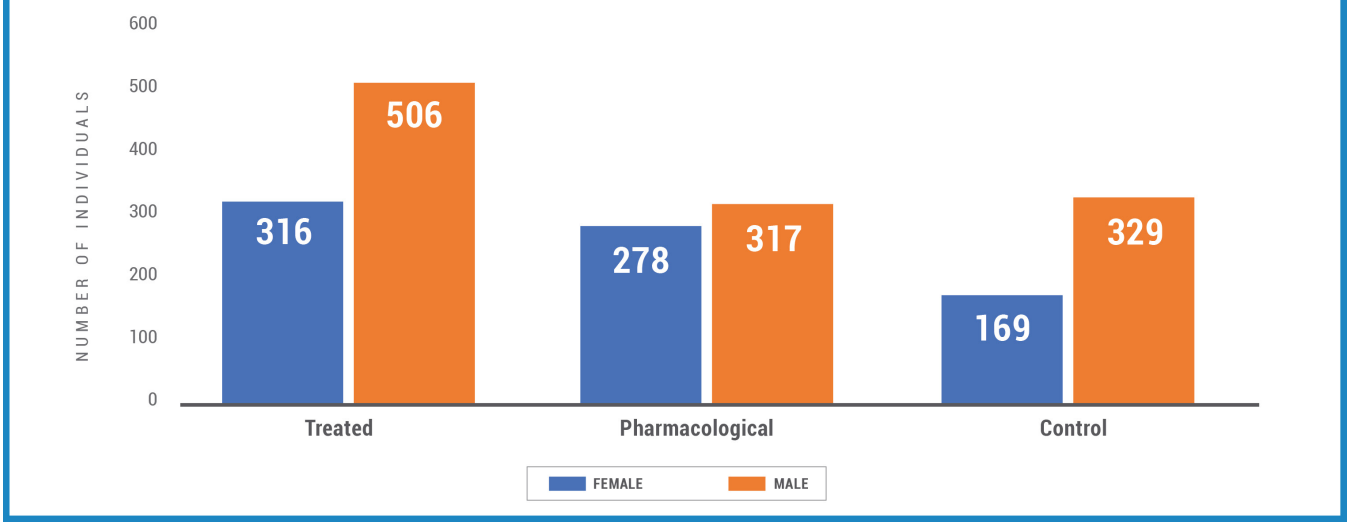
Figure 5. Diabetes Treatment Cascade by Gender



COMPARISON OF CASCADES

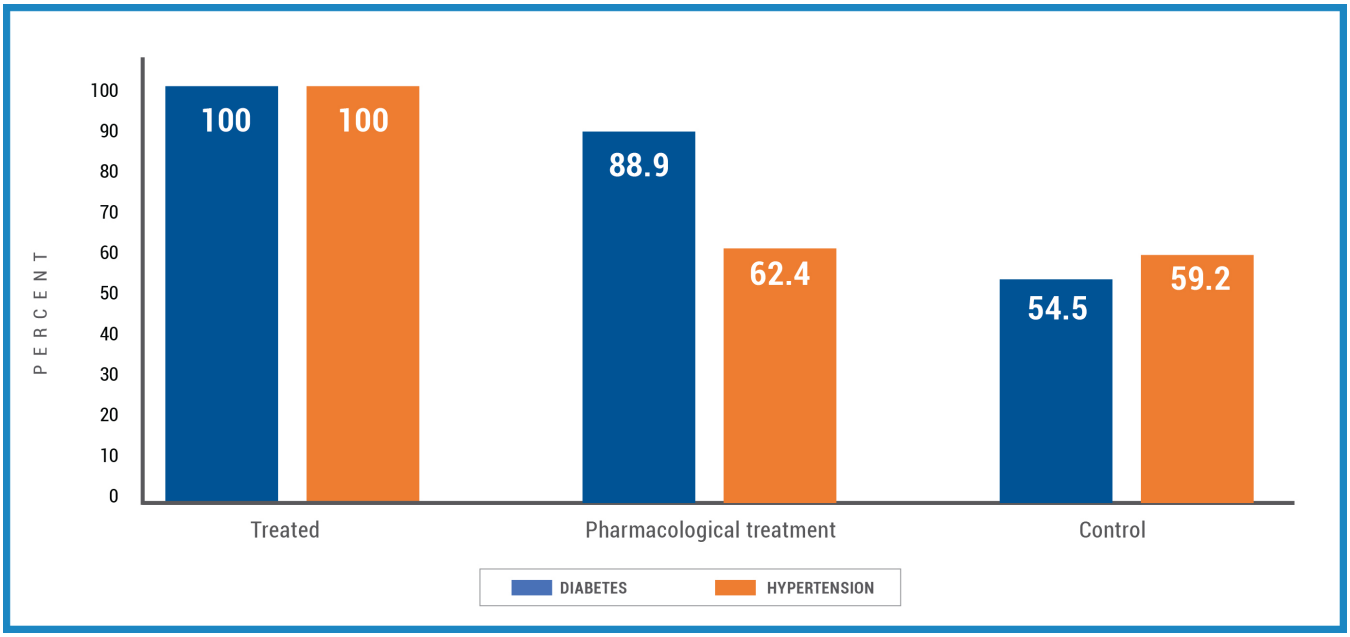
A comparison of the hypertension and diabetes care cascades is shown in Figures 6 and 7. A higher number of individuals are treated for, receiving pharmacological treatment for, and experience control of hypertension. In terms of percentages, although a higher proportion of individuals receive pharmacological diabetes treatment, a higher proportion of hypertension patients experience control.

Figure 6. Diabetes and Hypertension* Care Cascades (Showing Number of Patients).



***Includes all patients with hypertension, not just those with hypertension and without diabetes.**

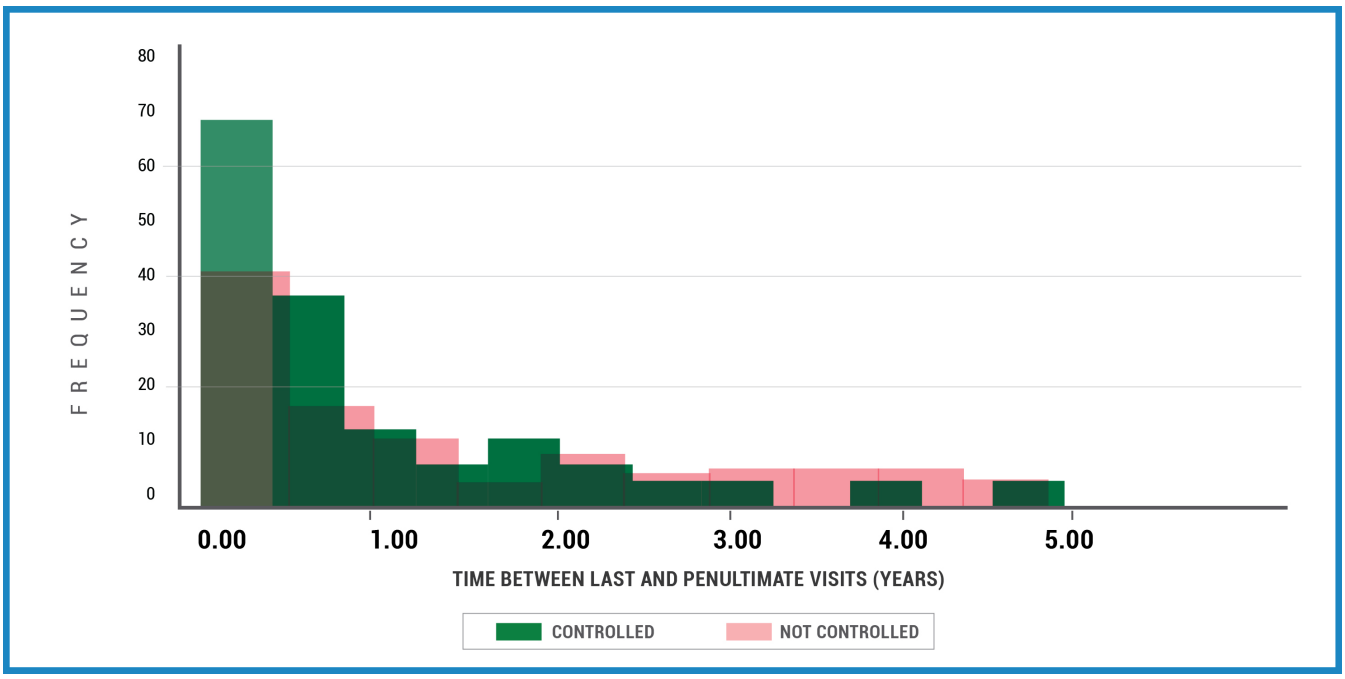
Figure 7. Diabetes and Hypertension Care Cascades (Showing Percent of Patients)



TIME BETWEEN VISITS

The histogram in Figure 8 shows the distribution of the time between the last two follow-up visits for patients regarding hypertension control. As demonstrated by the figure, those with hypertension control are more likely to have a shorter period of time between visits, six months for those with control compared to one year for those without control.

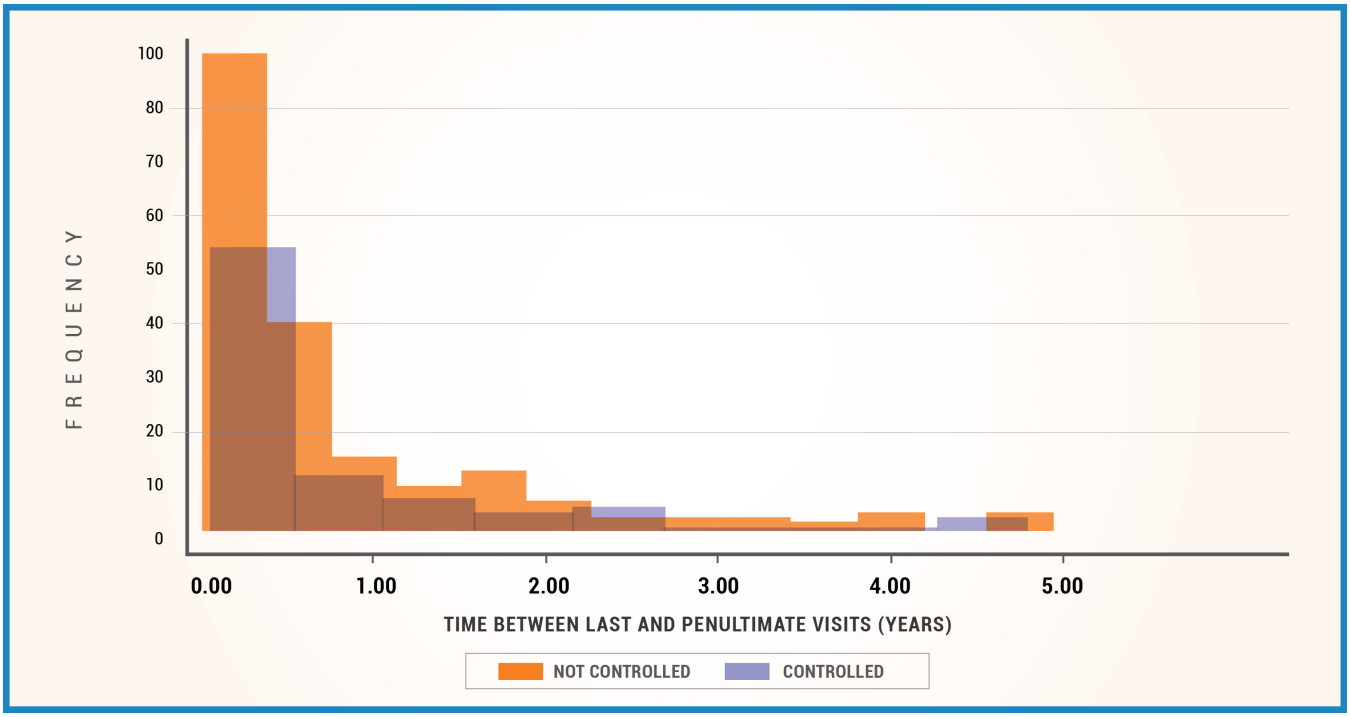
Figure 8. Time between Last and Penultimate Visits (in Years) for Patients with Hypertension



Labels: Green—hypertension control; Red—no hypertension control.
***Figure only includes those whose maximum time between visits was five years or less.**

The histogram in Figure 8 shows the distribution of the time between the last two follow-up visits for patients regarding diabetes control. As demonstrated by the figure, the difference in the follow-up time for those with and without diabetes control is marginal, but those without control have a slightly longer time to follow-up (five months compared to four months, respectively).

Figure 9. Time between Last and Penultimate Visits (in Years) for Diabetes Patients (With or Without Hypertension)



3.2 Qualitative Study Component

The findings outlined are derived from analyses of the transcripts from the two KIIs and the five FGDs. A summary of the final study sample is presented, followed by findings based on each stage of the care cascade, and then a summary of the systemic issues that emerged.

STUDY SAMPLE

Twenty-one adults (two males and 19 females; age range 38–60 years old) took part in the KIIs and FGDs. Participants were from five parishes: St. George, St. David, St. Andrew, St. Patrick, and Carriacou. There were two KIIs with health policy makers and five FGDs with patients and healthcare professionals. Three FGDs were conducted with 11 patients in total based on the following groups: (i) patients with hypertension only; (ii) patients with diabetes only; and (iii) patients with diabetes and hypertension. Two FGDs were held with health professionals based on the following groups: (i) nurses only; and (ii) doctors only. There were eight healthcare professional participants in total (five from health centers and three from the General Hospital).

SCREENING

Participants reported that screening is typically done at health facilities, private clinics, pharmacies, and community health fairs, but no national screening program exists. A policy maker shared that typically when patients arrive at a healthcare facility, the nurse will usually measure their blood pressure and perform a finger stick. The policy maker noted that this process is a form of surveillance and directs clinicians to the next step that they should take. One health professional confirmed that health centers are equipped with glucometers, so blood glucose testing is routinely done, and then depending on the readings, HbA1C testing will follow. Another health

professional specified that for patients attending the District Medical Officer (DMO) clinics, routine screening is done. However, participants noted that there are no standard, uniform protocols or guidelines for NCD screening.

The discussion highlighted challenges for individuals who may want to pursue self-screening or are referred for additional testing. More specifically, a policy maker emphasized that laboratory tests are not affordable or easily accessible. Several healthcare professionals, on the contrary, indicated that they believed that screening was accessible, with one professional sharing that they offer phlebotomy testing at the clinics and then take the samples to the lab on behalf of patients to reduce their need to commute to the hospital for testing.

Several participants observed a gender difference in NCD screening-seeking behavior, with females being more likely to be screened than men. According to one contributor "the males in the population are reluctant to go get testing for screening (…) because culturally the males (…) (have) not been cultured to care about his health." The discussion also noted that the working hours for men (in particular, those working in fishing, construction, schools, or farming) are not conducive for screening. Participants speculated that males may prefer health providers of the same sex, but there are generally more female healthcare providers. An idea for increasing screening outreach among the male population is collaborating with workplaces where a high percentage of males are employed (such as the construction, gas, water, and telecommunications industries).

DIAGNOSIS

Healthcare professionals indicated that when high blood pressure or blood glucose readings are first noted, the patient is generally asked to return to the clinic to re-check measurements, and about three or four consistent readings above normal parameters are required to make a diagnosis. A healthcare professional added that other factors are also considered to make diagnoses, such as strong family history and/or comorbidities. One policy maker noted that diagnoses are typically given by doctors at health facilities. The participant confirmed that a hypertension diagnosis is given based on serial blood pressure measurements (three consecutive high readings) but stated the exception that when diastolic BP is "more than one hundred and five, they (doctors) can accept that one reading as a hypertension." A type 2 diabetes diagnosis is given based on FBS >110 and a HB1Ac >6.5. A delay in receiving and accessing lab results was highlighted as one specific challenge for healthcare professionals to provide a prompt diagnosis to patients.

Several patients shared that they received diagnoses only following the onset of symptoms. For example, one patient shared that when they experienced unusual symptoms (specifically, blurred vision), they sought medical care from a doctor and subsequently received a diabetes diagnosis. However, some patients noted that they received diagnoses following elevated test results from routine screening. Most patients were satisfied with the care received during the diagnosis process, but one patient voiced displeasure with the care received, citing the medical professional's behavior as "standoffish."

TREATMENT AND CONTROL

Healthcare professionals noted that patients diagnosed with NCDs are routinely referred to a chronic disease clinic and a dietician for nutritional counseling. One healthcare professional shared that in their health center, there is a specific chronic disease clinic once a month and healthcare professionals follow up with patients to ensure that they keep their appointments. Another professional highlighted that their center adds "food care sessions on specific days for diabetics." Moreover, education materials (typically provided by the Ministry of Health), such as pamphlets for food care, are shared with the patients. One policy maker stated that all treatment should educate and promote a healthy lifestyle.

Healthcare professionals shared that a team approach (consisting of a nurse, a physician, a social worker, and a dietician) is used to treat NCDs, with each team member having distinct roles. For example, doctors provide the diagnoses, physical assessments, and medication management, while nurses take

measurements and provide counseling in terms of diet, medication, and exercise. Patients are also referred to ophthalmology and/or the renal clinic when needed and to a consultant for initial follow-up and management.

Healthcare professionals acknowledged using clinical guidelines for the treatment of diabetes and hypertension, with one nurse sharing that manuals for diabetes and hypertension are utilized in the clinics and another nurse noting that their institutions used set guidelines for treatment of diabetes and hypertension. However, a "training bias" was emphasized, where there are no nationally standardized guidelines, and different guidelines were followed based on where the physician is trained. For example, one doctor noted that they use the American Diabetes Association's guidelines, but there is no consensus and "providers generally would choose which guidelines they use and that is not ideal." Another participant pointed out, "Even though we have clinical protocols, . . . based on where persons are trained, they tend to use different things," or have certain drug preferences. For diabetes treatment, one healthcare provider specified that "we would start them off (with no contraindication) on the gold standard, which is Metformin."

From the patients' perspective, some patients expressed relief at being treated, while others were disheartened that only a few options were presented and stated a preference for "local remedies." Patients frequently noted emotional and logistical challenges faced with their treatment regimens, such as injecting themselves with insulin at home, a sense of despair at taking pills every day, and financial concerns (including changes in their eating habits that involved a healthier, more costly diet). One patient also shared that they experienced sadness at watching other family members eat whatever they desire. Two patients agreed that more emphasis should be placed on educating patients about NCD treatment.

LONG-TERM MANAGEMENT

Patients often highlighted challenges with medication adherence. One patient indicated that most people do not want to take medication out of fear, because they have heard about possible adverse side effects or because of the high cost of the medication. Participants also discussed nonadherence specific to younger adults, noting that younger adults often do not understand the importance of taking medication and consider it a hindrance to "enjoying life," because it requires lifelong medication. Healthcare professionals echoed the challenges that patients experience with adhering to treatment, particularly highlighting the high number of drugs that some patients must take daily and complacency following improvements in readings as factors in nonadherence. Healthcare professionals also noted that misinformation or misconceptions associated with diabetes and or hypertension lead to patients missing their drugs or follow-up management. One health professional also acknowledged that side effects of certain medicines can contribute to patient noncompliance, adding "we have a significant amount of male patients actually stopping their medication because of erectile dysfunction that may coincide with taking it."

Participants also discussed the health complications associated with diabetes and hypertension, noting the financial implications of addressing such complications. One health professional discussed that some diabetic patients develop ulcers, which can become very extended, and podiatrists are not available to monitor such ulcers. To emphasize how expensive addressing complications can be, one participant explained that dialysis (which a patient may need three times a week) costs approximately $700[21] per session, while a CT scan (which a patient may need if a stroke is suspected) costs approximately $800. Another participant discussed that the financial burden of complications extends beyond the individual patient to society and government because of the costs related to human resources and medicines.

[21] All dollar amounts are in U.S. dollars, unless noted.

In terms of availability of services, participants shared that appointments could take as long as six months to see a consultant for further management during which time further complications may occur or patients resort to alternative medicines, such as "bush tea." One participant noted that long wait times are particularly problematic for patients requiring quick interventions. In such cases, the participant observed that patients would resort to seeking care from private practitioners. The size of the healthcare workforce was cited as a factor in long wait times. Beyond wait times, some healthcare professionals acknowledged a lack of patient responsibility as a reason for loss to follow-up, with one participant stating that "the service is available for follow-up (…), but not all of them (patients) use it as they should, unfortunately."

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PREVENTION

Both patients and health professionals noted the importance of NCD prevention efforts and acknowledged existing inadequacies. One participant indicated that "we have a serious problem with awareness of the chronic disease . . . so, you have a lot of patients who do not understand that hypertension and diabetes are silent killers." Health professionals shared that there are ongoing prevention activities, such as distribution of pamphlets during visits to selected communities. However, health professionals also noted that staffing constraints limit the occurrence of such prevention activities. Several patients indicated that it would be beneficial to sensitize the public to the health implications of NCDs and the ways people can reduce their risks (possibly through radio notices). Patients and health professionals both identified youth as an important target population for education as this approach can ultimately reduce the number of diagnoses in the future. Another prevention approach mentioned (but not elaborated on) was the implementation of healthy food service guidelines.

SYSTEMIC ISSUES

Governance

In terms of NCD policies and governance, there is a national chronic disease strategy available, and a National Chronic Non-Communicable Disease Commission was set up as a Cabinet-appointed commission, but the Cabinet never received the recommendations. One policy maker highlighted the need for a strong political will to draw attention to NCDs.

Patient-Centered Care and Patient Readiness for Treatment

Participants also emphasized the need for patient-centered care with an emphasis on gender, accessibility, and age-appropriate health education, particularly for children and young adults. During FGDs, some patients expressed disappointment that after being diagnosed, doctors would administer medications to them, rather than being prescribed a local treatment. As a result, they blame the system or the "set-up" within these district health centers and clinics. Another patient felt that healthcare professionals are negligent in following up with patients and their chronic disease issues. The patient preferred to be seen by the same doctor, suggesting that seeing different doctors limits the ability to build a trusting relationship and confidence in management. Several patients also expressed a desire for more education about the causes of their conditions, self-management techniques, and implications of not reaching targets.

Pharmaceuticals

Healthcare providers shared that medications for diabetes and hypertension are not always available in the public sector at "government pharmacies" and in those cases, the patients would have to source the medication privately. This situation was confirmed by the patient group, with one patient stating, "sometimes you go to the pharmacy to get the medication and they don't have any and maybe sometimes we don't have the money to get it privately in the pharmacy." Healthcare professionals also shared how the issue of stockouts and high costs of acquiring medicine privately affect the care that they are able to deliver. One professional expressed that "this is basically what I go through every single day in a clinic with at least one or two patients, I have to talk and figure out what they can afford and what they can't afford, how can I get them to have it." One healthcare provider noted a specific challenge with the list of drugs on the formulary: "There are drugs that are available outside of the hospital setting that are not necessarily available on our formulary in the hospital, but we would still be able to prescribe those." Another healthcare provider highlighted that the limited diabetes drugs available in the system affect the treatment for diabetes that they can offer. This participant noted that "we have a fairly limited amount of (drug) options before we can jump to insulin."

Medical Supplies and Equipment

In addition to medicine stockouts, multiple healthcare professionals highlighted that stock outs with medical supplies, in particular testing strips, occasionally prevented screening and diagnosis. The issue of equipment not functioning was noted, with one patient stating when they go to the clinic to get a "professional check," the instruments frequently do not work.

Stigma

Participants identified the stigma associated with NCDs as a barrier to screening, treatment, and care of patients. They mentioned that this stigma is worse for males because of the association between erectile dysfunction and diabetes. One participant shared, "There is a stigma, especially for the men. You know, you have diabetes so everybody thinks, ok you can't perform." Participants also discussed a stigma associated with anti-hypertensive drugs, with another participant sharing: "The men sometimes don't want to take the medication because they feel it wouldn't give them the sex drive." Participants also highlighted the fear and the stigma of amputations resulting from diabetes, as well as stigma related to the association of diabetes with obesity.

4. Discussion

This study aimed to generate quantitative and qualitative data to inform improvements to country-level responses to diabetes and hypertension management and care. Considering both the quantitative and qualitative findings, this section discusses the gaps, barriers, or breakpoints for each component of the care cascade. A discussion of findings related to systemic issues follows.

THE CARE CASCADE

Screening and Diagnosis

While the study did not collect any quantitative data related to the screening or diagnosis stage, qualitative findings (specifically, that some patients only received diagnoses after symptoms presented) suggest that increased screening can support earlier detection. This would allow more timely management of risk factors and treatment and ultimately may reduce morbidity, mortality, and healthcare costs.[22]

The higher proportion of females to males with type 2 diabetes or hypertension in the study sample of treated patients differ from global prevalence trends (possibly due to sex differences in screening behaviors and/or treatment initiation). Globally, men are estimated a higher prevalence of type 2 diabetes than women in midlife[23] and similarly, among adults (aged 30–79 years), men have a slightly higher prevalence of hypertension than women.[24] Contrastingly, in the study's randomly selected sample, there were approximately 40 percent more females than males with only diabetes and 35 percent more females than males with only hypertension. Similarly, based on STEPS 2010 data for Grenada, more women than men reported diagnoses of hypertension or diabetes. This situation may be because sex differences in the prevalence of type 2 diabetes and hypertension in Grenada differ compared to global trends. However, it is possible that more women sought care or initiated treatment and, therefore, comprised a larger proportion of the study sample (which only captured adults already enrolled in treatment via chronic disease clinics). The latter proposed explanation aligns with the study's qualitative findings that highlighted a gender difference in NCD screening where females were more likely to seek screening and/or treatment than men in Grenada.

Of note, clinical practices for diagnosing hypertension and diabetes appear to differ to some extent from commonly used guidelines in the region. The WHO Guideline for the Pharmacological Treatment of Hypertension in Adults recommends that hypertension is diagnosed, if on two visits on different days (second measurement is usually one to four weeks after the first measurement) systolic blood pressure is ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg.[25] CARPHA Guidelines for the Management of Diabetes in Primary Care in the Caribbean suggest a positive diagnosis of diabetes is made with any of the following: RBG 11.1 mmol/L (>200mg/dL), FPG 7 mmol/L (>126mg/dL), HbA1c >6.5 percent, but if results indicate Impaired Glucose Tolerance (IGT) of 5.6 - 6.9 mmol/L or 100 –125 mgdL, guidelines indicate to advise on lifestyle modifications and repeat testing in three to six months.[26] Qualitative findings suggest current practices for diagnosing hypertension and diabetes may deviate to some extent from the WHO and CARPHA guidelines, with more than two elevated readings being required for diagnoses.

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[22] Schmidt BM, Durao S, Toews I, Bavuma CM, Hohlfeld A, Nury E, Meerpohl JJ, and T Kredo. 2020. "*Screening strategies for hypertension.*" Cochrane Database Syst Rev. May 7;5(5):CD013212. doi: 10.1002/14651858.CD013212.pub2. PMID: 32378196; PMCID: PMC7203601.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7203601/

[23] Huebschmann, A., Huxley, R., Kohrt, W., Zeitler, P., Regensteiner, J. and J. Reusch. 2019. "Sex differences in the burden of type 2 diabetes and cardiovascular risk across the life course." *Diabetologia* volume 62, pages 1761–1772.

[24] Nguyen, T. and C. Chow. 2021. "Global and national high blood pressure burden and control." *The Lancet*. August 24. DOI:https://doi.org/10.1016/S0140-6736(21)01688-3 https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)01688-3/fulltext

[25] WHO. 2018. *HEARTS Technical package for cardiovascular disease management in primary health care: evidence-based treatment protocols*. Geneva: WHO. https://apps.who.int/iris/bitstream/handle/10665/260421/WHO-NMH-NVI-18.2-eng.pdf

[26] CARPHA. 2019. *Guidelines for the Management of Diabetes in Primary Care in the Caribbean*; Pocket Guide. Port of Spain: CARPHA. https://www.carpha.org/Portals/0/Documents/Management%20of%20Diabetes%20in%20Primary%20Care%20in%20the%20Caribbean.pdf

Treatment and Monitoring

For the total quantitative study sample, approximately 50 percent of patients had less than six months between their last two visits, while the average time between the last two visits was 1.5 years. Individuals with hypertension control were more likely to have a shorter period between visits compared to those without control. Qualitative findings highlight some issues with long wait times, especially for appointments with specialists. Insufficient patient responsibility for attending routine follow-ups was also discussed.

In terms of monitoring for type 2 diabetes, CARPHA Guidelines recommend measuring blood pressure at every visit and repeating HbA1c every three months until client has achieved desired HbA1c, then the test can be repeated every six months. Similarly, WHO HEARTS guidelines recommend "taking A1c measurements every three to six months; every six months if stable on unchanging treatment." Out of all persons in treatment for diabetes, only 7.4 percent had a recorded HbA1c result in either their last visit or penultimate visit, which suggests clinical practice deviates frequently from the aforementioned guidelines. The reasons for such low HbA1C testing frequency were not discussed in FGDs or KIIs and should be further investigated. Of note, patients with diabetes in the study sample who received lifestyle advice only had an average RBG and/or FBG at diagnosis (average FBG=133.7; average RBG=168.9) that was lower than the average RBG and/or FBG at diagnosis for those on pharmacological treatment (average FBG=203.6; average RBG=256.02). This may reflect early case finding, where non-pharmacological treatment was used to control those with borderline diabetes or those at high risk of developing diabetes.

In terms of monitoring for hypertension, according to the HEARTS Hypertension Clinical Pathway,[27] hypertensive patients should have a six-month minimum follow-up, while high-risk hypertensives should have a three-month minimum follow-up. Based on the sample of patients receiving treatment for hypertension only, only 26 percent had a blood pressure measurement within the last six months, reflecting a large monitoring gap.

In terms of treatment for hypertension, 38 percent of patients with hypertension were on monotherapy. The WHO Guideline for the Pharmacological Treatment of Hypertension in Adults recommends, "for adults with hypertension requiring pharmacological treatment, WHO suggests combination therapy, preferably with a single-pill combination (to improve adherence and persistence), as an initial treatment." The high percentage of patients on monotherapy may represent deviation from this guideline and possibly signal undertreatment and/or clinical inertia to scale up medication to achieve control

Achieving Disease Control

At least 40 percent of patients in treatment for only hypertension or diabetes did not achieve control (approximately 41 percent and 45 percent, respectively). Based on qualitative findings, uncontrolled diabetes and hypertension in patients could be related to the quality of clinical services, treatment adherence issues, and/or patients' inability to purchase their prescribed medication (because of high costs or unavailability). In FGDs, nonadherence was commonly linked to the side effects of erectile dysfunction and decreased libido, especially for diabetes medication. In line with these findings, one systematic review found that "interventions that include helping patients to cope with side effects appear to be particularly effective in improving oral antidiabetic drug adherence."[28] The issues of preference for traditional remedies, patient complacency, and insufficient patient education were also linked to nonadherence.

[27] PAHO. 2022. *Hypertension Clinical Pathway.* https://www.paho.org/en/documents/hypertension-clinical-pathway

[28] Zomahoun, H, de Bruin, M, Guillaumie, L., Moisan, J., Grégoire, J-P., Pérez, N., Vézina-Im, L-A, and L. Guénette. 2015. "Effectiveness and Content Analysis of Interventions to Enhance Oral Antidiabetic Drug Adherence in Adults with Type 2 Diabetes: Systematic Review and Meta-Analysis." *Value in Health*, Volume 18, Issue 4, ISSN 1098-3015, https://doi.org/10.1016/j.jval.2015.02.017. https://www.sciencedirect.com/science/article/pii/S1098301515019117

Primary Prevention

In the sample, hypertension (n=506) was more prevalent than diabetes (n=315) and a large proportion of the sample were comorbid (n=222). One of the key strategies to reducing the burden of these NCDs is prevention of the associated risk factors, including unhealthy diets, physical inactivity, tobacco use, and harmful use of alcohol.[29] The convergence of the provider and the patient perspectives on the need for primary prevention, especially health education, presents opportunities to implement initiatives in an environment that appears ready for change.

CROSSCUTTING ISSUES

Information Systems

A major constraint of the care cascade analysis was limited data on patient medical records, and insufficient available data to track patients who move from diagnosis to treatment. A combination of paper-based and electronic medical records (EMR) is in use for almost all patients. Research assistants noted that the EMR system was slow to access and review data and often the system would freeze. Additionally, paper-based patient records are not standardized. On many paper-based patient medical records, formal diagnoses of diabetes and/or hypertension were not noted, although patients were receiving medications for treatment of diabetes and/or hypertension. In some cases, when a diagnosis was noted, it was not accompanied by a date and thus, the length of time in treatment is unknown.

Nonstandardized Approach to Care

Findings revealed a lack of a standardized approach to service delivery for both conditions, which is likely a contributing factor to the large proportion of patients who have not achieved disease control. The lack of standardized treatment guidelines may be a potential factor negatively affecting care as it was revealed that doctors typically follow treatment guidelines based on where they receive their training, and treatment guidelines for type 2 diabetes and hypertension are not standardized nationally.

LIMITATIONS

The following outlines several limitations of the study design:

- Given that data collection was limited to within the public health system and quantitative data analysis was restricted to the sample, findings are not generalizable to the entire population.
- Quantitative data were collected from medical records between October 2022 to November 2022. Data were extracted from patient files once patient diagnoses were received at least six months prior to data collection. Patient records for patients who were in care during the COVID-19 pandemic were, therefore, included in the study sample as Grenada recorded its first COVID-19 case in March 2020. The data should be interpreted with caution as several disruptions and change in patient behaviors occurred during the pandemic. Healthcare services were reduced during the peak outbreak periods partly because of a high number of infected healthcare workers. Social distancing restrictions and curfews also likely reduced the number of persons accessing services during 2020.

- Data from private practices are not regularly reported to the MOHWRA and were not as readily available or accessible for this study. Of note, a fairly large proportion of the population is reported to use private health services. Data gathering and analysis from private facilities should be planned for future studies.
- The target population is focused on adults 20 years and older and for diabetes analysis, the focus is limited to type 2 diabetes.
- Quantitative data captured measurements taken at facilities and recorded in patient files. Home-based measurements through patients' self-monitoring are likely not captured in these results and, therefore, disease control may have occurred for some patients but not been recorded in the files.
- Blood pressure measurements should also be interpreted with caution given variance in both the type of device used for measurement and the practices for recording measurements. Both digital and manual blood pressure monitors are used across the study sites. Additionally, rounding to the nearest 5mmHg or 10mmHg was observed in many data points, which may lead to overestimation or underestimation of the number of patients with hypertension control.
- The use of FGDs limited the level of confidentiality that could be achieved during a discussion. Stakeholders may have either reduced their participation or only communicated information that they felt comfortable sharing.
- Using the cascade framework restricted issues to the points along the cascade and may have impeded a fuller discussion and understanding of the systemic, patient, and provider related issues.
- Varying levels of seniority and management within the professional FGDs may have reduced participation among the less senior professionals.
- The majority of the FGD participants were female. This demographic may have skewed the data.
- The use of virtual communication platforms may alter group dynamics, leading to less interactive exchange.
- Online Zoom interviews unintentionally excluded participants who were not comfortable with the technology (such as some elderly people) and, therefore, they were unable to participate. This was a missed opportunity because the burden of both diseases is larger among the elderly. The selection of interview platforms in this country's context would have been better if WhatsApp or Facebook were used, compared to the use of Zoom. In-person interviews are recommended for future studies.

5. Recommendations

The following are recommendations for improving diabetes and hypertension care along the care cascade in Grenada. The recommendations were developed based on an analysis of study findings, as well as a literature review of international standards, best practices, and evidence-based programs in both gray and peer-reviewed literature. These recommendations are also summarized in Table 4 below.

1. *Improve the quality of NCD services through the adoption/development of standardized clinical guidelines, decision-support tools, recall mechanisms, and a patient-centered approach.*

1.1. **Formally adopt standardized national guidelines for treatment of NCDs, train health professionals on standardized guidelines, and establish routine mechanisms to assess adherence to guidelines.** Study findings reveal that standardized national treatment guidelines for type 2 diabetes or hypertension have not yet been adopted. Findings also suggest that some clinical practices deviate from commonly used treatment guidelines in the region. To ensure high-quality care (especially for medication titration) is delivered consistently at all facilities across the country, treatment guidelines should be adopted at the national level for NCDs (including diabetes, cardiovascular diseases, different types of cancers, and chronic respiratory diseases). The use of standardized guidelines could also facilitate titration by nonphysicians, such as nurses or pharmacists.[30] Standardized treatment guidelines should be reviewed on a regular basis to ensure continued alignment with evidence-based practices. The adoption of such guidelines must be accompanied by long-term training plans for health professionals, as well as plans to assess adherence to the guidelines.

1.2. **Implement standardized decision-support tools (such as algorithms, clinical pathways, flowsheets, or standard hospital order sets) to remind healthcare professionals of the steps to be followed in different clinical situations.** These tools could be used for the following: selecting and titrating medications; providing observations, tests, or investigations required to make a diagnosis; or helping patients manage their own conditions or know when to seek care. Ideally, such decision-support tools should align with the nationally adopted treatment guidelines (as referenced in Recommendation 1.1).

1.3. **Establish a standard process for ensuring follow-up and recall of patients (that is, phone call, text message, email, or home visit).** Recent research identified the return intervals after visits where the patient had an elevated blood pressure reading as a significant driver of hypertension control.[29] In the short term, the development of a standard follow-up process can focus on patients with hypertension or diabetes and be expanded for other NCDs. Follow-up support should include differential diagnosis of the causes of nonadherence and then tailored messaging and education to individual patients. Development and implementation of such a recall process for NCD patients should be accompanied by a standard written policy/procedure with assigned roles and responsibilities.

1.4. **Create an enabling environment (including the setting of relevant quality standards, training plans for healthcare professionals, and aligned regulatory and financial systems) for the delivery of person- or patient-centered care in primary care.** Plans should promote the design and implementation of individualized patient plans that engage both the patient and their family, incorporate psychosocial support strategies, and address patient preferences (for example, alternative medicines) and concerns (for example, side effects).

[29] WHO. 2022. "NCD Factsheet." https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
[30] Brettler, Jeffrey W., et al. 2022."Drivers and scorecards to improve hypertension control in primary care practice: Recommendations from the HEARTS in the Americas Innovation Group." *The Lancet Regional Health-Americas.*

One systematic review noted that patient-centered care had positive influences on patient satisfaction and self-management,[31] which may support improved medication adherence and achievement of long-term disease control. Patient empowerment approaches, including patient education tailored specifically to differences in age, gender, and literacy level, should be employed. In particular, the specific needs of younger adults for screening and adherence support should be included in health worker trainings, as this group is not always considered at high NCD risk but requires early and sustained intervention to prevent morbidity. [32]

2. *Strengthen the national health information system to increase the availability of reliable information for clinical management of NCDs, disease surveillance, and evidence-informed policy development.*

2.1. **Establish a minimum dataset of NCD-related indicators that is routinely collected, analyzed, and disseminated at the national level to monitor and evaluate progress.** The recently published Noncommunicable Disease Facility-Based Monitoring Guidance provides a list of 22 core indicators (see Appendix 4) and 59 optional indicators that the government can select for monitoring their NCD management performance. The majority of indicators depend on reliable data from individual health records, facility NCD disease registries, or medicine stock registers. Specific baseline values and targets will need to be developed for each indicator at each reporting level, as well as established methodologies, roles,and responsibilities for data collection. Routine analysis and dissemination of such data within the MOHWRA and back to facilities will facilitate evidence-informed decision-making. In the interim, as the electronic health information system is further developed and usage expands, the implementation of morecomprehensive NCD registries (including indicators, such as those referenced above) should be considered as they can support medication needs estimation, among other benefits.

2.2. **Assess and address challenges with the digital health information system (HIS) that impede full scale adoption and routine use in the clinical care of NCDs.** A rapid assessment of challenges related to the use of the HIS in health centers and hospitals (such as lag times with data entry and data retrieval from electronic medical records) could be conducted to inform and prioritize targeted improvements to the HIS. Electronic health records have the potential to improve not only clinical outcomes by improving quality and reducing medical errors, but also financial and operational outcomes at the organizational level.[33] As the electronic HIS undergoes further development and is adopted more widely, the country can consider incorporating standardized decision support tools and follow-up processes (as those described in Recommendations 1.2 and 1.3) into the electronic patient records, and establishing integration with laboratories and pharmacies

2.3. **Collect data at the national level on NCD risk factors at least every five years to inform targeted prevention efforts.** One of the key strategies to reducing the burden of these NCDs is prevention of modifiable risk factors, including unhealthy diets, physical inactivity, tobacco use, and harmful use of alcohol,[34] but recent data on the prevalence of NCDs risk factors in Grenada are not available. The WHO STEPwise Approach to Chronic Disease Risk-Factor Surveillance (STEPS) is a standardized method for collecting, analyzing, and disseminating data on key NCDs risk factors in adults.[35] The last STEPS survey conducted in Grenada was in 2010, while the STEPS methodology recommends the implementation of STEPS surveys every three to five years.

[31] Rathert C, Wyrwich MD, and SA Boren. 2013. Patient-Centered Care and Outcomes: *A Systematic Review of the Literature. Medical Care Research and Review.*
[32] Rathert C, Wyrwich MD, and SA Boren. 2013. Patient-Centered Care and Outcomes: *A Systematic Review of the Literature. Medical Care Research and Review.*
[33] Menachemi, N. and Collum, T.H., 2011. Benefits and drawbacks of electronic health record systems. *Risk management and healthcare policy.*
[34] WHO. 2022. "NCD Factsheet." Accessed at: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
[35] World Health Organization, 2005. *WHO STEPS surveillance manual: the WHO STEPwise approach to chronic disease risk factor surveillance*

3. *Strengthen the availability and timely access to NCD-related services, including testing and specialty services.*

3.1. **Increase availability and access to affordable diagnostic testing, including point-of-care (POC) testing (especially HbA1c testing), at the lower-level facilities.** POC testing can allow for more immediate clinical management discussions and decisions between healthcare professionals and patients. Study findings demonstrate that less than 10 percent of patients with diabetes had a recorded HbA1c result during their last two visits, which may be due to a lack of availability or accessibility of HbA1c testing. One review examining studies over one and a half decades found that the introduction of POC HbA1c testing was associated not only with improved diabetes management and glycemic control, but also increased patient satisfaction and motivation.[36]

3.2. **Establish and regularly update a health workforce registry to ensure the availability of an adequate number of health professionals, including specialists for NCD-related complications (such as podiatrists, nephrologists, endocrinologists, cardiologists, and ophthalmologists) to provide service coverage based on current and projected population health needs.** While the use of a national needs-based health workforce planning method is being increasingly adopted, a standardized approach has not yet emerged.[37] The WHO Global Strategy on Human Resources for Health: Workforce 2030 advises that planning consider workforce needs as a whole (rather than treating each profession separately), while taking into account reliable and updated health workforce information, population needs, labor market analyses, and scanning of scenarios. The establishment of a national health workforce registry is essential for strengthening health workforce planning; the country should ensure such a registry aligns with the WHO Minimum Data Set for Health Workforce Registry, as applicable to its context. Furthermore, as a small island, Grenada should consider creative strategies for addressing workforce challenges, such as long-term partnerships with other countries to pool health workforce education, accreditation, and regulation needs, offering telemedicine to complement the primary care services, and task shifting.

3.3. **Strengthen equipment maintenance and management protocols and procedures to improve equipment functionality and accuracy of results.** This could include developing assessment checklists that identify the performance status of medical equipment in the health centers. A medical equipment maintenance program should consist of procedures for scheduled maintenance and corrective maintenance activities. Timely corrective maintenance or replacement (if needed) of nonfunctional equipment should be prioritized to ensure timely diagnoses and continuity of care.

[36] Schnell O, Crocker JB, and J. Weng. 2017. "Impact of HbA1c Testing at Point of Care on Diabetes Management." J Diabetes Sci Technol.
[37] Asamani, J. A., Christmals, C. D., and G.M. Reitsma. 2021. "The needs-based health workforce planning method: a systematic scoping review of analytical applications." *Health Policy and Planning.*

4. *Ensure consistent availability of safe and affordable medications and supplies for NCD care.*

4.1. **Strengthen supply chain management to reduce stockouts of medicines, POC diagnostic tests, and other laboratory supplies and improve quality control of medicines and supplies.** The implementation of POC diagnostic testing (Recommendation 3.1) relies heavily on adequate supply chain management. An audit into the supply chain management of medicines, POC diagnostic tests, and other laboratory supplies for NCD care may identify gaps or barriers to efficient supply chain management. Improved supply chain management would reduce stockouts in the public pharmacies and, therefore, less patients would have to purchase costly medicines privately.

4.2. **Review and update the national essential medicines list (NEML) routinely.** Study findings revealed that several healthcare providers expressed concern over the limited drug options available for diabetes and hypertension treatment. The WHO recommends that governments formally check whether their NEMLs need to be updated at least every two years following the publishing of the WHO Model List of Essential Medicine.21 The selection of NCD medicines for the NEML should be linked to data on medicines utilization, thereby allowing the routine updating of the NEML to function as a mechanism to improve appropriate and rational prescribing. The selection of NCD medicines should aim to lower costs for patients and improve accessibility and availability, where possible. One particular group of medicines to consider are fixed-dose combination (FDC) pills as recent research noted that the majority of hypertension guidelines recommend using a FDC pill as initial treatment due to evidence of improved adherence and control and decreased length of time to achieve control.[38]

5. *Building upon the existing National Chronic Non-Communicable Disease Policy and Multisectoral Plan for Grenada (2013–17), develop a medium-term work plan specifically focused on NCD prevention activities (including primary and secondary prevention strategies, such as reducing modifiable risk factors and implementing screening programs).*

5.1. **Adopt primary prevention strategies aimed at reducing tobacco use, harmful alcohol use, unhealthy diets, and physical inactivity.** The 2022 Updates to Appendix 3 of the Global NCD Action Plan 2013-2030 (the draft second update to the WHO 'Best Buys' and Other Recommended Interventions for the Prevention and Control of Noncommunicable Diseases) include a list recommended policy options aimed at "reducing modifiable risk factors for noncommunicable disease and underlying social determinants through creation of health-promoting environments" that the country can consider adopting.

5.2. **Establish national screening programs for NCDs.** Given that there is no formal national screening program in Grenada, it would be important to implement programs to screen the population (especially high-risk groups or those who have less frequent contact with the health system) for different NCDs. The 2022 Updates to Appendix 3 of the Global NCD Action Plan 2013-2030 (the draft second update to the WHO 'Best Buys' and Other Recommended Interventions for the Prevention and Control of Noncommunicable Diseases) include a list of recommended policy options related to screening approaches for different NCDs (particularly for specific cancers) that the country can consider adopting. As a small state, task-shifting through the use of community health workers in NCD prevention and early detection activities can contribute to successful screening programs.[39] Additionally, promotion of self-screening where appropriate and possible can also support early detection.

[38] Brettler, Jeffrey W., et al. 2022."Drivers and scorecards to improve hypertension control in primary care practice: Recommendations from the HEARTS in the Americas Innovation Group." *The Lancet Regional Health-Americas.*
[39] Basu, Partha, et al. 2019 "A pilot study to evaluate home-based screening for the common non-communicable diseases by a dedicated cadre of community health workers in a rural setting in India." *BMC Public Health.*

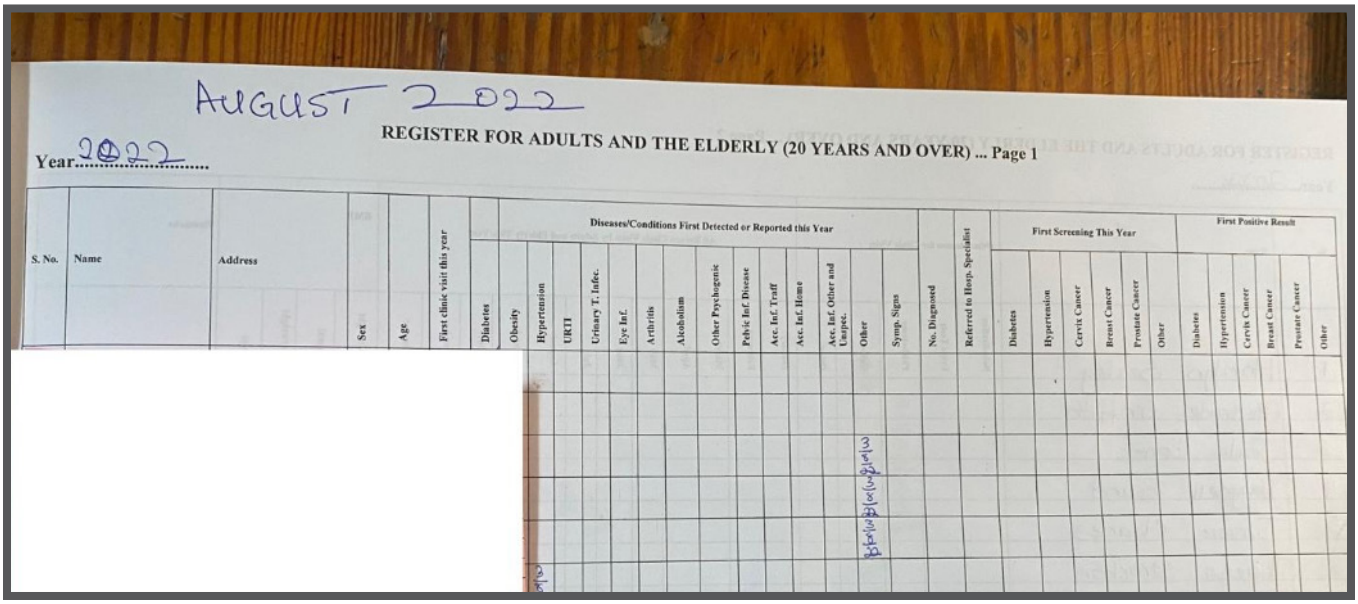
Table 4. Summary of Recommendations

1.	Improve the quality of NCD services through the adoption/development of standardized clinical guidelines, decision-support tools, recall mechanisms, and a patient-centered approach.
1.1	Formally adopt standardized national guidelines for the treatment of NCDs, train health professionals on standardized guidelines, and establish routine mechanisms to assess adherence to guidelines.
1.2	Implement standardized decision-support tools (such as algorithms, clinical pathways, flowsheets, or standard hospital order sets) to remind healthcare professionals of the steps to be followed in different clinical situations.
1.3	Establish a standard process for ensuring follow-up of patients (that is, phone call, text message, email, or home visit).
1.4	Create an enabling environment (including the setting of relevant quality standards, training plans for healthcare professionals, and aligned regulatory and financial systems) for the delivery of person - or patient - centered care in primary care.
2.	Strengthen the national health information system to increase the availability of reliable information for clinical management of NCDs, disease surveillance, and evidence-informed policy development.
2.1	Establish a minimum dataset of NCD-related indicators that is routinely collected, analyzed, and disseminated at the national level to monitor and evaluate progress.
2.2	Assess and address challenges with the digital health information system (HIS) that impede full-scale adoption and routine use in the clinical care of NCDs.
2.3	Collect data at the national level on NCD risk factors at least every five years to inform targeted prevention efforts.
3.	Strengthen the availability and timely access to NCD-related services, including testing and specialty services.
3.1	Increase availability and access to affordable diagnostic testing, including point-of-care (POC) testing (especially HbA1c testing), at the lower-level facilities.
3.2	Establish and regularly update a health workforce registry to ensure the availability of an adequate number of health professionals, including specialists for NCD-related complications to provide service coverage based on current and projected population health needs.
3.3	Strengthen equipment maintenance and management protocols and procedures to improve equipment functionality and accuracy of results.

Table 4. Summary of Recommendations (Cont'd)

4.	Ensure consistent availability of safe and affordable medications and supplies for NCD care.
4.1	Strengthen supply chain management to reduce stockouts of medicines and POC diagnostic tests and other laboratory supplies and to improve quality control of medicines and supplies.
4.2	Review and update the national essential medicines list (NEML) at least every two years.
5.	Building upon the existing National Chronic Non-Communicable Disease Policy and Multisectoral Plan for Grenada (2013–17), develop a medium-term work plan specifically focused on NCD prevention activities (including primary and secondary prevention strategies, such as reducing modifiable risk factors and implementing screening programs).
5.1	Adopt primary prevention strategies aimed at reducing tobacco use, harmful alcohol use, unhealthy diets, and physical inactivity.
5.2	Establish national screening programs for NCDs.

Appendix 1: Example of Register for Adults and Elderly Used at a Health Center



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REGISTER FOR ADULTS AND THE ELDERLY (20 YEARS AND OVER) ... Page 1

S. No.	Name	Address	Sex	Age	First clinic visit this year	Diseases/Conditions First Detected or Reported this Year																No. Diagnosed	Referred to Hosp. Specialist	First Screening This Year						First Positive Result					
						Diabetes	Obesity	Hypertension	URTI	Urinary T. Infec.	Eye Inf.	Arthritis	Alcoholism	Other Psychogenic	Pelvic Inf. Disease	Acc. Inf. Traff	Acc. Inf. Home	Acc. Inf. Other and Unspec.	Other	Symp. Signs				Diabetes	Hypertension	Cervix Cancer	Breast Cancer	Prostate Cancer	Other	Diabetes	Hypertension	Cervix Cancer	Breast Cancer	Prostate Cancer	Other

Appendix 2: Example of Register for Adults and Elderly Used at a Health Center

PARISH	FACILITY
St. George Parish	1. Woburn Medical Station 2. St. George's Health Center 3. Grand Anse Medical Station
St. David Parish	4. Westerhall Medical Station
St. Patrick Parish	5. Sauteurs Health Center
St. Mark Parish	6. Grand Roy Medical Station
St. John Parish	7. Victoria Medical Station
St. Andrew Parish	8. Grand Bras Health Center 9. Crochu Medical Station
Carriacou	10. Hillsborough Health Center

Appendix 3: List of Variables Used for Data Extraction from Medical Records

Health center
Gender
Year of birth
Date of first measurement (when diagnosis was made)
Height (inches) at first measurement
Weight (lbs) at first measurement
RBG (mg/dL) at first measurement
FBG (mg/dL) at first measurement
HbA1c % at first measurement
Cholesterol (mg/dL) at first measurement
SBP (mmHg) at first measurement
DBP (mmHg) at first measurement
Date of penultimate measurement (prior to last measurement)
RBG (mg/dL) at penultimate measurement
FBG (mg/dL) at penultimate measurement
HbA1c % at penultimate measurement
Cholesterol (mg/dL) at penultimate measurement
SBP (mmHg) at penultimate measurement
DBP (mmHg) at penultimate measurement
Date of last measurement
RBG (mg/dL) at last measurement
FBG (mg/dL) at last measurement
HbA1c % at last measurement
Cholesterol (mg/dL) at last measurement
SBP (mmHg) at last measurement
DBP (mmHg) at last measurement
DM
Date of DM diagnosis
Date DM treatment started
Treatment for DM
DM medications
Date last hospitalized for diabetes-related condition
Reason for diabetes-related hospitalization
HTN
Date of HTN diagnosis
Date HTN treatment started
HTN medications

Appendix 4: Core Indicators by Disease

The following lists the 22 core indicators grouped by disease that were extracted from the WHO Noncommunicable Disease Facility-based Monitoring Guidance: Framework, Indicators and Application. Of note, 39 optional indicators were included in the guidance document, but are not listed here.

Hypertension and cardiovascular diseases

1. Availability of hypertension core medicines.
2. Availability of CVD core medicines.
3. Availability of a functional blood pressure measuring device.
4. Blood pressure control among people with hypertension.

Diabetes

1. Availability of diabetes core medicines.
2. Availability of plasma glucose testing..
3. Availability of of HbA1c testing.
4. Glycaemic control among people with diabetes.

Chronic respiratory diseases

1. Availability of asthma core medicines.
2. Availability of chronic obstructive pulmonary disease core medicines.
3. Asthma control.
4. Chronic obstructive pulmonary disease control.

Cancers—Breast cancer

1. Clinical breast evaluation for early diagnosis of breast cancer among women aged 30–49 years with signs and/or symptoms associated with breast cancer.
2. Timeliness of referral for breast cancer diagnosis among women aged 30–49 years with associated signs and /or symptoms of breast cancer who had suspicious findings from clinical breast evaluation.

Cancers—Cervical cancer

1. Availability of human papillomavirus testing.
2. Cervical cancer screening with high-performance test among women aged 30–49 years.
3. Cervical cancer screening among women aged 30–49 years.
4. Cervical cancer screening test positivity among women aged 30–49 years.

Cancers—Childhood cancer

1. Clinical evaluation for early diagnosis of childhood cancer among children with signs and/or symptoms associated with childhood cancer.
2. Timeliness of referral for childhood cancer diagnosis among children with associated signs and/or symptoms of childhood cancer who had suspicious findings from clinical evaluation.

Cancers—General cancer

1. Clinical evaluation for early diagnosis of cancer among people with signs and/or symptoms associated with cancer.
2. Timeliness of referral for cancer diagnosis among people with associated signs and/or symptoms of cancer who had suspicious findings from clinical evaluation.

Appendix 5: Selected Health System and Health Indicators in Four OECS Countries

		DOMINICA	GRENADA	ST. LUCIA	ST. VINCENT & THE GRENADINES	REGIONAL* AVERAGE
GENERAL	Population (2021)1	72,413	124,610	178,652	104,332	–
	Income level	Upper Middle	Upper middle	Upper middle	Upper middle	–
	Public expenditure on health as % of GDP (2019) [1] *PAHO/WHO recommended benchmark: 6%*	3.5	2.1	4.9	3.2	3.9
	Out-of-pocket expenditure as % of total health expenditure (2019) [1]	33.9	54.4	23.9	29.1	32.2
	Life expectancy at birth (2021) [1]	78	2.5	76	72.8	72.2
NCD-RELATED	Prevalence of overweight and obesity among adults (2016) [2]	60.3	51.4	48.1	55.0	62.5
	Prevalence of physical inactivity in adults (2016) [2]	21.6	57.4	79.5	46.1	39.3
	Prevalence of raised fasting blood glucose (2014) [2] **	11.1	11.1	14.5	10.6	8.3
	% with diabetes achieving control	n/a	n/a	12 (2019-20) 4 [4]	n/a	33.1 [5]
	Prevalence of raised blood pressure (2015) [2] **	22.5	24.3	27.1	23.3	17.6
	% with hypertension achieving control	n/a	n/a	12 (2019-20) 4 [4]	15 (2015) [6]	23.6 [7]
	Percentage of deaths from NCDs (2019) [3]	n/a	83	82	79	81.9 [1]
	Total number of NCD deaths (2019) [3]	n/a	840	1,200	740	–
	Probability of premature mortality from NCDs (%, 2019) [3]	n/a	23	18	21	–
	STEPS survey/comprehensive health examination survey every 5 years [3]	✗	✗		✓	–
	National integrated NCD policy/strategy/action plan [3]	✗	✗		✓	–
	Evidence-based national guidelines/protocols/standards for the management of major NCDs [3]	✓	✓		✓	–
	Drug therapy (including glycemic control)/counselling to prevent heart attacks and strokes [3]	✗	✗		✓	–

Note: ✗ = not achieved; ✓ = partially achieved; ✓ = fully achieved; * = data based on countries in the region of the Americas as classified by PAHO/WHO unless cited otherwise; ** = more recent data available for some countries but for comparison, data from the same source is shown.

[1] PAHO/WHO Health in the Americas+. 2021. https://hia.paho.org/en
[2] Pan American Health Organization. 2019. NCDs at a Glance: NCD Mortality and Risk Factor Prevalence in the Americas. Washington, DC: PAHO.
[3] WHO Noncommunicable Diseases Progress Monitor Reports. 2022. https://apps.who.int/iris/bitstream/handle/10665/353048/9789240047761-eng.pdf?sequence=1&isAllowed=y
[4] Based on population level estimates using data from STEP 2019-20 report. *Findings from: Final Report: Assessing the Care Cascade for Diabetes and Hypertension in St. Lucia. Mixed Methods Study Utilizing Qualitative Data from Health Professionals and Service Users and Quantitative Data from The St. Lucia Steps 2019–20 Survey.* World Bank. 2023.
[5] Based on pooled data from selected countries in Latin America and the Caribbean in a 2018 study: Manne-Goehler, Jennifer, et al. "Health Systems Performance for Diabetes in 25 Low-and Middle-Income Countries (LMICs), 2005–2016." 2018. Diabetes 67.Supplement_1.
[6] Based on study sample in most recent STEPS report for St .Vincent and the Grenadines
[7] Based on pooled data from selected countries in Latin America and the Caribbean in a 2019 study: Geldsetzer, Pascal, et al. 2019. "The state of hypertension care in 44 low-income and middle-income countries: a cross-sectional study of nationally representative individual-level data from 1· 1 million adults." The Lancet 394.10199: 652-662. Appendix Table S6. The hypertension care cascade by region when weighting each country proportional to its population size.