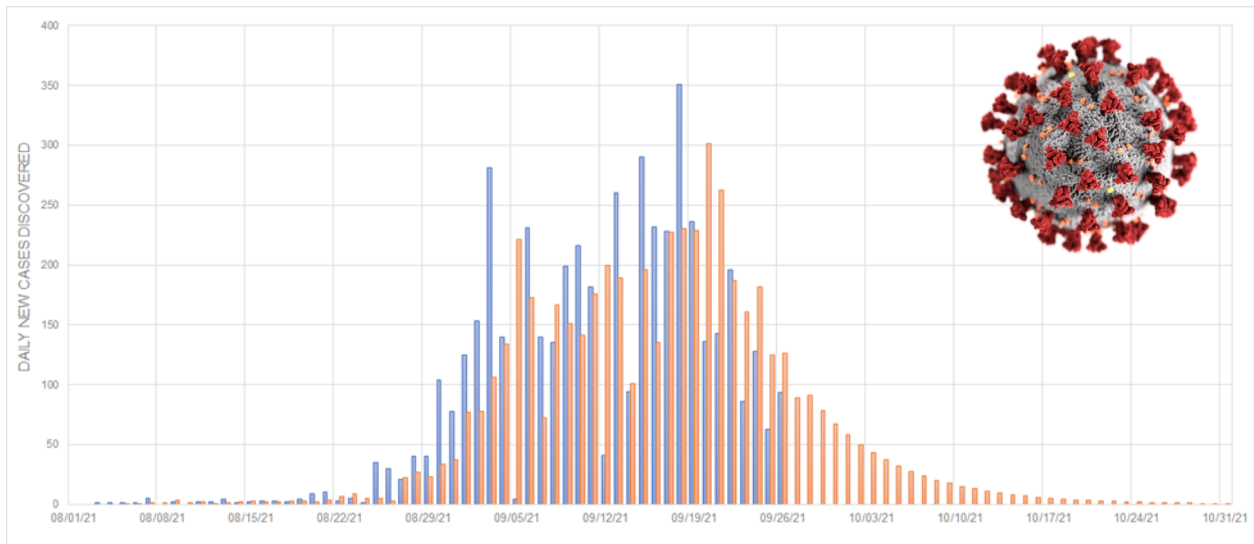


**WINDWARD  
ISLANDS  
RESEARCH  
& EDUCATION  
FOUNDATION**



*2021 Annual Report*

**Daily new discovered cases of SARS-CoV-2 (blue) and projected number of cases till October 31<sup>st</sup> (orange) (modeled on Monday 27th September using from data supplied by Dr. Shawn Charles, Grenada's Chief Medical Officer): total new cases anticipated to be discovered if the rate of testing remains constant from September 27<sup>th</sup> to October 31<sup>st</sup> = 600-800). This graphic was updated using exponential smoothing , but the model accurately predicted the decline of the outbreak in Grenada, which had its peak on 18th September 2021.**



### **Mission Statement**

WINDREF seeks to advance health and sustainable environmental development through multi-disciplinary research and education programs. WINDREF strives for program excellence by promoting collaborative relationships between internationally recognized scholars and regional scientists, and by adhering to the highest ethical and academic standards in the design and conduct of research.

### **Goals**

- To provide a scientific resource centre capable of coordinating international collaborative research of the highest caliber in the areas of medicine, medical and veterinary public health, environmental health, anthropology, sociology, ecology, marine and terrestrial biology, and ethics.
- To provide a first rate academic opportunity to scientists from the Caribbean and around the world through unique research opportunities that enhances the knowledge and welfare of local and international communities.
- To conduct applied scientific research for the benefit of community and health development at the local, national and international levels.
- To share relevant scientific information with local and international communities in the pursuit of evidence-based policies.

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## Director's Report on WINDREF Activities in 2021

The Global SARS-CoV-2 pandemic dominated our lives as it did in 2020 despite the introduction, at the beginning of the year, of many different, but all highly effective and available vaccines. The evolution of the *Delta* variant significantly altered the virus' transmissibility changing the epidemiology, economic, and public health importance of the pandemic. Having had no community spread in Grenada for the first year and a half, the arrival of the *Delta* variant in August produced a rapid outbreak, which peaked on September 18<sup>th</sup> and fell as quickly as it rose with only a few cases remaining in the country by the end of October. The further evolution of the SARS-CoV-2 virus and the emergence of the Omicron variant in South Africa at the end of November, which was many times more transmissible than the Delta variant, spread rapidly around the world and reached Grenada around the middle of December resulting in a 2<sup>nd</sup> wave. Fortunately, the Omicron variant has not proved to be as pathogenic as the Delta variant and by the end of 2021, although there were many diagnosed cases in Grenada, no one had been admitted to the hospital or died from this new variant. Experts suggest that in fully vaccinated individuals, the Omicron variant may be behaving more like the common cold, which is caused by four other coronaviruses which circulate globally. A number of articles in leading journals suggest that the Omicron variant replicates in the upper respiratory tract, has a different mechanism of entry into the cells to previous variants which may partially explain its decreased pathogenesis. We await the further evolution of additional new variants in 2022 and we are well placed

in investigating SARS-CoV-2 variants in Grenada with the addition of sequencing equipment and access to bioinformatic databases.

The corridor side laboratory in WINDREF was given a significant upgrade by SGU in 2020/2021, and Real Time qPCR testing was started in the molecular lab in mid-February 2021. Prior to this, all PCR tests had been conducted in partnership with the molecular lab in the SVM. The opening of the new lab greatly enhanced the working conditions for the laboratory staff and facilitated the collection in Open Modica Hall of samples and their rapid transfer directly into the WINDREF lab through a hatch in the wall of the molecular lab. Overall, more than 18,000 PCR tests were completed by the lab team with an average delivery time of results of around 6 hours. The results of the screening, surveillance, and general testing program, can be seen in the PCR testing program section of the Annual Report.



Vanessa Matthew-Belmar and Nandy Noel conducting the isolation of the RNA virus from newly collected samples in the refurbished molecular lab in WINDREF.



**Dr. Bhumika Sharma and Mrs. Elsa Chitan, the head of the laboratory, in the PCR room which houses the qPCR equipment. During the first Grenada wave which occurred from mid-August to the end of September at the peak of transmission up to 600 samples were tested by PCR per day, and results returned in a timely manner.**

It is likely that the rapid turnaround of PCR test results, identification of positive individuals and their isolation, together with quarantine of all contacts and their testing at the appropriate time, in combination with all other public health measures, help to bring the August – October outbreak under quick control. We thank SGU for providing the funding for the new lab, the materials, and the staff, including the hiring of 8 nurses to meet and test students arriving at the Maurice Bishop International Airport, and to provide vaccination and testing services personnel for the Gouyave Polyclinic. This small, but highly motivated team played an important role in the testing and vaccination program in Grenada during the year.

In December, two sequencing machines were acquired, and towards the end of the year, with the advent of a number of positive COVID-19 cases in Grenada, 11 samples, from individuals who had not left Grenada, were

sequenced. The samples originated from individuals living in different parts of Grenada, who had no previous travel history in the past 14 days, and all had tested PCR positive with a CT value of less than 25 for SARS-CoV-2. All 11 samples were sequenced as the BA.1 clade of the Omicron variant of concern, and were reported by the Ministry of Health to the Pan American Health Organization, in accordance with the International Health Regulations (IHR) (2005), Article 6 on “Notification”. Members of the SGU/WINDREF/MOH lab teams received online training in the sequencing technique by Members of Professor Christine Carrington’s PAHO-WHO Reference Sequencing Laboratory at the UWI St. Augustine Campus located in Trinidad.



**Members of the WINDREF lab team conducting the first sequencing tests with the online guidance from Dr. Nikita Sahadeo, Mr. Vernie Ramkisson and Mr. Soren Nicholls from Professor Carrington’s lab.**

The sequencing equipment will be available to analyze the SARS-CoV-2 variants seen in Grenada since the start of the outbreak here, and will provide a valuable resource for regional requests for sequencing to be conducted for other countries. If any patients admitted to the Grenada General Hospital or unfortunately pass away with a diagnosis of COVID-19,

their samples will be sequenced to determine the variant. The equipment also provides enormous potential for understanding the further evolution of the SARS-CoV-2 variants and of other viral, bacterial, and protozoan and helminth pathogens, which has not been possible to date. This will help understand the epidemiology of viral infections, such as dengue, and the zoonotic potential of the canine hookworm species, for example.

Most of the WINDREF research projects had to be curtailed during the year, as curfews were imposed, schools were closed, large gatherings were banned, and many of our research programs were put on hold. Zoom meetings continued to be the norm and as many of the research projects that could be continued, progressed.

During 2021, a couple of new programs received funding and were launched during the year. These included the Caribbean Cancer Portal, which is a partnership between the Pan American Health Organization (PAHO), Barbados and Eastern Caribbean Office, the Ministry of Health, Grenada, the Caribbean Association of Oncology and Hematology, the Grenada Cancer Society, the Grenada National Chronic Non-communicable Disease Commission, and WINDREF.

The Innovative Nature-based Solutions to Enhance Community Resilience in Grenada Program was also launched during the year funded by the Caribbean Biodiversity Fund. A project manager, Ms. Kerricia Hobson, was recruited in December, and the other members of the team will be recruited during the latter part of the year and early in 2022.

The Baroness Howells Sports for Health Program launched in 2010, restarted its activities

in November with an online exercise program. In addition, this program facilitated the vaccination of the Grenada Olympic and Pan American Health Organization games Grenada teams.



**Members of the Grenada Pan American Games with Veda Bruno Victor, General Secretary, Grenada Olympic Committee (front center), and WINDREF Directors**

Another project funded in 2021 was a Wastewater Treatment and Recycling Project which was fully funded by the Caribbean Development Bank. This three year initiative which has Drs. Cal Macpherson and Lindonne Glasgow as its co-PI's, aims to recycle the wastewater from the Princess Alice Hospital to re-purpose it for agricultural use. This will provide the local farmers in the Mirabeau area with a sustainable water supply, which has recently become less reliable given the impacts of climate change on what was a predictable rainy and dry season. This project is a collaborative initiative with the National Water and Sewage Authority, the Ministry of



Health, several local NGO's, local community members, and international partners. An innovative water treatment processing plant will be imported from collaborators in Scotland, and the filtration system utilizes recycled glass instead of sand for purifying the water. The unit will be powered using solar power and will be the first of its kind in the region. Should this pilot project prove successful, it will be replicated in many other Small Island Developing States in the region, and potentially, elsewhere. The program recycles glass bottles, reduces the impact of mining sand for water filtration units, and provides a clean safe sustainable water supply which has no running cost. Its aim will be to mitigate the impact of climate change in rural communities.

Presentations on research outcomes were presented at a number of different conferences held online during the year, and these are listed in the conference section of this report. On Saturday October 23<sup>rd</sup>, SGU held its Research Day, and a number of WINDREF Research Scientists presented their work at this event. Ms. Tania Khan received the award for the best WINDREF presentation at Research Day.



**Tania Khan receives a plaque from the Provost of SGU, Dr. Glen Jacobs, for best WINDREF presentation at Research Day**



**Research Day award winners 2021**

The planned Keith B. Taylor Memorial Lecture, which was to be given by Dr. Carissa Etienne, Director of PAHO, was once again postponed this year.

The Mike Fisher Memorial Award for 2021 was awarded to Professor Richard Horton, Editor-in-Chief of The Lancet for the past 26 years. During his tenure as Editor-in-Chief, Professor Horton has made enormous contributions to the widest possible field of One Health.



**Professor Richard Horton at the House of Lords WINDREF Dinner, December 2018.**

During 2021, we lost a number of distinguished members from our WINDREF comm-

unity, including Mary Jeanne Kreek, Ed Fischer, and Adetokunbo Lucas.

sights into the world of global health. We miss all of their contributions greatly.

Mary Jeanne Kreek was a valued member of our Board of Directors from 2006, passed away on Saturday 27th March. Our sincere condolences to her daughter, Esperance, who joined our Board of Directors in 2019, and her brother, Robert, and their families.

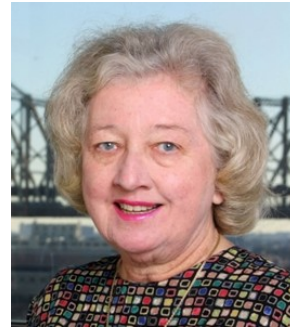
Dr. Kreek led and financially supported our joint project between Rockefeller University and WINDREF on "Genetic Correlates of the Addictive Diseases: Cocaine, Alcohol and Marijuana Addiction" which she partnered locally with Dr. Noël from 2005 to 2017. Over the decades, Mary Jeanne was an inspiration to many of our Research Scientists and hosted a number of them in her lab at Rockefeller.

Mary Jeanne was a Physician-scientist, the Patrick E. and Beatrice M. Haggerty Professor, and a senior attending physician at The Rockefeller University. She was internationally known for her work, which included new treatments and a greater understanding on drug and alcohol addiction for which she received many awards from many institutions.

We very much appreciated her contribution and commitment to WINDREF. She was a great friend of ours and also to SGU and was always wonderful company.

Ed Fischer was a Founding Member of the WINDREF Scientific Advisory Board, and his sound advice to us during his many annual visits was always inspirational. Dr. Fischer received the Nobel Prize for Medicine in 1992.

Ade Loukas delivered the 2<sup>nd</sup> WINDREF Annual Lecture in 2001 and regularly gave us in-



**Mary Jeanne Kreek**  
1937 - March 27, 2021



**Ed Fischer**  
1920 – August 27, 2021



**Adetokunbo Lucas**  
1931 – 25 December 2020

During 2021, Dr. Allana Roach was appointed as a Research Fellow, and Dr. Bhumika Sharma and Mrs. Vanessa Matthew Belmar were appointed as Research Scientists.



**Dr. Allana Roach**



**Dr. Bhumika Sharma**



**Mrs. Vanessa Matthew Belmar**

Collaboration between WINDREF and the Grenada Cooperative Nutmeg Association (GCNA) continued in 2021 with the signing of an MOU between the two institutions to facilitate the identification of the sex of young nutmeg plants using qRT-PCR. It is impossible to determine the sex of nutmeg plants before 5-7 years of years, except through molecular PCR techniques. This places a economic burden on local nutmeg farmers, as male trees need to be removed to provide an ideal ratio of 50 fe-

male to 1 male plant to maximize nutmeg production. PCR can identify the sex of the young plants, thus, improving the selection of the right ratios and planting of the same, saving years of production time.



**The Honorable Minister of Agriculture, Lands, and Forestry, Hon. Peter David (Right) and Dr. Trevor Noël (Left) look on as the GCNA Mr. Leo Cato and Dr. Calum Macpherson sign the MOU facilitating the training of MOA staff in molecular techniques to sex nutmeg seedlings.**

On behalf of the members of the Grenada, United Kingdom, and United States Boards of Trustees and Directors, I would like to thank our collaborators and donors for making 2021 a very successful year for WINDREF. We thank all of our donors for supporting the work of WINDREF over the past year, and look forward to another successful year in 2022 which we hope will see the end of the SARS-CoV-2 pandemic.

**Calum N.L. Macpherson  
Director, WINDREF**

## WINDREF Organization

### Board of Directors

- Baroness Howells of St. David's, OBE (Emeritus President)
- Calum N. L. Macpherson, PhD, DIC, FRSPH (Vice President & Director)
- Trevor P. Noël, MPH, PhD, FRSPH (Deputy Director)
- Margaret Lambert, MA, (Secretary/Treasurer)
- Karen Lawson, PhD
- Ellen Ratner, MEd, LLD
- Joseph Feldman, MD
- Esperance Schaefer, MD, MPH
- Kirani James, BSc, CBE
- George McGuire, MSc

### Board of Trustees (United Kingdom)

- Baroness Howells of St. David, OBE, Emeritus President
- Lord Stevens of Kirkwhelpington, KStJ, QPM, DL, FRSA,
- Lord Trees of The Ross, DVM, PhD
- Neil Poulter, MD
- Patrick Orr
- Margaret Lambert, MA (Ex Officio)
- Calum Macpherson, PhD, DIC, FRSPH (Ex Officio)

### Scientific Advisory Board

- John R. David, MD
- Malcolm A. Ferguson-Smith, MBChB, FRCP, FRCPATH
- Calum Macpherson, PhD, DIC
- Anselm Hennis, MBBS, PhD, FRCP, FACP
- Ian McConnell, BVMS, FRSE, F. Med. Sci.
- Hugh Montgomery, MD
- Baron Peter Piot, MD, PhD, CMG, FRCP
- Neil Poulter, MD, PhD
- Melinda S. Sothorn, PhD, CEP
- Richard Scribner, MD, MPH
- Lord Trees of The Ross, DVM, PhD

- Joy St. John, BSc, MBBS, MPH
- Thomas Meade, CBE, DM, FRCP, FRS
- Graham Serjeant, MD, FRCP, CMG
- M.S Swaminathan, MBBS
- John Ferguson, MBChB, FRCGP

### Administration—Grenada

- Dr. Randall Waechter, Grants Coordinator
- Mr. Kareem Coomansingh, Assistant Grants Coordinator
- Ms. Isha English, Assistant Administrator
- Mrs. Naomi Whyte, Executive Secretary
- Mrs. Yvette Simon, Secretary
- Ms. Celia Clyne Edwards, Legal Support
- Mr. Hayden Redhead, Program Manager
- Ms. Kerricia Hobson, Project Manager, Innovative Nature-based Solutions to Enhance Community Resilience
- Mrs. Ramona Otway, Accountant
- Mr. Michael Cahill, Legal Support, USA
- Mrs. Nakita Francis, Grants and Finance Officer
- Ms. Nikita Cudjoe, SARS-CoV-2 Program Manager
- Ms. Roberta Evans, Zika and Neurodevelopment Project Manager
- Mrs. Stephanie Holmes, Saving Brains Project Manager
- Mrs. Elsa Chitan, Lab Technician
- Ms. Nandy Noel, Data Manager

### Administration—United States

WINDREF (USA) was established as a 501(c)3 non-profit organization to facilitate coordination of the USA activities and to administer charitable donations from the United States and worldwide. Its goal is to enhance the development of WINDREF's research and educational programs. The offices are located in Great River, New York. Ms. Jennifer Rudolph provides administrative and logistical support, and Mr. Michael Cahill provides legal support



### **Administration—United Kingdom**

WINDREF (UK) was set-up as a charitable trust in Winchester, England in 1999 to promote collaboration between WINDREF scientists and academic centers of research in the United Kingdom and the European community. A Board of Trustees was appointed in 1999 to oversee the activities of WINDREF (UK). The office is located in London. Mr. Patrick Orr serves as the WINDREF (UK) accountant, along with Mr. Stan Lee serves as the treasurer, provide oversight of the financial operation and chartable status of WINDREF (UK).

### **Senior Research Fellows**

- Hugh W. Ferguson, BVM&S, PhD, Dipl. ACVP, MRCVS, FRCP
- Paul Fields, PhD
- Paul Garner, MBBS, MD
- Mary Glenn, PhD
- Duane Gubler, ScD
- Stephen Morse, PhD
- Leslie Ramsammy, PhD, DSc (Hon)
- Douglas Slater, MD, MPH
- Stanley Weiss, MD
- Melinda Southern, PhD
- Richard Schribner, MD, PhD
- Cheryl Cox-Macpherson, PhD
- Marios Loukas, MD, PhD
- A. Desiree LaBeaud, MD, MSc
- Hugh Sealy, PhD, P. Eng
- Timothy Endy, MD, MPH
- Roger Radix, MD, MPH, MIB, FRSPH
- Jonathan Ashcroft, MD, MSc
- Anselm Hennis, MBBS, PhD, FRCP, FACP
- Neil Poulter, MD, PhD

### **Research Fellows**

- John Adamski, MD, MSc, MPH
- Muge Akpınar-Elci, MD, MPH
- Glennis Andall, PhD
- Charles Avgeris, MD, MSc
- Satish Bidaisee, DVM, MSPH, MSB,

FRSPH, EdD

- Grant Burgess, PhD
- Reccia Charles, PhD
- Sonia Chehil, MD, FRCPC
- Andrea Easter-Pilcher, PhD
- Martin Forde, ScD
- Mark Gibson, MA
- Orazio Giliberti, MD
- Richard Kabuusu, DVM, MPH
- Victoria Kimotho, MPH
- Barbara Landon, PsyD
- Clare Morrall, PhD
- Shamdeo Persaud, MD, MPH
- Christine Richards, PhD, MPH
- Bonnie Rusk, MSc
- Karen Schioler, PhD
- Shanti Singh, MD, MPH
- Kamilah Thomas-Purcell, PhD, MPH
- Randall Waechter, BBA, PhD
- Trevor Noël, PhD, MPH
- Laura Colket, PhD
- Tracy Penny-Light, PhD
- Carlene Radix, MD, MPH
- Vishaka Vasuki, BVSC, MSc
- Michelle Fernandes, MRCPCH, DPhil
- Karen Blackmon, PhD
- Lindonne Glasgow, PhD, MPH
- Allana Roach, PhD

### **Research Scientists**

Sadiq Al-Tamini, Sumita Asthana, Yitzhack Asulin, Bishara Baddour, Jean-Pierre Barakat, Matthew Beeson, Matthew Boles, William Brown, Ella Cameron, Nicholas Caputo, Rae Connolly, Abraham El-Sedfy, Daniel Firer, Kristy Fisher, Scott Forman, Brandon Francis, Vamsi Guntur, François Hallé, Anthony Junck, Megan Kaminskyj, Sebastian Kreitzschitz, Erik Lacy, Ede Tyrell, Richard Lehman, Jason Lowther, Setshidi Makwinja, Paul Mancuso, Baher Maximos, John McCormack, David Melamed, Kirk Minkus, Jerry Mitchell, Jessica

Morlok, Kevin Neill, Bayela Nfila, Yolanda Ng, Michael Nillas, Andre Panagos, Barry Politi, Sandeep Pulim, Sean Ramsammy, Justin Rebo, Laura Robinson, Corey Schwartz, Sarah Scott, Christopher Skaff, Nadia Solomon, David Steinberg, Derrick Tlhoiwe, Sarah Treter, Nghia Truong, James Tsai, Dan Twyan, Frank Van Natta, Ru-Amir Walker, Juliette Williams, David Winokur, Colleen Wunderlich, Elliot Yung, Regan Schwartz, Katherine Brigman, Mmakgomo Coangae, Felicity Lillingston, Keith Bensen, Sadik Uddin, Rakesh Patel, Mathew Browne, Jessica Clayton, John Hollerman, Alan Rhoades, Nikita Cudjoe, Karen Brennan, Stephanie Holmes, Roberta Evans, Victor Ashby, Jeffon Telesford, Karla Farmer, Molly Ziegler, Christopher Gibson, Shanice McKain, Steve Nimrod, Elsa Chitan, Nandy Noel, Bhumika Sharma, Vanessa Matthew-Belmar.

## WINDREF Lectures

### Research Lecture Series:

1994: Stephen Morse- "Emerging and Re-emerging Viruses"  
1995: Stanley Weiss- "The HIV Pandemic"  
1996: Duane Gubler- "Dengue: A global problem of increasing importance"  
1997: Graham Sergeant- "Sickle Cell Disease"  
1997: David C Clyde- "Health and Disease in Grenada: A historical perspective"  
1998: Leslie Ramsammy- "Tackling our Agricultural and Medical Problems through One Health One Medicine Approach"  
1998: Robert Redfield- "The Epidemiology of HIV/Aids"  
1999: MS Swaminathan- "The Green Revolution"

### WINDREF Lecture Series:

2000: Sir Kenneth Stuart, MD, DSc (Hon)- "Caribbean Health Research Needs"  
2001: Professor Adedokumbo Lucas, MD, DPH, DSc (Hon)- "International Collaboration for Health Research"  
2002: Lord Walton of Detchant, MBBS, MD, DSc, MA (Oxon), FRCP- "A Doctor in the House"  
2003: Professor David Molyneux, MA, PhD, DSc, FIBiol- "Success and Failure in Parasitic Disease Control: Lessons Learnt?"  
2004: Lord Soulsby of Swaffham of Prior, MRCVS, DVSM, MA, C.Biol., F.I. Biol., DSc (Hon) - "Zoonoses, Old and New. . . the Price of Freedom is Eternal Vigilance"  
2005: Mary-Jeanne Kreek, MD- "Drug Abuse and Addictions: Some Scientific Approaches to a Global Health Problem"  
2006: Eric Ottesen, MD- "Understanding the Science, Attacking the Problem: Lymphatic Filariasis and Beyond"  
2007: John Rouben David, MD- "Leishmaniasis: A novel approach to control visceral leishmaniasis and another to treat cutaneous leishmaniasis"  
2008: Professor Sir Andrew Haines, MBBS MD FRCGP FFPHM FRCP FMedSci- "Climate Change, Energy Use and Health in the 21<sup>st</sup> Century"  
2009: Yvette Sheline, MD- "Brain Imaging: New Insights into Neuropsychiatric Disorders"  
2010: Valentin Fuster, MD, PhD- "The worldwide challenge of cardiovascular disease"  
2012: Baron Peter Piot, MD- "Global health in a changing world"  
2013: Robert Gallo, MD- "Viruses and Epidemics: Our attempts to control them with an emphasis on HIV and AIDS"  
2014: John Strasswimmer, MD, PhD- "Dr Albert Schweitzer, his life, legacy and the future: A celebration of his centenary"  
2014: Desiree LaBeaud, MD, MS- "Chikungunya and Dengue in Grenada and the

Americas: What are we in for?"

2015: Ruth Macklin, PhD- "Ethical Challenges in Confronting Disasters: Some Lessons Learned"

2016: Ian McConnell, BVMS, PhD, MA, FRSE- "One Health: Lessons from the Past, and Future Opportunities"

2017: Kenneth R. Bridges, MD- "Rise of Sickle Cell Disease and Novel Approaches to its Treatment"

2018: Timothy Endy, MD, MPH- "Understanding Dengue Pathogenesis and Essential Areas for Research"

2019: Timothy Endy, MD, MPH- "Overview of Dengue disease research at SUNY Upstate Medical University and prospective primary dengue study with St George's University/ WINDREF"

#### **Distinguished speakers at the House of Lords WINDREF dinners**

1999- Lord Walton of Detchant "A Doctor in the House"

2001- Lord Rix "A Wonderful World"

2008 Prof David Molyneux "The elimination of the neglected tropical diseases"

2010 Lord Sebastian Coe "Sport for Health in the Caribbean: The Inspiration of the Olympics" and Professor Alan Fenwick "The Changing face of the neglected tropical diseases".

2014 Prof Gareth Williams "The Global Challenge of Diabetes" and Professor Harry Rutter "Where next for obesity"

2017- Prof David Heymann "Global Health Looking for the Future"

2018 Dr Richard Horton "Global Health in a

wounded World" and Kirani James "Sports for Health"

#### **Mike Fisher Memorial Award Recipients**

Mike Fisher graduated from King's College, London with a PhD in chemistry/ pharmacology. He joined Merck in 1957 and worked with them as vice president of research and headed a lab of 60 research scientists until 2004.

It was his scientific intellect and observational scholarship which led to perhaps his most profound discovery: that of the fungus, *Streptomyces avermillois* from which the drug ivermectin was derived. In the 1970's his lab was receiving thousands of soil and plant samples from all over the world which he was screening for their effects on a number of organisms. One sample sent to Mike Fisher from Dr. Satoshi Omura from a golf course bunker in Japan, contained *S. avermillois* which was lethal to Mike's lab mice and when others may have discarded the compound Mike persevered and tested ever more minute doses of the substance. He thus discovered a new powerful drug which was discovered to be effective against roundworm parasites. Mike received the Thomas Edison award for creative discovery and the veterinary and medical world received a compound that revolutionized the treatment and cure of a myriad of infectious diseases. Today as a result of the discovery of ivermectin over 35 million people no longer live under the threat of inevitably going blind from onchocerciasis (river blindness), millions more have been spared the gross disfigurement from lymphatic filariasis (elephantiasis and hydrocoele) and dogs and cats (heartworm), pigs, cattle, sheep, goats and horses live a healthier life because of ivermectin. Mike passed away at his Bel Air plantation home in Grenada on 20<sup>th</sup> April 2005. So many people and animals have benefited from

Mike's work. In 2015, the Nobel Prize for Physiology or Medicine was awarded jointly to Drs. William C. Campbell and Satoshi Omura for their role in the discovery of ivermectin.

### **The Mike Fisher Memorial Award Recipients**

2006 – Lord Lawson Soulsby  
2007 – Dr. Keith B. Taylor  
2008 – Lord May of Oxford  
2009 – Dr. John David  
2010 – Lord John Walton  
2011 – Prof Ade Lucas  
2012 – Dr. Donald Hopkins  
2013 – Prof R.C. Andrew Thompson  
2014 – Prof Alan Fenwick  
2016 – Sir Gordon Conway  
2017 – Dr. Charles R. Modica  
2018 – Prof Sarah Cleaveland  
2019 – Prof Janet Hemingway  
2021—Prof Richard Horton

## **Current Research Projects**

### **Caribbean Cancer Portal**

#### **Introduction**

Cancer is one of the chronic diseases that have imposed significant social and financial burdens on people and the health systems in the Caribbean. The incidence of cancer in the region has steadily increased over the last few decades. Comprehensive, structured, and responsive programs are needed to combat the trajectory of cancers as well as to improve the health outcomes of people affected. Cancer services groups in the region commonly face resource barriers that limit both the quality and quantity of services that can be delivered to target groups. The emergence in 2020 of COVID-19 has compounded the challenge, with several outreach programs having to halt

or scale-down activities. The preliminary results from a survey of some cancer patients in Grenada in 2020 indicated a need for continuous and enhanced education on cancer prevention, cancer patient care, and available services. Other support services are also needed to inform decision-making for better health outcomes.

#### **Development of the Caribbean Cancer Portal**

The Caribbean Cancer Portal was established to expand the range of services available for people affected by cancer in the Caribbean region, increase public access to cancer education and patient support services available through local and regional initiatives, and enhance decision-making by individuals regarding cancer prevention, treatment, and care. The concept for the Portal was developed by Dr. Lindonne Glasgow, an Assistant Professor in the Department of Public Health and Preventive Medicine and a WINDREF Research Fellow together with technical support from Mr. John Swope, a digital education specialist in the Office of Online Instructional Innovation at SGU.

The Caribbean Cancer Portal is operated by the Windward Islands Research and Education Foundation (WINDREF) with financial and logistical support from the Pan American Health Organization (PAHO) Barbados and Eastern Caribbean Office, the Ministry of Health in Grenada, the Caribbean Association of Oncology and Hematology (CAOH), Grenada Cancer Society (GCS), and the Grenada National Chronic Non-communicable Disease Commission (NCNCDC). Cancer patients and household/family members, caregivers, health prac-

titioners, and the general public will be able to engage in various activities on the platform.

Regional partners will collaborate to deliver synchronous and asynchronous cancer prevention and care education for the portal users. It is expected that education will lead to timely and appropriate decisions to improve health outcomes. The portal will also serve as a repository of information on oncology and related services available within and beyond the Caribbean region. The directory will expand patients and caregivers' access to information about a range of services and options for care. A supportive environment will be created for users to interact in theme-based (pre treatment, during treatment, post treatment) and general discussion forums. Resources will be hosted directly on the portal and through links to other platforms of regional and international partners.

The portal can be readily accessed by anyone from any location in the participating countries through a QR code or site address. The virtual services can be accessed continually during and following adverse events such as pandemics and natural disasters, when there is restricted movement of people, and when limited resources are available for transportation, consultation fees, etc. to access services. It is anticipated that users will be able to access the portal from the first quarter in 2022. The Caribbean Cancer Portal will be accessible primarily to residents in Grenada and St. Lucia in the first year of operation.

A Steering Committee was created in 2021 to provide oversight and input into this innovative new program.

## **Acknowledgements**

WINDREF would like to thank to PAHO, Barbados and Eastern Caribbean Office, for providing technical support for the project. Special thanks to the partner organizations for the contributions to enable the startup of the project: Ministry of Health in Grenada, Caribbean Association of Oncology and Hematology (CAOH), Grenada Cancer Society (GCS), and the Grenada National Chronic Non-communicable Disease Commission (NCNCDC). The Steering Committee members are specially recognized and thanked for providing guidance: Dr. Patrice Lawrence-Williams, Ms. Fiona Anthony, Dr. Owen Gabriel, Dr. Damian Greaves, Dr. Sonia Nixon, and Dr. Shawn Charles. Special thanks also to Ms. Sherry-Ann Joseph for assisting with her voluntary assistance of some of the organization of project activities. We also thank PAHO for providing financial support for this program.

*Submitted by: Lindonne Glasgow, John Swope and Calum Macpherson*

## **Global Challenges Research Fund (GCRF) One Health Project-Grenada**

WINDREF continued its partnership in the GCRF-One Health project in 2021 with network countries Grenada, Jamaica, Scotland and Kenya towards promoting sustainability of Water, Soil and Health. From small islands to large countries, efforts to promote sustainable water resource management is a priority for the socio-economic and health of communities. Interventions to ensure sustainability of water use, build climate resilience and in order to strengthen integrated management is the focus of this project. Healthy soil absorbs and provides safe and available water which is fundamental to life and cuts across

all social, economic, and environmental realities. Water security is increasingly being challenged through unsustainable human-water management strategies which compromises its availability, accessibility, and safety. Industrial effluents, large-scale farming, injudicious land use, anthropogenic environmental changes and growing demands have adverse effects on the supply and quality of water with compromised outcomes to health.

The Grenada team constituted WINDREF representatives, Dr. Calum Macpherson (Country lead), Dr. Lindonne Glasgow (Research Fellow and project lead), and Dr. Satesh Bidaisee (Research Fellow) in partnership with representatives of the National Water and Sewage Authority (NAWASA), Mr. Allen Neptune; Botanist/Chemist, Dr. Guido Marcelle; AKWATIX: Water Resources Management (Barbados), Dr. Adrian Cashman; TP Engineering (Grenada), Mr. Terrance Smith; Basic Needs Trust Fund (Grenada), Ms. Kizzy Abraham; Ministry of Social Development, Ms. Elaine McQueen and Mrs. Chrissie Worme-Charles; and Ministry of Health, Mr. Andre Worme.

The activities for 2021 included:

- Field work development on water reuse technology for Mirabeau hospital site
- Round table discussions and GCRF network conference
- Open Access Online Course

### **Water Reuse Site Development**

A selection criterion was developed to facilitate the selection of a site for the recycling of water and use of novel purification technologies. Underpinned by the One Health concept, the criteria included, *inter alia*, contributions to rural development, livelihood and sustenance, human health, environmental

preservation and development, and social inclusion. The Princess Alice Hospital at Mirabeau scored excellent in most criteria which included: The hospital is located in a rural part of the parish, St. Andrew, which has 26.8% of Grenada's population. The hospital is surrounded by productive farmlands owned by the hospital with portions leased to local farmers for cultivation. The hospital receives produce from the farmers, offsetting its operational budget. Both men and women farm the available lands as a source of income. The hospital consumes large quantities of water, most of it is used in the sluice. Currently, the grey water flows into open concrete drains travelling through agricultural plots. This wastewater contains detergents, some bio-hazardous waste, and pharmaceuticals. Its sewerage system is currently malfunctioning; black water is leaking into nearby agricultural lands creating a possible source of mosquitoes and pathogenic microorganisms. The negative impacts on soil health and human health are present at this site. There is space to place the water recycling equipment and redirecting grey water sources into the system is possible. This site is recommended because of the positive outcomes to the health and economy of the community. Equity among groups such a women and young people can be achieved by empowering them with the means for sustainable livelihoods.

The use of Activated Filter Media (AFM) will be employed to reduce the biological risk from bacteria and parasites as well as the chemical risk from the Mirabeau Site. AFM is a highly engineered product manufactured from recycling of brown and green glass bottles, processed to obtain the optimum particle size and shape. The spherical glass beads can measure as small as 0.2mm to 0.5mm and are stronger than steel containing a compo-

site of elements. The beads are then exposed to a 3-step activation process to increase their surface area by a factor of 300 for superior mechanical and electro-static filtration performance.



Figure: Tons of glass bottles arrive daily at the Dryden AFM plant outside Edinburgh, Scotland. The glass is sorted and the clear glass is recycled for the pharmaceutical industry, whilst the brown and green glass are ground into small glass beads. These glass beads are used to replace sand in water filtration units. This recycling of a waste product reduces the need for mining of sand. The beads are more durable, and together with AFM, can filter out much smaller particular and infectuous disease agents providing a greater quality of recycled water.

This project is funded by the Caribbean Development Bank in the amount of EC 1million dollars. Clean Water Wave and Dryden Aqua, located outside of Edinburgh, will develop and install a 40 foot container complete with the

filtration equipment which will be powered by solar panels at the Mirabeau site in 2022. The project will run for 3 years, following which the operation, and know-how, will be handed over for full management by the Ministry of Health and NAWASA. If the pilot study is successful, the aim is to replicate the project in different locations and perhaps even in different countries.

### Other GCRF Activities

The WINDREF team participated in round table discussions which focused on community, academic and business discussions with international stakeholders. Community stakeholder discussions focused on sustainable solutions for wastewater management, academic round table discussions engaged research and practice approaches towards implementing environmental innovation, technology and design approaches and business round table engagement provided a forum to match funding resources with community-based initiatives. Round table discussions throughout 2021 culminated in a GCRF network conference in August to present on the updates for each country location as well as support the development of a continuity plan going forward.

### Open Access Online Course

WINDREF in cooperation with UK Research and Innovation (UKRI), the Global Challenges Research Fund (GCRF), St. George's University and its Health, Polluted Water and Soils Network in Jamaica, Grenada, Kenya and Scotland offered a Free Open Access Online Course entitled: Water, Soil and Health: Sustainable Community Interventions during the period April to June 2021. The course aimed to support the exchange of knowledge, experience,

ideas, and capacity building to develop community-based solutions on how to achieve the triple health and environment co-benefits of access to clean water, a basic human right, healthy and productive soils and delivery of safe and nutritious foods.

Each GCRF network partner country contributed a module which focused on the following four modules:

- Industry Research and Innovation - Scotland
- Biological Wastewater: A Renewable Resource - Grenada
- Agrochemicals and Pollution - Kenya
- Mangroves and Human Health - Jamaica

The course attracted 578 participants from 46 countries who engaged in recorded presentations, live and interactive seminar, reading resources, discussion forum and quizzes. WINDREF's focus for this course was to promote sharing of knowledge and transfer of technology towards capacity building for a diverse and fully functioning ecosystem that provides nutrients, energy, water cycling and allows the soil to express its full potential to sustain humans, animals, and the environment.

*Submitted by: Lindonne Glasgow, Satesh Bidaisee and Calum Macpherson*

## **Zika and Neurodevelopment Among Infants in Grenada**

### **Background**

This study continues to explore any potential impacts of exposure to the Zika virus (ZIKV) on child neurodevelopment in Grenada. To date, the project has examined child development across the first five years of life. The research team hopes to continue following

the children beyond five years of age and is currently looking for funding to do so.

### **Sample**

According to the results of a nanoscale plasmonic gold (IgG) antigen array (pGOLD) on maternal blood samples, approximately 70% of the 388 infants enrolled in the study were exposed to ZIKV *in utero*.

### **Assessment**

Data is collected using a variety of neuropsychological measures (Oxford Neurodevelopmental Assessment (OX-NDA), INTER-GROWTH-21<sup>st</sup> Neurodevelopmental Assessment (INTER-NDA), A Developmental NEUROPSYchological Assessment (NEPSY-II), Reynolds Intellectual Assessment Scales, Second Edition (RIAS-2) and the Grenada Learning And Memory Scale (GLAMS) along with vision testing (CARDIFF Vision Tests), electroencephalography (EEG) and survey data encompassing participant sociodemographics, home environments and the arboviral and medical history of the child. Due to the COVID-19 pandemic, the research team collects maternal assessment data over the phone, and the child assessment data in the home instead of their local health center. Data is currently being collected on children aged 4 and 5 in the cohort.

### **Year 1 Outcomes**

Results from the first year showed that ZIKV exposed infants have developed on par with their unexposed peers. No differences were detected between the exposed and unexposed groups on Visual Acuity. All infant serum samples collected and tested for ZIKV, and the dengue virus (DENV) yielded negative results for both viruses. This means that children whose mothers were confirmed to be infected with ZIKV during pregnancy were



exposed to the virus *in utero* but have not likely been infected with the virus themselves. Electroencephalography results of the children’s brains suggested an elevated epilepsy incidence rate in ZIKV exposed children, relative to the global incidence rate of 0.001% in the first year of life, and focal, rather than generalized abnormalities on EEG. Given the very small sample size, these results are preliminary.

**Year 2 Outcomes**

In the second year we found that neurodevelopment in ZIKV exposed infants continued to progress at the same rate as their unexposed peers. Differences, however, were detected in Visual Acuity. Zika exposed infants showed Visual Acuity deficits compared to their unexposed peers. This finding is being investigated further in follow-up at 3, 4 and 5. Only one Zika positive result was detected from the samples of infant blood that were assessed at year two. All the samples tested negative for dengue.

**Year 3 Outcomes**

Preliminary data analysis indicates that children at this age are performing at the expected levels for their age on a measure of neurodevelopment. Further analysis is required to determine the effect of Zika on group status. Due to COVID-19, infant serum samples have not been analyzed at this time.

**Years 4-5**

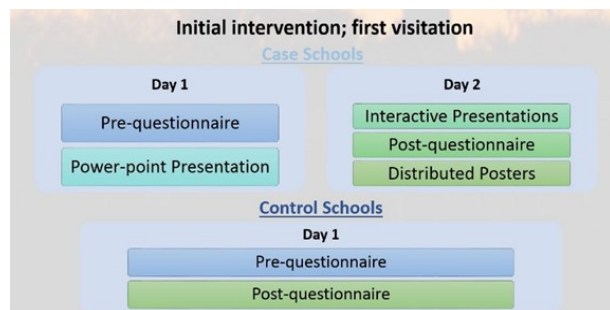
Our team continues to pivot to collect data despite delays and complications associated with the COVID-19 pandemic. Data is currently being collected on children aged 4-5 in the cohort, which is expected to finish in April 2022.

*Submitted by: Roberta Evans, Nikita Cudjoe, Randall Waechter, Barbara Landon, Michelle*

*Fernandes, Karen Blackmon, Elsa Chitan, Trevor Noël, Calum Macpherson and A. Desiree LaBeaud*

**Engaging Youths as Agents of Change**

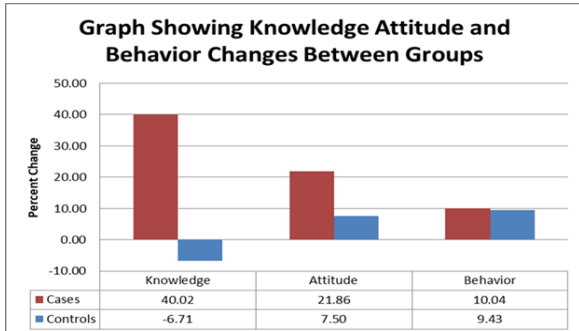
Pilot data – project initially began in January 2019. However, due to Grenada’s nationwide lockdown in March of 2019 due to COVID-19, the project was cut short and put on hold and schools remain closed- with a reopening date set for Jan 2022. It was a collective decision that all the data collected in Phase I would be used as our Pilot Data and the study would be repeated in its entirety when schools reopen. Forty (40) primary schools were randomized to either receive a two-day educational intervention (n=16) or to be a control (n=24). The intervention included an oral presentation, interactive demonstrations, and informational posters. Pre- and post- questionnaires evaluated participants’ KAP (knowledge, attitudes, and practices) change with respect to disease and prevention of feco-orally transmitted protozoan diseases and arboviral diseases, attitude levels and self-efficacy in disease prevention; vector data was collected on each visit and measured.



**Figure 1: Case versus control school intervention and questionnaire administration.**

Improvements in disease knowledge and attitudes were significant in the intervention groups compared to the control groups

( $p < 0.0001$ ). We expect to see even more improvement with the implementation of the 'Our Voice' interventions in 10/20 case schools in the upcoming project rollout in 2022.



**Figure 2: Graph showing: Knowledge, attitudes and behavioural percent changes in feco-orally transmitted protozoan diseases questioning between case and control groups.**

- Standard Operating Procedures were established: Hand washing; Water filtration; "Mosquito Tag"; Data Collection and Data Entry; Vector Control Data Collection and Data Entry; "Our Voice," and classroom introduction of Discovery Tool mobile app.



- Oriented Grenada-based team to Our Voice initiative and use of the Discovery Tool mobile app for use by community members in conducting environmental assessments
- Configured Discovery Tool test codes for use of Grenada-based team
- Purchased and delivered 10 Android tablets for use in the intervention
- Developed and refined detailed protocol

for integration of Our Voice into standard intervention

- Included specific provisions for protecting the privacy of minor participants
- Defined the role of teachers, research team members, and vector control team in rolling out and supporting the study
- Drafted a complete Our Voice SOP with detailed workflow including timelines and classroom discussion questions for case schools
- Provided in-depth training and logistical support for use of the Discovery Tool and integration of Our Voice protocols into classroom component at case schools
- Modified IRB (Protocol #19054) to include standard *Our Voice* pre/post questions related to community cohesion and participant self- and collective efficacy
- Administered pre-intervention surveys at 40 schools
- Randomized and assigned school sites (20 case, 33 control)

**Challenges:**

- The research team continues to meet regularly to adjust plans in the era of COVID uncertainty
  - ◊ In March 2020, classroom teaching was suspended in all Grenada public schools in response to the public health threat posed by COVID-19 cases in the community
- ◊ As of January 4, 2021, the resumption of classes has been cancelled until further notice- likely reopening in January 2022
- ◊ Ongoing communication with the Ministries of Health and Education regarding approval to access schools

**Deliverables:**

- Project's pilot data abstract acceptance and virtual poster presentation at the American Society of Tropical Medicine

- and Hygiene (ASTMH) 69<sup>th</sup> annual meeting, November 2020.
- Submitted and presented pilot data's abstract and virtual poster at the 3<sup>rd</sup> annual Stanford Maternal and Child Health Research Institute (MCHRI) Symposium November 2020.
  - Prior to the COVID-19 pandemic, because of our intervention in early 2020, grade 4 students were taught PAHO approved handwashing techniques, making them well equipped to teach those around them including their fellow schoolmates, family during the COVID-19 outbreak.

We are poised and ready to re-enter the schools and complete the project as soon as the COVID-19 prevention/mitigation policies allow. We will continue to modify plans as needed in the hope of completing Phase I prior to June 2022.

We foresee a continuation of the use of interventions, including but not limited to the "Our Voice" data collection system, with hopes that it can also be implemented in the school curriculum.

*Submitted by: Desiree LaBeaud, MD, MS, Abby King, PhD, Trevor Noël PhD, MPH, FRSPH Nikita Cudjoe, MPH, Nandy Noel, Prathik Kalva, Amrik Singh Khan, Sonia Alvarez, Ann Banchoff, MSW, MPH and Bethel Bayrau.*

### **Saving Brains Grenada Project**

The Saving Brains Grenada Transition to Scale (TTS) project continued throughout 2021 given a no cost extension from Grand Challenges Canada (due to the ongoing COVID-19 pandemic) and additional funding from the Caribbean Centre for Child Neurodevelopment.

For the academic year 2020-2021, three Conscious Discipline (CD) Coaches had been working alongside 54 teachers in 12 pre-primary schools and 25 parents in 2 community groups. 70 Roving Caregivers have also been delivering weekly coaching sessions to 500 families within their homes. In January 2021 in-person coaching was interrupted and direct contact between CD Coaches, Roving Caregivers, teachers, and parents was negatively impacted by the SARS-CoV-2 pandemic. Two long periods of restrictions (January – May 2021 and September – December 2021) meant that coaches were not permitted into schools or homes and were forced to teach remotely. Having experienced severe COVID-19 related lockdowns in 2020, the coaching teams were well prepared and quick to adapt to the restrictions in movement in 2021, providing coaching to teachers and parents online. The core skills of Conscious Discipline - **Safety, Connection and Problem Solving** were key to offering support to both teachers and parents particularly at the peak of the pandemic in Grenada in September and October 2021 when families and communities were suffering losses and feeling very scared. The CD skill of Composure was essential and a great comfort to adults and children alike. As one teacher stated: "The Conscious Discipline approach has contributed tremendously to the students ... especially during this COVID period...it has helped students and staff utilize strategies to cope with stress and other challenges in our daily lives."

The CD-based Power of Unity states that "We are all in this together" and this was the Coaches' focus through this very difficult time. Connection with parents and teachers within the 12 schools were made via Zoom, WhatsApp groups and social media; and it wasn't long before the CD coaches received requests from other teachers and parents to

join the support group. Instructional and information videos on the powers and skill of Conscious Discipline were shared and daily messages of support were offered by both Coaches and teachers/parents, creating a sense of social-emotional connection and community.

Parents attended online classes with their children where they were exposed to CD concepts. This, in some instances, developed into additional online group teaching sessions for parents with their children where they were taught calming breathing techniques and connecting 'I Love You Rituals'.

Despite teaching remotely and having little face to face contact with the children, teachers were enthusiastic about the benefits of Conscious Discipline.

"It has helped curb behavioural problems in children (and) develop their self-worth."

"It has helped me understand the brain state of my students so that I can better connect and communicate with them."

Such testimonials and teacher satisfaction resulted in requests from an additional five schools to join the program, which occurred in September 2021 and has resulted in the CD coaching team reaching capacity in ability to support teachers and parents. More CD coaches will need to be onboarded to meet the increasing demand for CD training and the team is currently seeking funding to meet that demand.

The Saving Brains Grenada manual, a how-to book outlining all aspects of the Saving Brains Grenada Programme, has been completed and is now available online. [\[my.sharepoint.com/:w:/g/personal/kburgen\\\_sgu\\\_edu/EQvnZe0WdwtBhtKSO-TIX-IBdOET-GwlvqYIL-C\\\_Alwx7g?e=8FG4ip\]\(https://my.sharepoint.com/:w:/g/personal/kburgen\_sgu\_edu/EQvnZe0WdwtBhtKSO-TIX-IBdOET-GwlvqYIL-C\_Alwx7g?e=8FG4ip\)](https://sgu-</a></p></div><div data-bbox=)

Ongoing training was delivered throughout 2021. The first online intensive training workshop was delivered over five 2-hour sessions in May 2021 and was attended by 50 parents and teachers. A six-hour intensive in-person training was conducted with each Roving Caregiver group and over 40 parents attended one of the 4-day community workshops offered in St. David's, Samaritan and Chantimelle during the summer holidays, where they could share ideas in a group setting and practice their newly learnt CD skills.

The uptake of CD by parents, teachers and Roving Caregivers was recorded using a fidelity measure designed for each group and administered by the Saving Brains Research Assistants.

In 2022 the team will continue to provide CD coaching in schools in Grenada, with the goal of expanding into a further 60 pre-primary and primary schools. We will accomplish this by training more CD Coaches and empowering selected teachers to lead the way by taking on more responsibility within their schools, supported by the CD coaches. We will continue partnering with the Roving Caregivers, who are showing strong fidelity to use and knowledge of the CD model and will continue working with them to help translate the existing parents' knowledge into practice.



**Fig. 1. Sophie doll made by teacher**



**Fig. 2. Conscious Discipline structures River View School- Wish Well board and Kindness Tree**



**Fig. 3. Parent conducting Safekeeper ritual with child**

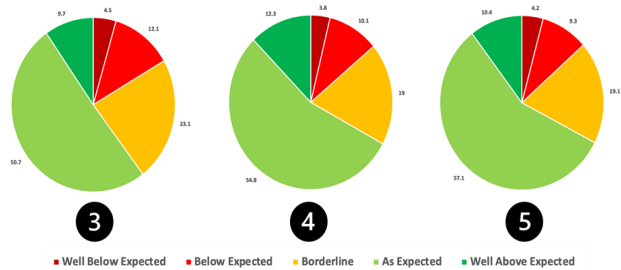


**Fig 4. Connection Ritual – Child greeting**

### Neuropsychological Assessments of 3-5-Year-Olds in Grenada

As part of this project, we were tasked by UNICEF to complete neuropsychological assessments to determine the status of early child development in 3-5-year-olds across Grenada. While we did not achieve our target sample of n=600 due to the COVID-19 pandemic, our team was able to complete n=514 of those assessments over a 2-year period (June 2019 – August 2021). Using an internationally validated measure, the NEPSY-II, trained researchers travelled to schools, homes, and health centers to collect data on the sample. Ten of the 32 subtests of the NEPSY-II were utilized to assess children across the following domains: attention and executive function, language, memory and learning, sensorimotor, social perception, and visuospatial processing.

3-5-Year-Old Overall NEPSY-II Performance



**Fig. 5. Overall Results on NEPSY-II Child Performance**

The overall results of this “snapshot” indicated that most children are performing at the expected levels for their ages. We did find some areas to be of concern (lower scores on memory and learning and language domains) but are inclined to believe that this is a cultural artifact of the specific

subtests, and not the abilities of the children.

A separate analysis was run to determine the effects, if any, of the COVID-19 pandemic on child development. Preliminary data indicate that there is no significant difference in NEPSY performance scores in children before and during the COVID-19 pandemic. However, it is important to note that these assessments might not capture the impact of the COVID-19 pandemic and associated lockdowns on early child development.

*Submitted by: Stephanie Holmes & Roberta Evans*

## **The Baroness Howells Sports for Health Program**

In 2021, the Sports for Health Program responded to the continued challenges of the SARS CoV2 Pandemic through a 3-phased approach.

In the first phase, WINDREF procured online technology devices to allow for live online physical activities. The standard daily onsite community-based activities were suspended due to public health regulations. Online technology was employed to provide continuation of access to physical activity sessions as a main goal for the Sports for Health Program. Online sessions were provided on three days each week which was live streamed from the Sports for Health program site at the Royal Grenada Police Force (RGPF). Online participation averaged 75 persons which represented 22.5% of the pre-Pandemic program participants. A survey was administered to online participants who reported a 95% satisfaction for the virtual Sports for Health sessions and a full vaccination status of 67 among the 75 respondents (89.3%).

The second phase of the Sports for Health Program was the promotion of SARS CoV2 vaccination among the program's population. Health promotion content including flyers, recorded presentations as well as live interactive sessions were distributed using social media and instant messaging platforms. Additionally, persons were contacted via telephone towards sharing information on vaccination information as well as vaccine administration schedules and locations offered by Grenada's Ministry of Health. At the end of 2021, 134 of the program's participants reported their status as fully vaccinated. Among the active participants, while an 89.3% vaccination rate was reported, for inactive participants, 67 out of 231 persons (29%) reported a fully vaccinated status. The difference in vaccination rates between active and inactive program participants identified the relationship between health seeking behavior of active participation in the program as well as seeking vaccination.

The third phase for the program focused on encouraging participation among persons who were inactive. In October of 2021, the option to provide onsite program activities within established public health protocols for outdoor exercise activities was made available which allowed for a live hybrid delivery of the program using both onsite and online delivery modalities. The dual options provide persons with technology limitations to access onsite program activities. Established public health protocols for the program does require for full vaccination status to participate. There is an ongoing effort by the WINDREF team in collaboration with the Ministry of Health to encourage uptake of the accessible and available vaccines.



The Sports for Health program through the funding and technical support from WINDREF was able to offer a virtual community-based exercise program to continue the program's activities during the pandemic period but also beyond as the virtual experience is expected to remain an option. Active participation in the program was identified as a satisfactory experience and associated with health seeking behavior of vaccination. Efforts to encourage active participation will continue to be applied as well as reviewed as the program continues to serve the community and mitigate risks of chronic diseases.



*Submitted by Satish Bidaisee*

## Innovative Nature-based Solutions to Enhance Community Resilience in Grenada (ING) Program

### Background & Context

The ING project is a collaboration between WINDREF and The Nature Conservancy (TNC) with funding from the Caribbean Biodiversity Fund (CBF). The project aims to enhance the climate resilience of coastal communities in the Grenville Bay Area (GBA) of Grenada, and particularly in the fishing community of Soubise, through a series of targeted, complementary and innovative nature-based interventions which will provide significant social, environmental and economic benefits to the

community.

Commencing in January 2022 with a budget of USD \$1,065,752, it is anticipated that the project will address some of the intensifying effects of climate change in Soubise that pose direct threats to homes, livelihoods, coastal infrastructure and the shoreline. These include sea level rise and storm surges, leading to high levels of coastal flooding and severe coastal erosion.



**Figure 1. Images of situation in Soubise (Courtesy of TNC EC)**

In 2015, fishers and their families were relocated to upland housing complexes and the area along the shoreline was converted into a community greenspace for recreation and events that still serves as the main access to the sea. However, the community recognised the need to stabilise and rehabilitate the shoreline to help reduce coastal flooding and erosion.

### Objectives

There are three (3) main objectives of the ING project:

1. To improve coastal protection from impacts such as storm surge, coastal flood-

- ing, and shoreline erosion, through reef restoration and shoreline stabilization.
2. To improve socio-economic resilience of the community to climate change through enhanced sustainable and alternative livelihoods focused on conservation of important ecosystems.
3. To improve awareness of and community engagement on innovative nature-based solutions (NbS) and approaches which can reduce the vulnerability of coastal communities to climate change impacts.

Project interventions are innovation solutions grounded in an ecosystem-based adaptation (EbA) approach of enhancing naturally occurring biodiversity and using ecosystem services as the strategy to help people reduce vulnerability and build resilience to climate change. It involves the restoration, conservation and sustainable management of ecosystems and incorporates locally sourced materials, traditional knowledge and local labour. The technical knowledge and skills attained by community members can be used by them to design and scale-up similar initiatives, to further protect their communities and other marine protected areas from future climatic impacts. ING's major NbS interventions are the: (i) restoration of the fringing reef; and (ii) stabilization of the natural shoreline. Together, these actions are expected to (i) reduce the wave energy reaching and impacting the shoreline thus providing protection against coastal flooding and erosion; (ii) enhance the community's access to the sea; (iii) improve the biodiversity within the Bay; (iv) enhance the community's greenspace used for recreational purposes; and (v) support more resilient lives, livelihoods, and infrastructure.

### Project Activities

- Coral Reef Restoration;

- Plant Nursery (Mangrove & Coastal Vegetation);
- Shoreline Stabilization;
- Monitoring & Rehabilitation Plan;
- Expanded Seamount Farming Operation; and
- Community Engagement & Participation.

The ING project will provide avenues for GBA community members to be employed in all activities thereby providing opportunities for generating supplementary income. ING will also ensure the meaningful inclusion of women, disadvantaged youths, and marginalized groups. Women in particular are the lead financial resource managers in GBA and therefore their engagement in project interventions will be essential to ensure the project's objectives and sustainability.



Figure 2. Example of in-water Coral Reef Restoration (Courtesy of corallive.com)



Figure 3. Sea Moss Farming (Courtesy of UNDP Grenada)



### Upcoming Activities

- Project Staff will be hired to manage all aspects of the project;
- Community meetings will be held to ensure local stakeholders are fully engaged;
- Coral and Plant Nurseries will be established to grow stock for restoring coral reef and stabilizing shoreline;
- Baseline data will be collected to facilitate monitoring.

The ING Project in the GBA will commence on 1 January 2022 and is due to be completed by 30 June 2024.

Submitted by: Kerricia Hobson

### Global Water Partnership

#### GWP-C Hosts First-Ever Caribbean Science Symposium on Water

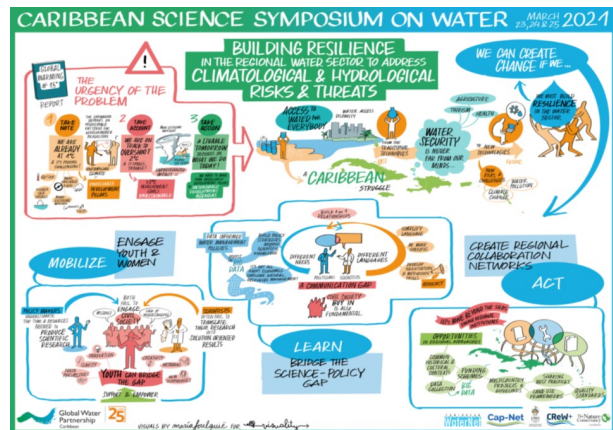
##### Symposium Partners:

Caribbean WaterNet (Cap-Net), The Faculty of Food and Agriculture of The University of the West Indies (UWI) St. Augustine Campus, The Global Environment Facility-funded CREW+ Project and The Nature Conservancy (TNC) Caribbean.

Whilst developments in the research and policy communities are starting to advance our understanding of some of the challenges climate change will pose to the regional water sector, there is a noticeable gap between research outputs, and their transposition from the science to the policy domain, and their use and relevance in informing evidence-based decision-making.

In recognising this gap, the Global Water Partnership-Caribbean (GWP-C) saw the need and opportunity to convene a **Caribbean Science Symposium on Water**; the first of its kind for

the region. The three-day virtual event commenced after World Water Day (celebrated on March 22nd) from March 23rd – 25th, 2021 under the theme: **“Building Resilience in the Regional Water Sector to Address Climatological and Hydrological Risks and Threats.”**



The Symposium brought together the science and policy communities in a dynamic and very interactive way. Participants included representatives from the research, science, development, economic, legislative and policy communities, practitioners from water and related sectors, young professionals, environmental entrepreneurs, university students and more, to share and discuss ideas on ongoing scientific studies, initiatives, innovations and best practices related to **enhancing water security developments and Integrated Water Resources Management (IWRM) in the Caribbean**. More than one hundred and fifty (150) participants attended the event on each day.

High-quality scientific, research, technical, exploratory papers, insights, possible solutions and more were shared throughout the event based on the following format:

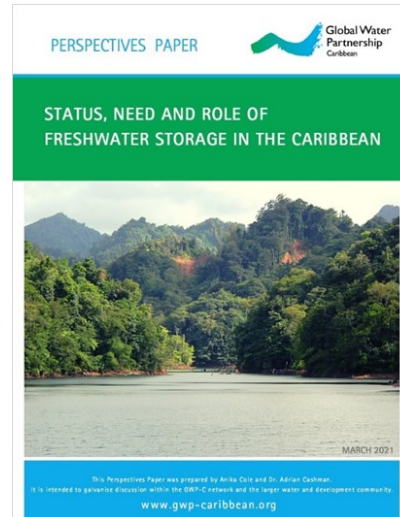
- **Feature Address:** By **Senator Simon Stiel** Global Water Partnership-Caribbean (GWP-C) – Minister for Climate Resilience and the Environment of Grenada. released two (2) Perspectives Papers titled:
- **Two (2) Keynote Presentations:** By **Professor Michael Taylor** – Professor of Climate Science and Dean of the Faculty of Science and Technology at The University of the West Indies (UWI) Mona Campus in Jamaica and **Ms. Rianna Gonzales** – Youth Engagement Specialist at Global Water Partnership (GWP).
- Paper Sessions under the themes: Water and Climate Change, Resilience, Public Health and Water Quality and Wastewater Management.
- **Two (2) Moderated Sessions:** “Bridging the Science-Policy Divide” and “Time to Take a Regional Approach to Integrated Water Resources Management (IWRM).”
- **Roundtable Discussions on:** “Youth and Water” and “Wastewater Management.”
- **Special Session on Young Caribbean Water Entrepreneurs**

**Related Links:**

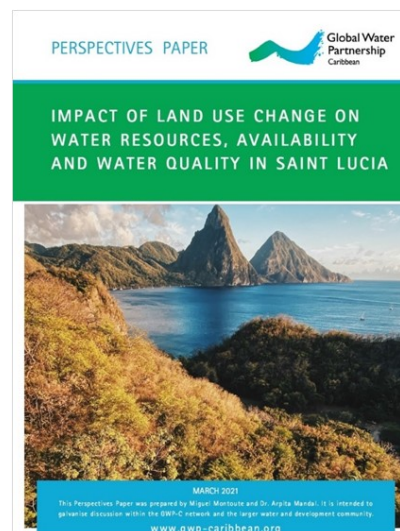
- [www.caribbeanswater.com](http://www.caribbeanswater.com) (Symposium Website)
- [Symposium Magazine](#)
- [COMMUNIQUE: Caribbean Science Symposium on Water 2021](#)
- [2021 Caribbean Science Symposium on Water Report](#)

**GWP-C Produces New Perspectives Papers on Freshwater Storage in the Caribbean and the Impact of Land Use Change on Water Resources in St. Lucia**

- **Status, Need and Role of Freshwater Storage in the Caribbean**
- **Impact of Land Use Change on Water Resources, Availability and Water Quality in St. Lucia**



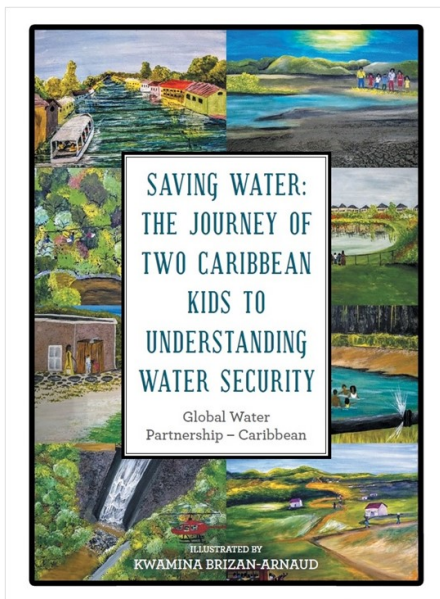
Both Papers were written by GWP-C Technical Committee (TEC) Members. The Paper “**Status, Need and Role of Freshwater Storage in the Caribbean**” was authored by GWP-C TEC Members Anika Cole and Dr. Adrian Cashman. **Download here:** <https://bit.ly/3dW0tNT>



The Paper on **“Impact of Land Use Change on Water Resources, Availability and Water Quality in St. Lucia”** was authored by GWP-C TEC Members Miguel Montoute and Dr. Arpita Mandal. **Download it here:** <https://bit.ly/3g17gKK>

### **GWP-C Empowers Caribbean Kids to be Water ChangeMakers in its First-Ever E-Book Available on Amazon**

In 2020 with the onset of the global COVID-19 Pandemic, the Global Water Partnership-Caribbean (GWP-C) was motivated to find a novel and creative way of educating Caribbean kids about the critical value of water, the various water issues that occur throughout the Caribbean region and how they could be empowered to become Water ChangeMakers.



This idea became a reality when GWP-C in March, officially launched its first-ever children’s book titled “Saving Water: The Journey of Two Caribbean Kids to Understanding Water Security” – which is currently available on

Amazon in both Kindle (E-Book) and Paperback versions here:

<https://amzn.to/3mHPxJy>

Though the book is generally targeted at kids between the ages of 9 – 12 years old, it takes kids or any reader, on an educational adventure. The book follows the main characters, 10-year old twins Janelle and Joel from Grenada and their parents, as they journey to fifteen (15) Caribbean countries to observe their main water issues and possible solutions, with the twins being empowered to become Water Changemakers. The book is co-authored by GWP-C and Grenadian author and artist Kwamina Brizan-Arnaud, who also did the brilliant illustrations in the publication.

### **GWP-C and HELP Hold Timely Consultation for the Caribbean on Addressing Water-Related Disaster Risk Reduction in the COVID-19 Pandemic**

Consultation Collaborators:

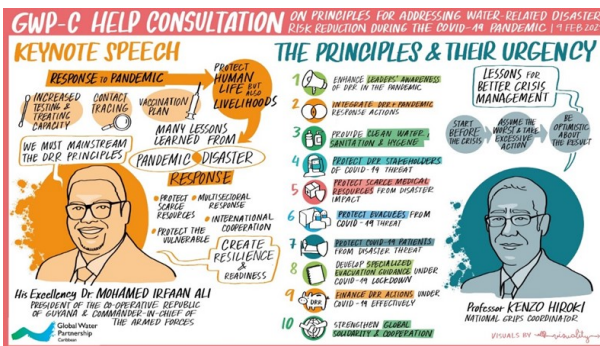
Global Water Partnership (GWP), The High-Level Experts and Leaders Panel on Water and Disasters (HELP), the Government of Japan and the National Graduate Institute for Policy Studies.

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The High-Level Experts and Leaders Panel on Water and Disasters (HELP) developed a set of Principles to Address Water-Related Disaster Risk Reduction (DRR) during the COVID-19 Pandemic. These Principles, present urgent practical advice for leaders and managers with expertise in responding to DRR or COVID-19 challenges, to be better prepared for the “twin risks.” This being, the vulnerability of countries in the pandemic to both health and water-related disasters at the same time.

Risks which are of major concern for many Caribbean countries.

Given the importance of addressing this issue, Global Water Partnership-Caribbean (GWP-C) and Global Water Partnership (GWP), partnered with HELP (with support from the Government of Japan and the National Graduate Institute for Policy Studies) to conduct a 3-hour virtual Consultation on February 9th, 2021 for the Caribbean. The purpose of the event being to discuss, share and gain practical insights on how the HELP Principles could be implemented in the field. Additionally, to equip decision-makers, experts and practitioners in the Caribbean region, on how to be better prepared for co-occurring disasters on water and health.



His Excellency Dr. Mohamed Irfaan Ali: President of the Co-operative Republic of Guyana and Commander-in-Chief of the Armed Forces was the keynote speaker at the Consultation. The Consultation saw the participation of over ninety (90) plus attendees.

**Related Links:**

Keynote address by His Excellency Dr. Ali here: <https://fb.watch/3yWMNbdIxI/>

- [GWP-C and HELP Consultation](#)

**GWP-C Provides Support to the Government of Grenada to Develop A National IWRM**

**Communications Strategy and Implementation Plan**

**Collaborators:**

The Government of Grenada through the Ministry of Agriculture, Lands and Forestry.

The Global Water Partnership-Caribbean (GWP-C) is supporting the Government of Grenada through the Ministry of Agriculture, Lands and Forestry, to develop a National Integrated Water Resources Management (IWRM) Communications Strategy and Implementation Plan for Grenada.

This will be a pivotal tool in raising awareness and promoting action on IWRM in the country. Furthermore, the Communications Strategy and Implementation Plan will be aligned to Grenada’s recently revised (2019) National Water Policy and IWRM Plan. Financial support provided by GWP-C contributed to various key aspects of this project. One major activity being five (5) national consultations in Grenada targeted at a wide cross-section of stakeholders, to get their views and inputs on various aspects of water resources management in the country to support the development of the IWRM Communications Strategy and Implementation Plan.

**Related Link:**

National IWRM Communications Strategy and Implementation Plan for Grenada

**GWP-C Supports Government of Dominican Republic with Initiatives to Support Country’s NDCs**

**Collaborators:**

Global Water Partnership (GWP), The National Determined Contribution (NDC) Partner-



ship and the Government of the Dominican Republic.

Over the period July 2020 to July 2021, Global Water Partnership-Caribbean (GWP-C) in collaboration with the Nationally Determined Contribution (NDC) Partnership has been supporting the Government of the Dominican Republic (DR) in the preparation of the country's submission for the second round of the NDCs. Additionally, support was given to the government to enhance their NDC Implementation (action) Plan or Roadmaps, by developing along with the National Council for Climate Change and Clean Development Mechanism and the NDC support unit in the Dominican Republic, two (2) main deliverables under the consultancies listed below:

1. Analysis to address additional climate risks not included in the first NDC submitted. Downscale climate projections for localised increased, intense rainfall. Estimates of increased risk of flooding in major riverine valleys and large human settlements, threats of landslides on steep slopes, projections of affected households and loss of livelihoods.
2. Develop a bankable investment portfolio at basin-level. This portfolio included water resources, livelihoods diversification, resilient agriculture, processing schemes, supply chains and food security. It also included a basin-scale approach and a short/mid-term financial strategy, aiming to maximise resources efficiency, covered areas and beneficiary population.

Each of the above Consultancies were successfully completed with various outputs being produced.

**Related Links:**

- [GWP-C Supports Capacity Building on Climate Scenarios in the Dominican Republic](#)
- [GWP-C Led Initiative to Develop Investment Portfolio for Financing Climate Change Projects in the Dominican Republic is Underway](#)

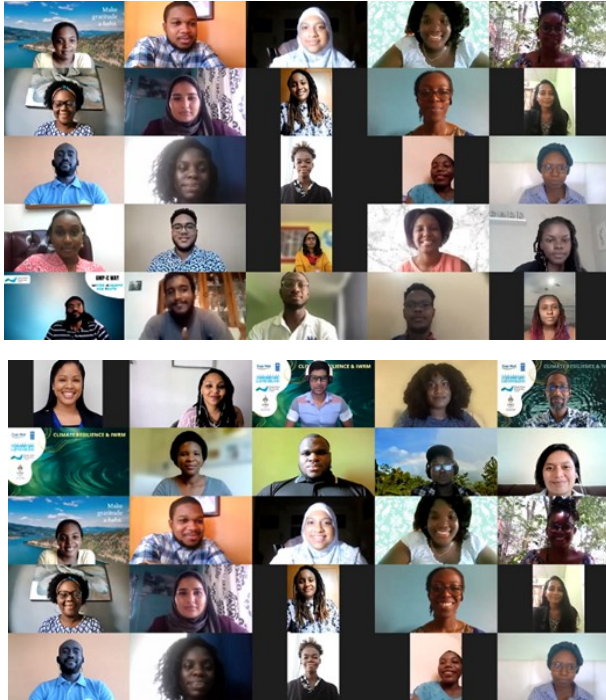
**GWP-C Empowers Young Caribbean Leaders in its Water Academy for Youth**

**Academy Partners:**

Caribbean Community Climate Change Centre (CCCCC), Caribbean WaterNet (Cap-Net UNDP), the Faculty of Food and Agriculture (FFA) of The University of the West Indies (UWI) St. Augustine Campus and the Caribbean Climate Innovation Centre (CCIC).

Thorough, dynamic, innovative and immersive are some of the words that can be used to describe the **Global Water Partnership-Caribbean Water Academy for Youth (GWP-C WAY)**.

The carefully crafted 3-month programme which is the first of its kind in the region, was officially launched on July 6th, 2021 and ended in September 2021. It is a specially designed training programme for Caribbean young leaders and professionals between the ages of 20 – 35 years which builds their capacity in Integrated Water Resources Management (IWRM). Additionally, it equips them with a range of skills which would allow them to provide sustainable solutions to Caribbean water issues.



- Climate Resilience and IWRM (with a focus on Caribbean youth)
- IWRM and Sustainable Development Goal (SDG) Indicator 6.5.1 (Degree of IWRM Implementation)

GWP-C has and continues to remain committed to engaging Caribbean youth in water management. It recognises that youth are not just the future but the present. Young people of the Caribbean are a powerful force that can ignite positive change and bring visibility to water and other challenges that affect us collectively.

**Related Links:**

- [The 2021 GWP-C WAY](#)
- [Caribbean Water Stories by the GWP-C WAY Cohort](#)

The **GWP-C WAY Cohort** was comprised of thirty-two (32) remarkable young professionals who earned their spot in the Academy after a very competitive application process. Cohort members are representative of the following twelve (12) countries: **Barbados, Belize, Curaçao, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Vincent and the Grenadines, St. Kitts and Nevis, Suriname, and Trinidad and Tobago.**

The Academy was administered virtually with the Cohort participating in a significant number of capacity building sessions delivered by a cadre of experts in IWRM and other fields. These sessions included:

- Scientific Writing (Articles and Papers)
- Business Development and Entrepreneurship
- Proposal/Concept Note Development
- Storytelling in Water
- Problem-solving through Innovation

**Belize Becomes a Partner Country under GWP-C**

For the first time since the establishment of the Global Water Partnership-Caribbean (GWP-C) in 2004, Belize has become an official Partner country of the GWP-C. It is well-known that Belize is a country based in Central America but has maintained strong ties to the Caribbean, as part of the Caribbean Community (CARICOM). Mainly due to the country's geographical location, it fell under the GWP Central America Partnership.

Despite the grouping of Belize under GWP Central America, GWP-C has always engaged with organisations and professionals in Belize in relation to its work on Integrated Water Resources Management (IWRM) in the Caribbean. An official request received from Belize to become a member of GWP-C, was approved by both Regional Steering Committees of GWP-C and GWP Central America. Activi-

ties within the framework of Central American regional institutions such as the Central American Integration System (SICA) which includes Belize as a member state, will continue to operate through GWP Central America. GWP-C is very pleased to welcome Belize as one of its Partner countries, along with the twelve (12) Partner organisations from the country, that were formerly part of GWP Central America.

**Related Links:**

[GWP-C Partners](#)

**GWP-C Contracted for Consultancy to Develop a Regional IWRM Framework for the CARICOM Region**

The Global Water Partnership-Caribbean (GWP-C) has been contracted by the Caribbean Public Health Agency (CARPHA) to develop a **Regional Action Framework for Integrated Water Resources Management (IWRM) for the CARICOM Region**. The consultancy is part of Component 3 of the Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States (GEF-IWEco) Project, which is presently being jointly implemented by CARPHA and the Organisation of Eastern Caribbean States (OECS).

The ten (10) GEF-IWEco participating countries are the territories of focus under the consultancy, which include: Antigua and Barbuda, Barbados, Cuba, the Dominican Republic, Grenada, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines and Trinidad and Tobago. There are various deliverables under the consultancy that will contribute to the development of the Regional IWRM Framework. This process requires stakeholder inputs along the way, taking into

account already ongoing initiatives of various institutions and partners in the region.

In 2021 under the Consultancy, the GWP-C has already hosted two (2) rounds of National Consultations with stakeholders from the ten (10) IWEco countries to support the development of the IWRM Framework.

*Submitted by: Global Water Partnership-Caribbean team*

**Caribbean Corporative Measurement Reporting and Verification Hub Project (CCMRV Hub)**

**Introduction**

The Caribbean Cooperative Measurement, Reporting, and Verification Hub (the MRV Hub) is a 5-year project funded by the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation & Nuclear Safety (BMU) of Germany.

Twelve (12) countries, Antigua & Barbuda, Barbados, The Bahamas, Belize, Dominica, Grenada (Host) Guyana, Jamaica, Saint Lucia, St. Kitts & Nevis, St. Vincent & the Grenadines, and Trinidad & Tobago are being supported by the implementing partners, led by the Greenhouse Gas Management Institute (GHGMI) with support from the Regional Collaboration Centre of the UNFCCC (RCC-STG), UNDP/UNEP Global Support Programme (GSP) with WINDREF acting as institutional host.

**MRV Hub Annual Meeting 2021**

The 3rd Annual Meeting of the MRV Hub was held virtually on 23<sup>rd</sup> & 24<sup>th</sup> Mar 2021. Over the 2 days a total of 64 participants, including 27 representatives from all 12 of the MRV Hub Member States, participated in the

event. Regional/Int'l organisations such as the Organisation of Eastern Caribbean States (OECS), GHGMI, GIZ Grenada, UNFCCC, UNEP -DTU, UNDP, the UNFCCC RCC-STG and GGGI were also in attendance.

The meeting focused on providing member countries and organizational partners with updates on the status of MRV Hub programme, and a review of member country-specific project achievements and challenges. The MRV Hub Management and Secretariat presented a detailed summary of activities in 2020, including the 2020 Annual Meeting, launch of the MRV Hub Summer Academy, country-specific work-streams, expansion of the MRV Hub staff, and the continued development of sector-specific work crews. Member-country representatives provided valuable feedback and shared their views on the MRV Hub's progress. Representatives from on-going projects in Antigua & Barbuda, The Bahamas, and Saint Lucia described their experience working with the MRV Hub team, emphasising technical support received for mitigation modelling, MRV system design, and national greenhouse gas inventory compilation and reporting.



**Cross Section of MRV Hub Team & Participants at Annual Meeting 2021**

**MRV Hub Direct Support to Member Countries**

The MRV Hub team expanded engagements with countries by competing against international consultancies and winning open procurement tenders in the region covering various topics identified as challenges faced by governments, such as greenhouse gas inventory (GHGI) compilation, mitigation modelling and analysis, data collection training, stakeholder outreach, MRV system assessment and design and creation of international reporting components (e.g. drafting NC/BUR Chapters).

**The MRV Hub Work Crews**

The active MRV Hub Work Crews, Data Management Systems (DMS), On-Road Mobile Sources, and Forestry & Other Land Use (FOLU) have entered the final phase of this operational cycle. Each working group of technical experts were recruited from MRV Hub member countries and the wider MRV Hub regional and international network and engaged in mentorship and capacity building activities targeted towards overcoming identified technical capacity constraints of the Hub Member Countries. Many challenges were encountered in availability, quality, and access to data/datasets that provide adequate detail and time-series consistency. Work crews have spent a significant amount of time on solutions, engaging country representatives, and conducting research to tailor international guidance to regional circumstances. Work is underway to launch new MRV Hub Work Crews on i) Agriculture and ii) Modelling and Projections.

**MRV Hub Summer Academy 2021**

Despite the continued constraints of the COVID-19 pandemic, the MRV Hub held its 2nd Summer Academy via live virtual training



sessions from Aug to Sep 2021. The 8-week course consisted of live lectures, office hours, and homework assignments, managed and delivered through the Greenhouse Gas Management Institute learning management system. Two (2) participants from each member country were awarded full sponsorship to attend the training program, with special invitation extended to the 2020 MRV Hub Summer Academy cohort to return and participate.

A total of 25 participants, which included 9 of the twelve 12 MRV Hub Member countries, joined the weekly sessions led by GHGMI and MRV Hub instructors and trainers: Wiley Barbour, Ryan Deosaran, Molly White, Brittany Meighan, Dr. Anup Joshi, Dr. Olia Glade, Hayden Redhead and Ahyana Bowen. The instructors focused on GHG inventory data collection, compilation, and documentation procedures through background readings, exercises, lectures, case studies and Q&A discussion forums tailored to the region's context and the identified capacity building needs; and culminated with a final assessment.

### **Mitigation Modelling & Projections Programme (MPP)**

The Mitigation Modelling & Projections Programme (MPP) is a comprehensive work programme, first announced and launched during the MRV Hub Annual Meeting in Mar 2021.

Since its launch, the MPP has executed the GHG Mitigation Modelling Tools Introduction Webinar Series, in collaboration with CARICOM, the Caribbean Center for Renewable Energy and Energy Efficiency (CCREEE) and the UNFCCC RCC-STG. The series consisted of 7, 1-hour sessions during the months of Apr to Jul 2021. The sessions introduced par-

ticipants to modelling and projections concepts and tools such as the following:

- Greenhouse Gas Abatement Cost Model (GACMO),
- The Low Emissions Analysis Platform (LEAP),
- PROSPECTS+,
- The MRV Hub's Comparison of tools guidance document,
- The Food & Agriculture Organization (FAO)'s Suite of Tools for Agriculture, Forestry and Other Land Use (AFOLU) sector modelling & projections and
- Renewable Energy Roadmaps (Remap) tool.

The MPP also developed an initial roster of regional modelling experts who have technical abilities in the modelling tools LEAP, GACMO & PROSPECTS+. This roster will assist in the identification of capacity building needs and support model development in the region.

The work of the MPP is expected to continue in the coming months with the implementation and launch of a LEAP model for the MRV Hub member countries and the establishment of a help desk for modelling and projections queries. In addition, the MPP is in the initial stages of the development of a training course on modelling and projections to be launched in 1<sup>st</sup> Quarter 2022 focused mainly on the LEAP modelling tool.

### **Partnerships & Networking**

#### Caribbean NDC Support Virtual Exchange Series

The RCC-STG in collaboration with the MRV Hub, NDC Partnership, Climate Analytics, and AOSIS, launched this year's Caribbean Exchanges series focused on turning commitments, as outlined in the revised NDCs, into

concrete NDC implementation actions.

#### Capacity Enhancement for Planning and Decision Support Survey

The MRV Hub, along with the Stockholm Environmental Institute (SEI) and the GHGMI, were consultants for an ongoing project called Capacity Enhancement for Planning and Decision Support within the Energy Sector in CARICOM countries organised by GIZ.

#### Data for Better Climate Action

In collaboration with GHGMI, the MRV Hub joined fourteen (14) global climate initiatives to launch a renewed effort to increase data-driven climate action worldwide. The #Data4BetterClimateAction campaign aimed to raise awareness about the inherent value of transparency in pursuing meaningful climate action and support.

#### COP26, Glasgow

A delegation from the MRV Hub attended COP26 in Glasgow and participated in several events while seeking to expand support for/ of member states and network partners. The Delegation led by Mr. Wiley Barbour (MRV Hub Programme Director) included members from GHGMI and regional MRV Hub Staff.

#### **MRV Hub Secretariat (WINDREF/Grenada)**

The Project continues to operate ahead of schedule and within budget, aided by the competent team at WINDREF, under the guidance of Drs Macpherson and Noël and with support from the Admin Team.

The MRV Hub now employs a total of 7 Caribbean staff. During the 4<sup>th</sup> Quarter of 2021 the MRV Hub Secretariat began the process of recruiting a Technical Support Associate with plans now being developed for a further new staff recruitment by the 2<sup>nd</sup> Quarter of 2022.

The project is now into its 4<sup>th</sup> year and the team has begun plans for the establishment of the MRV Hub as a regional service organization. Active research and modelling are now underway to determine the most effective and sustainable organizational model for this new organization.

The MRV Hub continues to engage in active outreach through various means including its periodic newsletter. During 2021 the Secretariat issued the 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> Newsletters. All newsletters and Annual Meeting Reports can be viewed on the [MRV Hub Organization webpage](#).

*Submitted by: MRV Hub Secretariat  
Mr. Wiley Barbour, Programme Director  
Mr. Hayden Redhead, Project Coordinator*

#### **Caribbean Research Ethics Education Initiative (CREEii)**

After launching its 2-year master's degree in bioethics (MScB) in 2020, the Caribbean Research Ethics Education initiative (CREEii) enrolled a 2<sup>nd</sup> cohort of fellows and continued to design and roll out new courses through 2021 (<https://creeii.org/>). In December 2021, 13 of 15 fellows from the first cohort are projected to graduate in June 2022 excluding 1 who took leave of absence to return and graduate with the 16 fellows enrolled in cohort 2 who have now completed their 3rd course. CREEii accomplishments include 9 new courses delivered to cohort 1, with 3 of these iteratively modified for cohort 2 based on feedback from fellows and faculty. A call for applications for cohort 3 will be released in January 2022.

All CREEii courses equip fellows to become

independent research ethicists and facilitate institutional change. Each course has 2 designated faculty (1 English-speaker and 1 Spanish-speaker) who collaboratively design and deliver the course. To standardize and improve course quality, CREEii compiled its 'Best Practices for Faculty' which are promoted among faculty.

The curriculum includes didactic courses and requires fellows to design, conduct, and submit master's thesis research including a plan for submitting their work to a peer reviewed journal for publication. With few exceptions, cohort 1 theses offer ethical analyses or arguments rather than empirical data. Each fellow is paired with a Research Supervisor (RS) who mentors and supervises their research over 15 months.

Advisory Board meetings were conducted in September 2021 to review progress on curriculum and other areas. It was noted that development is needed to better support fellows in writing and critical thinking, a deficiency that Advisors report is apparent in other master's level programs at various institutions in the USA and elsewhere. CREEii will increase opportunities for fellows to strengthen these skills on the basis of suggestions from its Advisors.

Centers for excellence in research ethics and bioethics are now established at both partner institutions (SGU and UAQ). In 2021, the **Center for Global Bioethics** was established in WINDREF as a resource for SGU. It is developing a strategic plan for activities in 2022 and beyond. UAQ's center, the **Unidad de Bioética** (<http://unidadbioetica.com/>) was established in 2017 under the first CREEi award and remains vibrant having obtained

Mexican federal support this year. Its publications and activities this year include i) *Bioethics of the health professions*, Editorial Universidad Michoacana de San Nicolás Hidalgo. CREEii faculty Arellano, Romero (editor), alumnus and Advisory Board member Adriana Mejía, and Raúl Villanueva. September 2020.; ii) *Month of Bioethics, investigations fifteen years after the Universal Declaration of Bioethics and Human Rights*, Editorial Universidad Autónoma de Querétaro. Arellano, Romero (editor); fellows Frigerio and Serrano; and alumni Bernardo García, Eduardo Farias, Pamela Garbus, Eduardo Casillas, Adriana Mejía and Raúl Villanueva. November 2020.; iii) *Updates in Wound Management*, Editorial Universidad Autónoma de Querétaro. fellow Pamela Frigerio. June 2020. It also hosts and participates in conferences and workshops in which CREEi faculty, fellows, and alumni give oral presentations including *World Bioethics Day*. Derrick Aarons, Rubén Romero, Bernardo García (alumnus and faculty), Hilda Romero (organizer); fellows Sara Torres, Lisette Arnaud; and alumni Irene Cordoba, Adriana Mejía (Advisory Board member). 15-16 October 2021.

Other publications from and information about CREEii 2020-2021 are listed below.

- Waechter R, Coomansingh K (CREEii alumnus), Macpherson C, Sarma S. Ethical Challenges in Global Health Research. Invited book chapter. Submitted Nov 2021.
- SGU Panel on Research and Scholarly Activity (oral progress report, 2021)
- SGU Research Day (onsite oral presentations). Oct 24, 2021
  - ◊ Macpherson, CC, Cummins P, Romero Zepeta, H. Bilingual educa-

- tion for research ethics.
- ◊ Nandy Noel (fellow), Macpherson, CC. Climate Change and Bioethical Challenges for Low and High Resource Countries.
- SGU news. 2020. [Novel NIH-funded master's degree program offers deep dive into bioethics research | St. George's University \(sgu.edu\)](#)
- Macpherson, CC. The Caribbean Research Ethics Education Initiative (CREEii). SGU School of Graduate Studies webinar series. March 2021.
- Nakita Francis (fellow). Ethical Issues in the Care of Covid-19 Infected Patient. Bioethics Caribe *BIOETHICS CARIBE – BSEC Newsletter*. January 2021. <https://www.bioethicscaribe.com/>
- Susan Muir (alumnus). The Role of Social Media during COVID-19: Ethical Implications. BSEC 12<sup>th</sup> Annual Forum (oral presentation).
- Shakel Henson (alumnus). Mental and Health Effects of Quarantine. BSEC 12<sup>th</sup> Annual Forum (oral presentation). October 2020.
- Melanie Smith (alumnus). Response of Government and Citizens to Management of the Crisis with Focus on Behaviours and Cultural Attitudes. BSEC 12<sup>th</sup> Annual Forum (oral presentation). October 2020.
- Shakel Henson (alumnus). Research Ethics Committees – Are they Equipped to Execute their Roles? – Case Study from St. Vincent. *BIOETHICS CARIBE – BSEC Newsletter*. May 2020
- Macpherson, C. Caribbean Research Ethics Education Initiative (CREEi) 2020-2024. *BIOETHICS CARIBE – BSEC Newsletter*. May 2020.

The December 2020 issue of the **CANREC Bulletin** (Caribbean network of research ethics committees) [https://carpha.org/Portals/0/Publications/CANREC\\_BulletinVol2-1-2.pdf](https://carpha.org/Portals/0/Publications/CANREC_BulletinVol2-1-2.pdf) included the following publications from CREEii faculty and alumni:

- Sharmella Roopchand Martin (CREEi alumnus and faculty). Are Ethics Committee Members in the English-Speaking Caribbean concerned about Payment Being Inducement?
- Kelly-Ann Gordon-Johnson (alumnus), Sharmella Roopchand Martin (alumnus and faculty). A Review of Regulations Governing Human Participant Research in Jamaica.
- CANREC News. CREEi Graduate is PAN-CAP's New Director.

They and others contributed to the Bioethics Society of the English-speaking Caribbean (BSEC) Newsletter and presented at BSEC's Annual Forum:

Submitted by: Cheryl Cox-Macpherson

### **Center for Research on Storytelling in Education (CRSE)** **WINDREF annual report contribution**

The Center for Research on Storytelling in Education's (CRSE) mission is to advance research on storytelling in education in order to develop more equitable and engaging practices in teaching, learning and educational leadership. At the core of CRSE is a belief that educational research is integral to improving education, ultimately making education systems more equitable, and increasing opportunities to learn across the lifespan. Our center launched in November 2019, with the support of WINDREF, and we are grateful for the support we continue to receive. We have

been able to expand our work throughout 2021, due to a \$50,000 USD Spencer Foundation Grant and a \$5,000 USD SGU small research grant (both of which began in 2020 and were extended this past year). Over the course of the past year, we published a book related to our research, presented our work through a podcast, have multiple upcoming conference presentations, are actively working on research articles, and we continue to collect data for our IRB-approved research. Currently, we are in the midst of completing a dynamic website of Open Educational Resources that will allow us to share our work with an even wider audience. We plan to launch our new website in January 2022.

Our recently published book, *Becoming: Transformative Storytelling for Education's Future*, details an inquiry process for educators to reflect on and tell their own stories of teaching and learning, in order to fuel personal, professional, and organizational transformation. Our book project included contributions from 26 academics, including 3 faculty from SGU (6 if you include the editors). Additionally, we were invited to discuss our book and share our current research on a popular podcast focused on higher education called *Tea for Teaching*, which is hosted by the State University of New York at Oswego. Our podcast episode was released November 2021.

Another significant CRSE project over the past year was our ongoing virtual conference series focused on storytelling in education. Our original plan was to host an international research conference here in Grenada, focused on storytelling in education, in June 2020. Because of the COVID-19 pandemic, we were unable to host an in-person conference, but over the past year we redesigned

our conference into a 9-month virtual professional learning experience, and ultimately had a greater reach than our original plan. Our workshops and research presentations were attended by over 250 participants worldwide. Each of our 1.5 hour-long sessions began with a research presentation from an invited 'Provocateur', and continued with an interactive workshop to build community and collectively share knowledge and resources. All conference materials were saved and we are working on making them available to the wider public through our new website. Two of our invited Provocateurs are SGU faculty (Dr. Antonia MacDonald for 'The Cultural Context of Storytelling' and Dr. Randall Waechter for 'The Science of Storytelling'). The below comment is representative of the feedback we received throughout our Virtual Conference Series:

*"I've loved these events because of the diverse group of educators, thinkers, storytellers, and scholars that are brought together. The Center has been able to bring together a rich group of people from all over...who model the kinds of diverse storytelling and thinking that they promote. Keep bringing together such a rich group of contributors!"*

We also have two upcoming conference presentations based on work. Dr. Penny Light will be presenting at The Association of American Colleges and Universities (AAC&U) Forum on Open Learning and Digital Portfolios in January 2020. Her paper is titled "Tell me your story: Reflection, Compassion, Eth-

ics, and Social Justice in ePortfolio practices”. Dr. Colket will be presenting at the American Educational Research Association (AERA), the world’s largest educational research conference, in April 2022. Her paper is titled, “Educators’ stories of learning: Critical tools for creating more equitable learning environments for our students’.

This past year, as we engaged in data analysis, we were able to explore creative ways to share the learnings of our research. With the remaining funds from our small grant from SGU, we were able to draw upon our data from peoples’ stories of teaching and learning during the COVID-19 pandemic, and we created an animated video project to present our emerging results. The digital story can be viewed here: <https://www.youtube.com/watch?v=WJBauytAg0Q>.

All of our work is built on the foundation of our research, in which we are collecting peoples’ stories of learning and teaching across a variety of cultural and institutional contexts. Our original research was based on in-depth interviews, but given our desire to expand our reach, we recently shifted to include an in-depth questionnaire. We were approved through SGU’s IRB for a new research study (approval received in November 2021) focused on the survey data, and we are looking forward to exploring the ways in which this new data set will supplement our previously collected data.

Our new survey was disseminated in December 2020. We distributed our survey through our CRSE network as well as the wider network of our co-directors and research coordinator. Through the in-depth questionnaire, our goal is to collect a larger number of stories about learning, inside and outside formal

educational contexts, spanning 4 stages of educational experiences (childhood, adolescence, young adulthood, and adulthood). Our aim is to use the data collected to inform the development of professional learning experiences and open educational resources to support the ongoing professional growth of educators and educational leaders in a variety of contexts, with the explicit purpose of creating more equitable, welcoming, inclusive, and powerful learning environments.

We are excited to continue and expand our work through our newly-developed dynamic and interactive website of Open Educational Resources related to our research. Our website is intended to be a hub for educators, educational leaders, educational researchers, and storytellers to connect and access our growing repository of resources. As an extension of our virtual conference series, the website enables us to leverage our conference work and our ongoing research, so that an even wider audience has access to the materials generated thus far. We intend for our research to support educators to harness the power of storytelling in their educational practices.

We would again like to thank WINDREF for supporting us through the 2021 annual year. We look forward to continuing to expand our work in collaboration with WINDREF in the years to come.

*Submitted by: Laura Colket, Tracy Penny-Light and Kitaka Mawuto*

## **COVID 19 Screening and Surveillance Programme in 2021**

In March 2020, St. George’s University (SGU) School of Veterinary Medicine along with

WINDREF collaborated with the Ministry of Health (MoH) for the Real-Time qPCR testing of samples for SARS CoV2. The first case identified in Grenada was recorded on 22 March 2020; this was an imported case from the United Kingdom. The first 3 positive samples identified in the SGU/SVM lab were subsequently sent to the Caribbean Public Health Agency (CARPHA) for confirmation, which was received a few days later. These positive results validated the SGU/WINDREF laboratory as a testing facility for SARS CoV2. Since that time, SGU/WINDREF has continued to partner with the MoH for testing samples for SARS CoV2 and following up with contact tracing.

During 2020, SGU provided the funding to develop a State-of-the-Art molecular diagnostic laboratory in WINDREF and provided much of the laboratory equipment. With additional donations from the MoH and the Pan American Health Organization (PAHO) the WINDREF laboratory became fully operational in early 2021 and continued to perform the PCR testing requirements for SGU and as requested also for the MoH. In August 2021, SGU partnered with WINDREF to establish an ongoing screening/surveillance program for testing of students, staff, faculty, contractors, significant others or any individual who needs to visit the SGU True Blue Campus. The SGU/ WINDREF Laboratory (Figure 1 and figure 2) was validated by the World Health Organization (WHO) on two occasions with 100% concordance of samples submitted to the lab by WHO and tested blindly, thus, PAHO approved our lab for SARS-CoV-2 PCR testing. This validation enabled the production and issue of PCR travel certificates in partnership with the MOH. Today, the lab is furnished with 2 Real Time RTPCR machines, an automated RNA Extrac-

tor, 4 -80 freezers, 2 -20 freezers and 2 work-stations.



**Fig 1: Vanessa Matthew-Belmar and Nandy Noel conducting the isolation of the RNA virus from newly collected samples in the refurbished molecular lab in WINDREF.**



**Fig 2: Dr. Bhumika Sharma and Elsa Chitan, the head of the laboratory, in the PCR room which houses two qPCR machines. During the Grenada outbreak, up to almost 600 samples were tested per day, and results returned in a timely manner.**

**Airport testing:**

SGU collaborated with WINDREF, MoH for the testing of passengers arriving on incoming flights to Grenada from 17 July -30 August. This partnership was developed to facilitate testing at the airport of the large number of arriving passengers, including SGU students for the Fall 2021 semester. This testing period at the airport was not limited to only SGU affiliates but also to returning nationals and visitors.

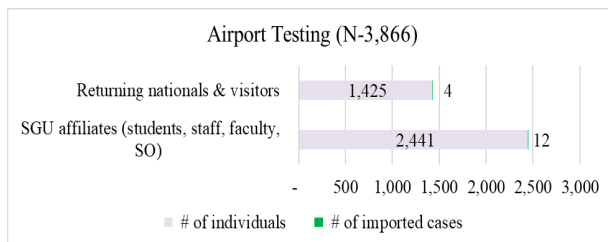
A WINDREF Response Team was assembled which included nurses to allow the seamless sample collection at the airport (Fig 3). After sample collection, SGU affiliates were transported to a government approved quarantine site via an approved airport taxi.



**Fig 3: WINDREF Response Team**

Over 3,500 samples were tested, of those 12 SGU affiliates and 4 returning nationals and visitors were found to be positive (Table 1).

All individuals remained in quarantine and were cleared based on a negative PCR test result. Positive individuals were isolated, re-tested and cleared by the Chief Medical Officer (CMO) based on a negative PCR test.

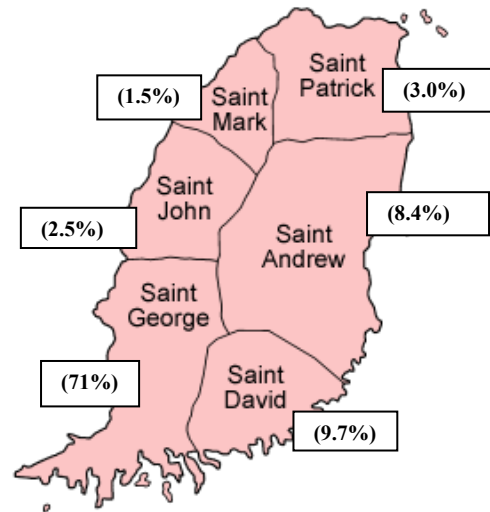


**Table 1: SGU/WINDREF testing of airport samples collected during July/August 2021**

### Screening Programs

Considering the increase in the number of cases associated with our first Delta wave in August, it was decided that all students, staff, and faculty be screened. This screening was

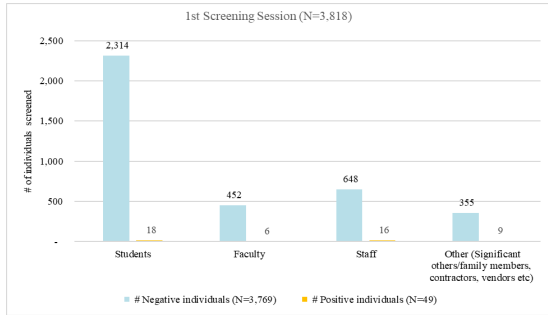
also open to all individuals who required access to campus, students, staff, faculty, visitors, contractors, significant others/family members, vendors and fishers. Although the testing was conducted in the Open Modica Hall at the True Blue Campus, the participants lived in all parishes of Grenada (Fig 4), and thus the prevalence obtained was representative of the outbreak throughout the country.



**Fig 4**

During our first screening session from 26 Aug - 5 September, over 3,500 PCR tests were completed and identified 49 breakthrough SARS-CoV-2 infections (Table 2). None of the 49 cases was hospitalized or was severely ill. Most results were provided within an 8 hour timeframe.

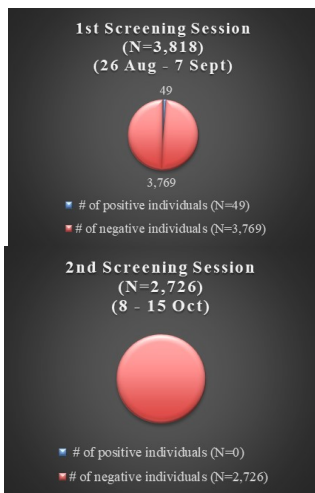




**Table 2: 1<sup>st</sup> Screening Session (N=3,818) 26 August – 5 September**

Upon discovery of a positive case, contact tracing was initiated immediately and those positive individuals were promptly isolated and were subsequently medically cleared by the CMO upon recording a negative PCR test. The screening sessions included all family members and direct contacts of positive cases.

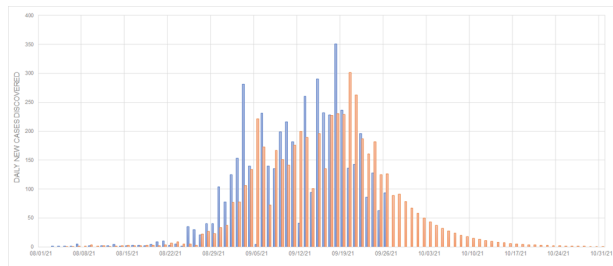
The second screening session was held between 8 -15 October, and during this period more than 2,500 individuals were tested using the lateral flow antigen test. No positive individuals were identified during the 2<sup>nd</sup> screening program (Fig 5) and this was mirrored by what was taking place in Grenada with there being very few cases identified through community spread.



**Fig 5: Number of SARS-CoV-2 cases identified during the two screening programmes**

### Surveillance Programmes

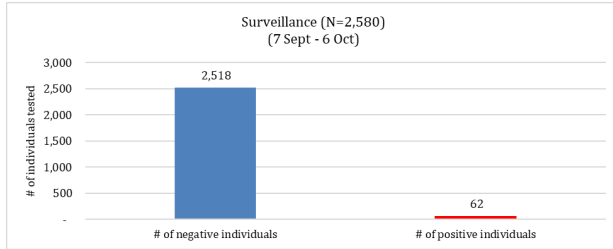
In mid-September, a predictive model for SARS-CoV-2 cases in Grenada was developed using the daily discovery rate provided by the MOH (Figure 6). The daily discovery rate peaked on September 18<sup>th</sup> and fell each day after that. This data was used to model the projected number of new cases, using exponential smoothing to predict the evolution of the outbreak. The model proved to be remarkably accurate for the first wave of SARS-CoV-2 experienced in Grenada which was caused by the arrival of the delta variant in early August.



Peak discovery date 18<sup>th</sup> September

**Fig 6: Daily new discovered cases (blue) and projected number of cases till October 31<sup>st</sup> (orange) (modeled from data supplied from Dr. Shawn Charles, the CMO)**

In addition to the screening programmes, surveillance sessions were conducted for all students, staff and faculty and anyone that requested a test within the SGU community. Since the 2<sup>nd</sup> screening program ended, a total of 62 (2.4%) out of 2,580 individuals tested during routine surveillance were found to be positive. (Fig 7). Similar to the 1st screening session, breakthrough infections were noted. These persons were isolated and contact tracing was conducted immediately. None of the 62 positive SGU affiliates were hospitalized or severely ill.



**Fig 7: Surveillance between 7 Sept – 6 Oct (N=2580)**

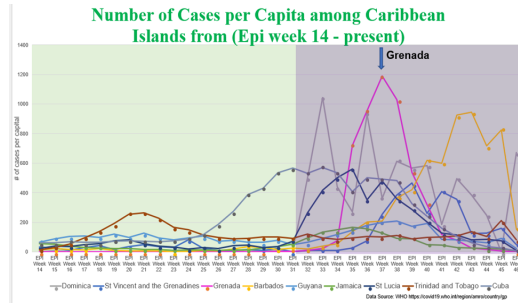
wearing of face masks, getting vaccinated and ongoing testing which has allowed us to quickly identify a positive case and allow contact tracing to be initiated.

In early August, vaccination rates were 17.7% with 95% of deaths being among the unvaccinated individuals.

Drive - thru testing sessions were implemented on Tuesdays and Fridays for symptomatic individuals or contacts of cases (Fig 10). These individuals were swabbed in their vehicles, minimizing contact with others in the SGU community.



**Fig 8: Drive Thru testing sessions**



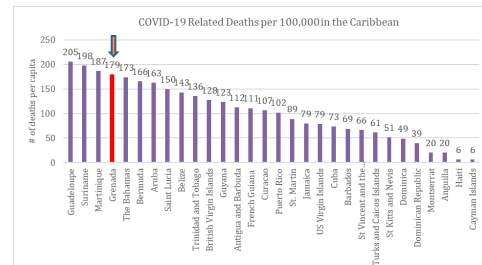
**Fig 9: SARS-CoV-2 cases per 100,000 in Caribbean countries**

Grenada ranked highly in the Caribbean in relation to COVID 19 related deaths (Fig 13).

Since the beginning of the screening/ surveillance program, WINDREF has tested over 3,000 individuals for travel certificates ranging from students to Olympic. (Fig 11)

**Regional Surveillance Data**

Grenada was similar to a number of other regional countries, including Dominica, Jamaica and Barbados in having an increase in the number of cases from the 2<sup>nd</sup> week in Aug (Fig 12). This was Grenada's first wave. Grenada had the highest number of cases per capita in mid-September, followed by a sharp decline which was partly attributed to the decrease in transmissibility and our adherence with protocols recommended by the WHO and PAHO including frequent hand-washing, sanitizing, physical distancing, the



**Fig 10: COVID-19 Related Deaths per 100,000 in the Caribbean**

In early December, WINDREF received 2 sequencing machines (MiniOne) from SGU which facilitated the sequencing of SARS-CoV -2 variants that have circulated historically and presently (Fig 14).



**Fig 11: Mrs. Vanessa Matthew-Belmar, a PhD Candidate, with the newly arrived Nanopore MiniOne Sequencing equipment which she will use to study the zoonotic potential of SARS-CoV-2 and will also be used to investigate the occurrence of SARS-CoV-2 variants in Grenada.**

At the end of December, 11 cases of SARS-CoV-2 were diagnosed by PCR and these cases were sequenced using the Nanopore MiniOne Sequencing machine and all were shown to be the Omicron variant. This was the first time that this variant had been reported in Grenada, and the information was provided to the CMO who officially reported the occurrence of Omicron to PAHO. By the end of 2021, the new outbreak of SARS-CoV-2 was being recorded from all parishes of Grenada. Fortunately, no individuals have been hospitalized and no deaths recorded from this 2<sup>nd</sup> wave as of December 31<sup>st</sup>, 2021.

We would like to thank Professor Christine Carrington and her lab staff, Dr. Nikita Sahadeo, Mr. Vernie Ramkisson and Mr. Soren Nicholls for their online technical assistance using the new equipment and uploading the

results into the Bioinformatics System which ultimately decodes the variant. This was feasible through the sharing of screens in real time and discussions online and worked extremely well.

### **Acknowledgements**

St. George's University, WHO, PAHO, MOH, CARPHA, Donella Telesford & the Contact Tracing Team, Tania Khan, Veronica Mapp-Alexander (Lab testing), Satesh Bidaisee, Naomi Whyte, Kareem Coomansingh, Christian Chu Fook, Jennifer Solomon (Director of Nursing Program), Johansen Sylvester (Director of the Cardiology Program), Orin Liddle (UHS), Sonalie Bollogama (WINDREF), Basil Williams (WINDREF), Markeda Fletcher (WINDREF), Ronasha Williams (WINDREF), Aiesha Levine (WINDREF), Britania Jeremiah (WINDREF), Peter English Jr (WINDREF), Amanda Mark (WINDREF), Amelia Noel – Lewis (WINDREF), Kanisha Noel (WINDREF), Janine Welsh Ghatt (WINDREF), Isha English Yvette Simon

*Submitted By: Calum Macpherson, Trevor Noël, Nikita Cudjoe, Vanessa Belmar – Matthew, Nandy Noel, Elsa Chitan, Bhumika Sharma, Katherine Yearwood*

### **Vaccinations in Grenada**

#### **National Vaccination Program**

Grenada recorded its first case of the novel coronavirus (SARS CoV-2) on March 22, 2020. The country spent the next ten months under stringent protocols, including curfew, airport entry testing, and contact tracing. On the 3rd of January 2021, Grenada experienced its first death from COVID-19, and at the time, there were 127 active cases in the country. Three days prior, the U.K. gave the approval for

emergency use of the Oxford AstraZeneca vaccine. On the 12th of February, Grenada's Prime Minister Dr. the Right Honorable Keith Mitchell and Minister of Health Mr. Nickolas Steele took their first doses of the AstraZeneca vaccine. This indicated the start of Grenada's vaccination program. Between the 15th and 23rd of February, vaccination took place at the General Hospital in St. George's for essential workers including medical staff and police officers. When uptake was suboptimal, the program was expanded to the Radisson Hotel in Grand Anse and was opened to the general public on the 22nd of February. WINDREF, in collaboration with the Ministry of Health (MOH), was involved in this program from the start of the vaccination program.

Vaccination continued through to the end of 2021 at key sites including the General Hospital, local Health Centers, and pop-up clinics across all parishes in Grenada. The WINDREF team, along with volunteers from SGU School of Medicine and School of Nursing assisted with pop-up clinics during the weekends. SGU undertook regular vaccination days at Open Modica Hall until June 1 to facilitate their vaccination mandate to enter campus. The group working at the Radisson Hotel, which included the COVID-19 Response Team eventually moved to the Kirani James National Stadium to continue the vaccination program. From September 27 the new COVID-19 clinic at the Gouyave Polyclinic was opened to service the Northwestern corridor of Grenada, including the parishes of St. John, St. Mark and St. Patrick. Dr. Jane Noël, Assistant Coordinator Ms. Tania Khan, MPH and Nurse Sally Ollivere worked with MOH nurses from the Gouyave Health Center

who rotated in to assist at the Polyclinic. Two security guards were made available from the tenth week at the Polyclinic. The clinic was cleaned by Ms. Rose Marie Charles and Ms. Hddie Ferdinand from the Gouyave Health Center. The clinic ran on Monday, Wednesday and Thursday each week up until December 23, 2021.

### WINDREF COVID-19 Response Team at Grenada's National Vaccination Program



Grenada General Hospital



St. Georges University Campus Vaccination Site



Kirani James National Stadium Vaccination Site





**Radisson Hotel Vaccination Site**



**Vaccination at St. Georges University**



**Regional Vaccination Distribution**



**WINDREF and MOH receive Pfizer Vaccine**



**AstraZeneca arrival from COVAX**



**Prime Minister the Right Hon. Keith Mitchell (top) and Minister of Health Hon. Nickolas Steele (below) receive their first AstraZeneca Vaccine.**



The Gouyave COVID-19 Polyclinic



Research Day Award Ceremony (09/11/2021)

### St. George’s University Research Day

The WINDREF team, represented by Ms. Tania Khan, presented at SGU Research Day and the National Society of Research Day/Phi Zeta Research Emphasis Day on October 23, on Grenada’s COVID-19 vaccination program and the reasons for vaccine hesitancy in Grenada. Notably, comprehensive data on total daily doses administered were correlated with key events in Grenada’s vaccination program. The vaccination presentation was awarded the prize for the Best Overall WINDREF Presentation on November 9, 2021.

WINDREF team, along with volunteers from SGU School of Medicine and School of Nursing assisted with pop-up clinics during the weekends. SGU undertook regular vaccination days at Open Modica Hall until June 1 to facilitate their vaccination mandate to enter campus. The group working at the Radisson Hotel, which included the COVID-19 Response Team eventually moved to the Kirani James National Stadium to continue the vaccination program. From September 27 the new COVID-19 clinic at the Gouyave Polyclinic was opened to service the North-western corridor of Grenada, including the parishes of St. John, St. Mark and St. Patrick. Dr. Jane Noel, Assistant Coordinator Ms. Tania Khan, MPH and Nurse Sally Ollivere worked with MOH nurses from the Gouyave Health Center who rotated in to assist at the Polyclinic. Two security guards were made available from the tenth week at the Polyclinic.



Vaccination Presentation on SGU Research Day



Receiving award for Best Overall WINDREF Presentation

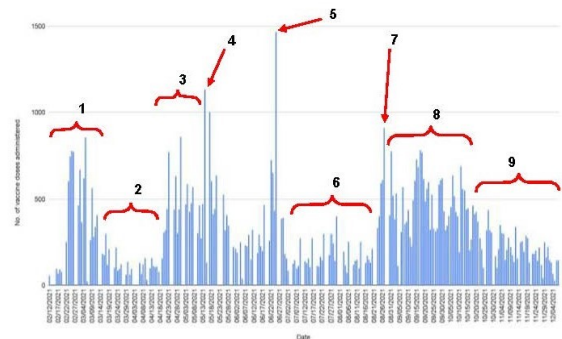


Figure 1. Vaccination Uptake in Grenada (February 2021-December 2021). Data from the Ministry of Health Grenada.



**Key Event in Vaccination Uptake in Grenada** (FDA) approval.

1. Frontline workers and sensitized general public receive first dose of AstraZeneca vaccine.
2. Concerns about blood clots related to AstraZeneca vaccine cause drastic reduction in vaccine uptake. Even after the European Medicines Agency found Astra Zeneca vaccine was “not associated” with clots on 18th March, the damage was already done. In Grenada the general public never really shook off the perceived risk of clotting events. Additionally, on April 9th Grenada received 24,000 doses of AstraZeneca vaccine through the COVAX facility.
3. Frontline workers and sensitized populations receive second dose of AstraZeneca vaccine. Notably, on April 15th St. Georges University became the first entity in Grenada to mandate vaccination and began denying entry to the campus for unvaccinated individuals starting on June 1st.
4. The second highest vaccine uptake day, on May 14th 1135 doses were administered due to an announcement that the current AstraZeneca vaccine batch was expiring.
5. The highest vaccine uptake day, on June 24th, 1486 doses were administered, due to a second announcement that another batch of AstraZeneca vaccine was expiring.
6. The general public was informed that Grenada would be receiving a shipment of Pfizer vaccine from the United States shortly. The public preferred to wait for the Pfizer vaccine than take the available AstraZeneca vaccine and uptake rates dropped.
7. Grenada received 29,250 doses of Pfizer vaccine which was released to the general public including children aged 12 years and older. A few days later, the Pfizer vaccine received U.S. Food and Drug Administration

8. On August 30th Grenada recorded its second COVID-19 death. There were 266 active cases and this escalated to over 5,500 overall cases with the death toll reaching 200. Vaccination rate remained steady at 500-600 doses per day during this period.

9. From mid-October, as national cases dropped and the death rate stabilized, the vaccination uptake dropped to under 200 doses a day and has continued to stay this low.

**Top Ten Reasons for Vaccine Hesitancy in Grenada**

Following months of meeting people in the community and speaking about reasons to vaccinate, both at local businesses and the vaccination centers, the top ten most reiterated reasons for vaccine hesitancy were found to be:

- 1) Misinformation on social media
- 2) Concerns about blood clots
- 3) Worries that vaccination will exacerbate comorbidities (asthma, diabetes, sickle cell, high blood pressure, cancer, leukemia)
- 4) Lack of understanding of the benefits of vaccination
- 5) Fear of Needles
- 6) “Waiting to See” Mentality
- 7) Peer pressure to not vaccinate
- 8) Concerns about Sterility
- 9) Concerns regarding effects of vaccinating while Pregnant
- 10) Concerns regarding effects of vaccinating while Breastfeeding

The team found that once people had the chance to sit and talk one-on-one with clinic staff about their specific concerns and have them alleviated by experts in the field,

the majority of people chose to vaccinate.

on September 27th and the clinic ran until December 23rd, 2021.

### National Television Appearances

Some of the members of the WINDREF COVID-19 Response Team took part in two national television broadcasts with the aim of disseminating evidence-based facts to the public regarding COVID-19 vaccination, testing and screening, including history of vaccination, COVID-19 vaccine development, and vaccine hesitancy in Grenada, COVID-19 testing techniques, (PCR and rapid antigen testing), variants of concern, screening, and surveillance. Dr. Jane Noël, Ms. Tania Khan, Ms. Vanessa Matthew-Belmar, Ms. Nikita Cudjoe and Ms. Nandy Noel represented the WINDREF team for a Prime Time Special on Perspectives, MTV Grenada on 24/11/21 and on the To the Point program on Grenada Broadcasting Network on 09/12/21.

### The New Gouyave Polyclinic COVID-19 Vaccination & Testing Clinic

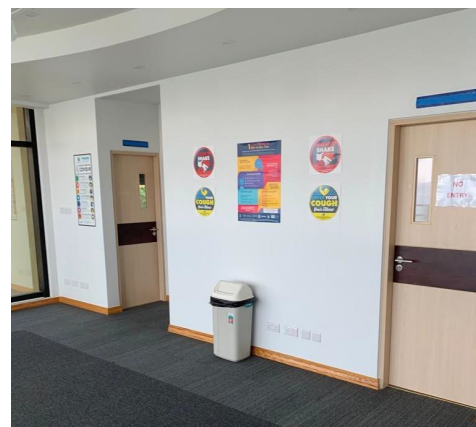


**SGU/WINDREF Researchers Panel:**  
**Back Row: Ms. Vanessa Matthew-Belmar (MSc), Dr. Jane Noel (MA, MB, BChir)**  
**Front Row: Ms. Nikita Cudjoe (MPH), Ms. Nandy Noel (BSc), Ms. Tania Khan (MPH)**



### The COVID-19 Vaccination and Testing Clinic at the Gouyave Polyclinic

Vaccination and COVID-19 testing was made available at the Gouyave Polyclinic starting





**The WINDREF/Gouyave Polyclinic Team  
Dr. Jane Noël, Ms. Tania Khan, Nurse Sally Olivere**

### Vaccination at the Gouyave Polyclinic

The vaccination rate had a distinct early peak from weeks 1 to 3 and the rate suddenly fell starting in week 4 and onwards. During the first week, 167 vaccinations were performed, followed by 218 vaccines in week 2, 237 in week 3, and 203 in week 4. Originally, only Pfizer and AstraZeneca vaccine were available. There were three occasions during the course of the clinic that Pfizer vaccine was not available due to low stock on the island (1/11/21 in week 6, 8/11/21 to 14/11/21 in week 7, and from 7/12/21 to 16/12/21 in week 11 and 12). AstraZeneca vaccine was also unavailable from the 1st to the 7th of November. Overall, there was a high incidence of hesitancy related to taking the AstraZeneca vaccine. There were a few people who took the AstraZeneca vaccine for both their first and second doses when Pfizer vaccine was not available. The Gouyave team observed that most people who were hesitant about the AstraZeneca vaccine needed one-on-one counseling regarding the perceived risks of the vaccine. On October 29th, the Janssen Johnson & Johnson vaccine was made available nationally at all vaccination clinics. The Janssen vaccine was the least used vaccine at the Polyclinic, with the exception of those who wished to travel as soon as possible or during the holiday season in December.

The overall trends in vaccination uptake at the Gouyave Polyclinic mirror the national statistics. The number of children being vaccinated between the ages of 12 and 17, remained low during the 3 month period, making up only 9.97% of all vaccines given. Overall, 990 people were fully vaccinated by the clinic with 1535 doses administered in total.

The statistics showed that females were more proactive with vaccination than males with 55.2% of vaccines being administered to females at the Polyclinic. The team not only vaccinated at the Gouyave Polyclinic but also did home vaccinations for the elderly, disabled and those who could otherwise not travel to the Polyclinic. The Hillview Home for the Aged in Gouyave received three visits by Gouyave Polyclinic staff and resulted in vaccination for all residents, except one patient whose relatives refused the vaccine on behalf of the resident. Figures 2-5 represent key vaccination data findings (doses administered, age demographics, gender demographics, daily vaccine uptake) at the Gouyave Polyclinic, all data for vaccinations can be found in the Appendix Figures 9-11.

Booster doses (included separately within vaccination numbers) were introduced into the vaccine program on November 8th. AstraZeneca, Janssen, and Pfizer vaccine were generally made available for **usage as booster doses. The exception was in instances when there was low overall** stock of Pfizer vaccine on the island, and therefore vaccine doses for children and second dose shots were prioritized over booster doses, as decided by the Ministry of Health. Once Grenada received more stocks of vaccine in mid-December, all three vaccines were made available once again as booster doses.

Notably, the WINDREF/Gouyave Polyclinic team in collaboration with the WINDREF COVID-19 Response Team ran the first mass Booster Day at St. Georges University on Friday, December 17th for students, staff, faculty and significant others. The up-

take was high, with 247 booster doses administered.

Overall, over the course of the three month period, from September 27th to December 23rd, 416 booster doses were administered, of which 70% were Pfizer vaccine, 27.9% were AstraZeneca vaccine, and 2.1% were Janssen vaccine. Figure 6 displays the breakdown of booster doses by vaccine type (AstraZeneca, Pfizer and Janssen vaccines), all data for booster doses can be found in the Appendix Figures 12-13.

A second Booster Day was held at St. George's University on December 28, 2021. Overall, 255 booster doses were administered, with 71 doses of AstraZeneca and 184 doses of Pfizer vaccine being administered. In terms of gender, 141 females and 114 males took the booster shot on this day. This data for the 2nd SGU Booster Day, listed separately from above booster dose data (administered after Dec 23rd), can be found in Appendix Figure 14.

### Vaccination at the Gouyave Polyclinic



**Ms. Tania Khan registering persons for vaccination.**





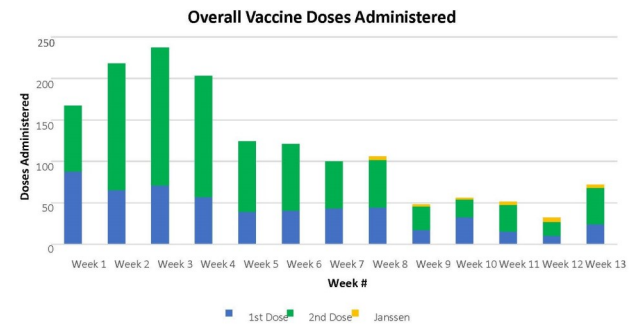
**Dr. Noël vaccinating a breastfeeding mom.**



**Vaccinations at the Hillview Home for the Aged in Gouyave, St. John**

Dr. Noël and Ms. Khan administering vaccinations at the Hillview Home.

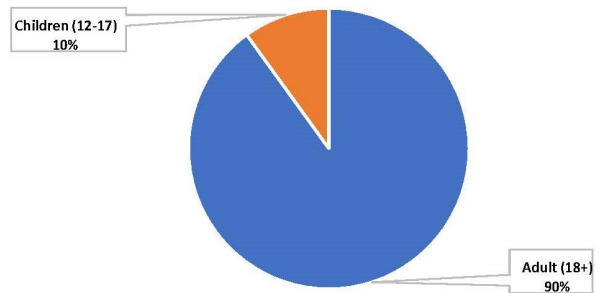
Middle picture: Hillview Home staff members supporting vaccination at the Home.



**Figure 2. Overall Vaccine Doses Administered Weekly (First Doses, Second Doses, and Fully Vaccinated Janssen doses)**

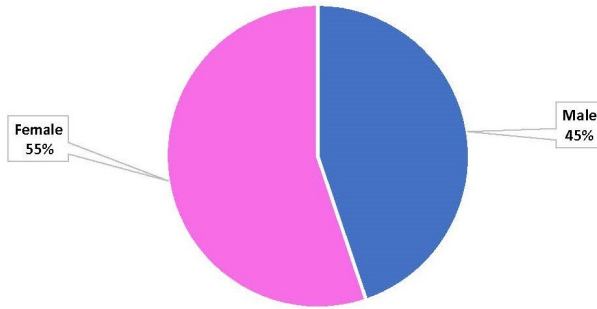


**Overall Vaccination Demographics by Age**

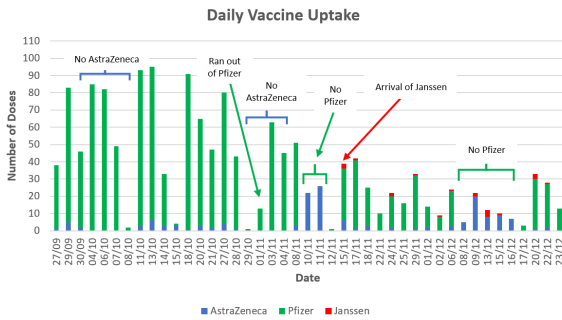


**Figure 3. Vaccination Demographics by Age (Month 1-3)**

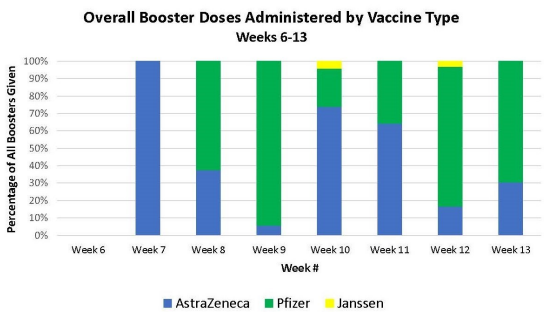
**Overall Vaccination Demographics by Gender**



**Figure 4. Vaccination Demographics by Gender (Month 1-3)**



**Figure 5. Daily Vaccination Uptake in Months 1-3 (27 Sept to 23 Dec)**



**Figure 6. Demographics of Booster Doses Weekly by Vaccine Type (Administered Week 6-13, including 1st Booster Day at SGU – Dec 17, 2021)**

**Testing at the Gouyave Covid-19 Polyclinic**

The Polyclinic started COVID-19 rapid antigen testing from the first day of clinic on September 27th. In week 1, 220 people were tested, with a positivity rate of 16.36% (36 persons). Over the three month period, there was a steady decline in testing. During week 2, 133 people were tested, with a positivity rate of 12.39% (14 persons). During week 3, 80 tests were administered, with a positivity rate of 6.25% (5 people). During week 6 (November 1-7), there were no positive cases at the clinic and this trend continued through the remainder of the year, with the exception of the final month (week 10) when 1 positive case was recorded. The number of people who came to the Polyclinic for testing declined to almost 0 by week 9 and stayed very low afterwards. Over the three month period, a total of 604 people were seen in the testing clinic. Of those persons, 67 of them received clearance papers for work without testing after having completed the mandatory 14 day quarantine, and 537 people were tested for COVID-19. Of the 65 positive cases recorded at the Polyclinic, 50 were unvaccinated, 6 were partially vaccinated with one dose, and 9 were fully vaccinated. Figures 7 and 8 represent COVID-19 rapid antigen test findings, all testing data can be found in the Appendix Figures 15-17.

**Testing at the Gouyave Polyclinic**

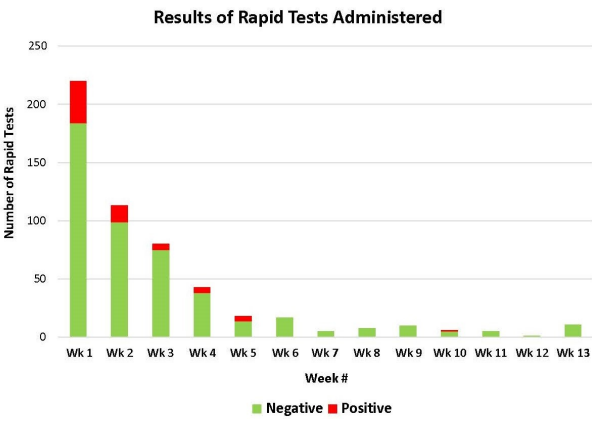






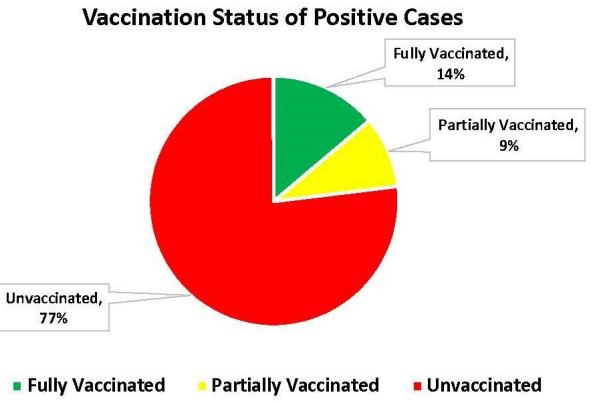
**Nurse Ollivere performing a COVID-19 rapid antigen test on a child at the Gouyave Polyclinic.**

**First Booster Day at St. George’s University  
(17/12/2021)**



**Figure 7. Results from Rapid Tests Administered (Positive and Negative Results) During Weeks 1-13**

**Appendix  
Gouyave Polyclinic Vaccination Data (27th Sept to 23rd Dec 2021)**



**Figure 8. Vaccination Status of Positive Cases (Unvaccinated, Partially Vaccinated - 1st dose only, and Fully Vaccinated)**

Week #	Week 1 27/9-3/10	Week 2 4/10-10/10	Week 3 11/10-17/10	Week 4 18/10-24/10	Week 5 25/10-31/10	TOTAL
Total Vaccinated	167	218	237	203	124	949
Total Male	69	109	103	99	67	447
Male, adult (18+)	63	97	96	87	60	403
Male, child (12-17)	6	12	7	12	7	44
Total Female	98	109	134	104	57	502
Female, adult (18+)	91	104	117	97	52	461
Female, child (12-17)	7	5	17	7	5	41
Total AstraZeneca	8	0	15	6	5	34
AstraZeneca 1 <sup>st</sup> Dose	2	0	1	0	0	3
AstraZeneca 2 <sup>nd</sup> Dose	6	0	14	6	5	31
Total Pfizer	159	218	222	197	119	915
Pfizer 1 <sup>st</sup> Dose	86	65	70	57	39	317
Pfizer 2 <sup>nd</sup> Dose	73	153	152	140	80	598

**Figure 9. Overall Vaccination Data – Month #1 (Weeks 1-5)**

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Week #	Week 6 1/11-7/11	Week 7 8/11-14/11	Week 8 15/11-21/11	Week 9 22/11-29/11	MONTH TOTAL	Cumulative TOTAL
Total Vaccinated	121	100	106	48	375	1324
Total Male	43	46	37	20	146	593
Male, adult (18+)	39	41	33	19	132	535
Male, child (12-17)	4	5	4	1	14	58
Total Female	78	54	69	28	229	731
Female, adult (18+)	69	52	56	26	203	664
Female, child (12-17)	9	2	13	2	26	67
Total AstraZeneca	0	51	10	2	63	97
AstraZeneca 1 <sup>st</sup> Dose	0	28	4	2	34	37
AstraZeneca 2 <sup>nd</sup> Dose	0	23	6	0	29	60
Total Pfizer	121	49	92	44	306	1221
Pfizer 1 <sup>st</sup> Dose	40	15	40	15	110	427
Pfizer 2 <sup>nd</sup> Dose	81	34	52	29	196	794
Total Janssen	0	0	4	2	6	6

Figure 10. Overall Vaccination Data – Month

Week #	Week 10 29/11-5/12	Week 11 6/12-12/12	Week 12 13/12-19/12	Week 13 20/12-23/12	MONTH TOTAL	Cumulative TOTAL
Total Vaccinated	56	51	32	72	211	1535
Total Male	25	22	20	28	95	688
Male, adult (18+)	23	21	17	24	85	620
Male, child (12-17)	2	1	3	4	10	68
Total Female	31	29	12	44	116	847
Female, adult (18+)	25	27	12	34	98	762
Female, child (12-17)	6	2	0	10	18	85
Total AstraZeneca	3	28	24	3	58	155
AstraZeneca 1 <sup>st</sup> Dose	1	7	9	1	18	55
AstraZeneca 2 <sup>nd</sup> Dose	2	21	15	2	40	100
Total Pfizer	51	20	3	65	139	1360
Pfizer 1 <sup>st</sup> Dose	31	8	1	23	63	490
Pfizer 2 <sup>nd</sup> Dose	20	12	2	42	76	870
Total Janssen	2	3	5	4	14	20

Figure 11. Overall Vaccination Data – Month #3 (Weeks 10-13)

Week #	Week 6 1/11-7/11	Week 7 8/11-14/11	Week 8 15/11-21/11	Week 9 22/11-28/11	MONTH TOTAL	Cumulative TOTAL
Total Boosters	0	17	40	18	75	75
Total Male	0	6	17	10	33	33
Total Female	0	11	23	8	42	42
Total AstraZeneca	0	17	15	1	33	33
Total Pfizer	0	0	25	17	42	42
Total Janssen	0	0	0	0	0	0

Figure 12. Booster Doses – Started During Month #2 (Weeks 6-9)

Week #	Week 10 29/11-5/12	Week 11 6/12-12/21	Week 12 13/12-19/12	Week 13 20/12-23/12	MONTH TOTAL	Cumulative TOTAL
Total Boosters	23	14	258	46	341	416
Total Male	7	4	143	22	176	181
Total Female	16	10	115	24	165	2325
Total AstraZeneca	17	9	43	14	83	116
Total Pfizer	5	5	207	32	249	291
Total Janssen	1	0	8	0	9	9

Figure 13. Booster Doses – During Month #3 (Weeks 10-13)

Total Boosters	255
Total Male	114
Total Female	141
Total AstraZeneca	71
Total Pfizer	184
Total Janssen	0

Figure 14. Booster Doses – SGU’s 2nd Booster Day (December 28, 2021)

Week #	Week 1 27/9-3/10	Week 2 4/10-10/10	Week 3 11/10-17/10	Week 4 18/10-24/10	Week 5 25/10-31/10	TOTAL
Total Seen at Clinic	254	135	86	46	19	540
Work Clearance	34	22	6	3	1	66
Total Tests Administered	220	113	80	43	18	474
Total Negative	184	99	75	38	14	410
Total Positive	36	14	5	5	4	64
Positivity Rate	16.36%	12.39%	6.25%	11.62%	22.22%	-
Positive, Male	17	7	0	2	1	27
Positive, Female	19	7	5	3	3	37
(+) Fully Vaccinated	5	4	0	0	0	9
(+) First dose only	2	4	0	0	0	6
(+) Unvaccinated	29	6	5	5	4	49
(+) St. John	23	11	3	4	3	44
(+) St. Mark	9	3	0	1	1	14
(+) St. Patrick	2	0	2	0	0	4
(+) St. George	2	0	0	0	0	2

Figure 15. Overall Rapid Testing Data - Month #1 (Weeks 1-5)

Week	Week 6 1/11 - 7/11	Week 7 8/11-14/11	Week 8 15/11- 21/11	Week 9 22/11- 29/11	MONTH TOTAL	Cumulative TOTAL
Total Seen	18	5	8	10	41	581
Work clearance	1	0	0	0	1	67
Total Tests	17	5	8	10	40	514
Total Negative	17	5	8	10	40	450
Total Positive	0	0	0	0	0	64
Positivity Rate	0	0	0	0	0	-
Positive, Male	0	0	0	0	0	27
Positive, Female	0	0	0	0	0	37
(+) Fully Vaccinated	0	0	0	0	0	9
(+) First dose only	0	0	0	0	0	6
(+) Unvaccinated	0	0	0	0	0	49
(+) St. John	0	0	0	0	0	44
(+) St. Mark	0	0	0	0	0	14
(+) St. Patrick	0	0	0	0	0	4
(+) St. George	0	0	0	0	0	2

**Figure 16. Overall Rapid Testing Data-Month #2 (Weeks 6-9)**

Week #	Week 10 29/11/21 5/12/21	Week 11 6-12 12/21	Week 12 13-19 12/21	Week 13 20-23 12/21	MONTH TOTAL	Cumulative Total
Total Seen	6	5	1	11	23	604
Work Clearance	0	0	0	0	0	67
Total Tests	6	5	1	11	23	537
Total Negative	5	5	1	11	22	472
Total Positive	1	0	0	0	1	64
Positivity Rate	16.67%	0	0	0	0	-
Positive, Male	0	0	0	0	0	27
Positive, Female	1	0	0	0	1	38
(+) Fully Vaccinated	0	0	0	0	0	9
(+) Partially Vaccinated	0	0	0	0	0	6
(+) Unvaccinated	1	0	0	0	1	50
(+) St. John	1	0	0	0	1	45
(+) St. Mark	0	0	0	0	0	14
(+) St. Patrick	0	0	0	0	0	4
(+) St. George	0	0	0	0	0	2

**Figure 17. Overall Rapid Testing Data - Month #3 (Week 10 -13)**

*Submitted by The WINDREF Vaccination Team*

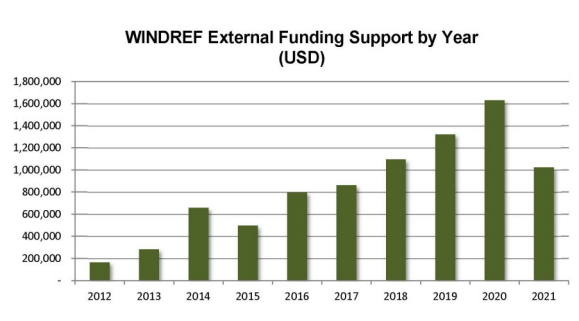
## External Grants and Funding

We thank all the donors who have made WINDREF's work possible in 2021:

- Caribbean Biodiversity Fund, Ecosystem-based Adaptation Facility – For the Innovative Nature-based Solutions to Enhance Community Resilience in Grenada project
- German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety, International Climate Initiative (via the Greenhouse Gas Management Institute) – For the WINDREF-based Measurement, Reporting & Verification Hub (CCMRVH)
- Global Challenges Research Fund – For the Global Health and Clean Water Project
- Global Water Partnership (GWP) – For the GWP Caribbean Regional Office
- Grand Challenges Canada – For the Saving Brains Grenada Scale-up project
- Janssen (via State University of New York) – For the Dengue Surveillance in a Caribbean Travel Population
- National Institutes of Health, Fogarty International Center – For the Caribbean Research Ethics Initiative (CREEI)
- Private Donor – For the SGU School of Veterinary Medicine Dean's Academic Excellence Award
- Private Donor – For the South Sudan Student Support Program
- St. George's University – For the One Health Research Initiative
- St. George's University – For the SARS-COV-2 Testing Program
- Stanford University – For the Engaging Young Persons as Agents of Change project and Zika follow up study
- The Spencer Foundation – For the Center for Research on Storytelling in Education

- UK Research and Innovation Global Challenges Research Fund (GCRF) via the British Institute in East Africa – For the Global Health and Clean Water project
- UNICEF – For the Saving Brains Grenada Scale-up project and Combatting Violence Against Women and Girls: Development of GBV Victims’ Rights Policy for Grenada
- United Nations Food and Agriculture Organization (FAO) – For the Caribbean CC4 Fish project
- United Nations Framework Convention on Climate Change Secretariat (UNFCCC) Secretariat – For the Caribbean Regional Collaborating Center St. George’s
- US Fish and Wildlife Service – For the Consumer Behavior Change Campaign and Intelligence-led Conservation Capacity Assessment to Address the Illegal Wildlife Trade in Trinidad and Tobago
- WS Atkins International Limited – For the Blue Economy Assessment project

Total funding received in 2021 was \$1.023 million, which was a 37% decline from the previous year, and the first time the Foundation has seen a decrease in funding in 7 years. This drop in funding was caused by the COVID-19 pandemic, as many research projects and associated funding was put on hold through the second half of 2020 and through most of 2021. With the pandemic now waning, it is expected that research will get underway once again and funding will resume its upward trend.



## 2021 Grant Applications

Nine grant applications were submitted to external funding agencies in 2021. The total potential value of these grant applications was \$5.76 million USD. Four of these applications were successful and five are still waiting for a final decision about funding. (green = funded, black = waiting for a decision, red = not funded):

- Macpherson, Waechter, Coomansingh, & Redhead. NDA Toolkit & No-objection Procedure and the Establishment of a Monitoring, Reporting, and Verification System (MRVS) for Saint Vincent and the Grenadines (Green Climate Fund via Caribbean Community Climate Change Center)
- Glasgow, & Swope. Grenada Cancer Education and Patient Support Services Platform (PAHO)
- Evans, Burgen, Landon, Waechter, Fernandes, & Blackmon. Strengthening Capacity for Neuropsychological Assessment in the English-speaking Caribbean (International Neuropsychological Association)
- Glasgow & Macpherson. Technical Assistance Grenada Wastewater Treatment and Recycling Project (Caribbean Development Bank)
- Frame, Richards, & Orlando. Community-based Approaches to Gender-based Violence in the State of Grenada (Sexual Violence Research Initiative)
- Colket & Penny Light. Storytelling for Educational Equity (Spencer Foundation)
- Lichtveld, Wickliffe, Zijlmans, Wahid, Beers, Covert, Drury, Ganguli, Glasgow, Hindori-Mohangoo, Macpherson, Newman, Oberheiman, Sekikawa, Shankar,

- Snitz, Thurston, Waechter, Wilson, Specht, & Taylor. Caribbean Consortium on Research in Environmental and Occupational Health: Neurotoxicant exposures and multigenerational adverse cognitive outcomes Training (NIH)
- Zijlmans, Lichtveld, Wickliffe, Hindoir-Mohangoo, Glasgow, Waechter, Macpherson, Wilson, Drury, Shankar, Abdoel Wahid, Covert, Ganguli, Snitz, Beers, Newman, Sekikawa, Oberhelman, Thurston, Taylor, Simeon, & Specht. Caribbean Consortium on Research in Environmental and Occupational Health: Neurotoxicant exposures and multigenerational adverse cognitive outcomes in Suriname (National Institutes of Health)
- Roach, Byrd, Greenhill. Advancing Diversity, Equity, and Inclusion Now in Machine Learning and Artificial Intelligence for Health Care: Core # 2 Ethics (National Institutes of Health)
- The Effectiveness of Life Seasons' Diabet-X in reducing HbA1c among Grenadians with Metabolic Syndrome. LifeSeasons. \$100,000.
- Neglected Tropical Diseases (NTDs) and Rheumatic Fever in Grenada: a project to prevent/eliminate helminthic and rheumatic fever infections among children (5-15 years of age). Bartholomew J. Lawson Foundation. \$41,903.
- Angiotensin converting enzyme and angiotensinogen gene polymorphisms in the Grenadian population: relation to hypertension
- Development of a decision rule for screening Obstructive Sleep Apnea and its epidemiologic relevance to the people of Grenada
- Prevalence and associated risk factors of hypertension in a sample population of native Caribbean's in Grenada, West Indies
- Assessing the prevalence of diabetic complications by examining type I and type II adult diabetics for signs of retinopathy, neuropathy, nephropathy and dermatological changes associated with poor glucose control within the native Caribbean population of Grenada
- Hypertension management and control in two Caribbean countries
- Assessment of the effectiveness of broad-spectrum treatment to children with protozoan and nemathelminthic parasitic infections on diarrhea and school attendance
- The effects of iron-deficiency anemia on cognition and behavior in infants
- Diurnal variation of urinary endothelin-I and blood pressure: related

## Past Research Projects

### Non-communicable Diseases

- The Elimination of the Soil Transmitted Helminths from Grenada and Beyond
- Perspectives on the Uptake of Breast and Cervical Cancer Screening in the English Speaking Windward Islands: A Collaborative Approach
- Woman to Woman: A Cervical Cancer Education Program for Grenadian Women
- Genetic Correlates of the Addictive Diseases: Cocaine, Alcohol and Marijuana Addiction -Grenada, WI, Dr. Mary-Jeanne Kreek, Kreek Laboratory, Rockefeller University. \$60,000.

- hypertension
  - Alcohol consumption in Grenada
  - The incidence and mortality of cancer in Grenada over the ten year period: 1990 -1999
  - The prevalence of abnormal haemoglobin traits in Grenadian secondary school adolescents
  - Knowledge, attitudes, beliefs and practices of sickle cell anemia in Grenadian primary and secondary school children
  - Decompression sickness among the indigenous fishing population in Grenada: Assessing the burden of disease
  - WINDREF / SGU Hurricane Relief
  - Spice Research Program
  - Sulfate-reducing bacteria in oxidized freshwater of tropical mangroves
  - Novel antibiotics from tropical marine environments: drug development in Grenada
  - Study of the mutacin C-7A
  - Gram-negative bacteria isolated from aquatic environments of Grenada (61.4° W, 12.0°N), West Indies
  - Identification of bacteria producing antibiotics isolated from deep marine biofilms of Grenada
  - SGU Environmental Testing Unit (ETU)
  - Post-hurricane water surveillance in problematic areas of Grenada
  - Evaluation of the relocation potential for villagers residing in Queen Elizabeth National Park, Uganda
  - Study of the calls of the spotted hyena at feeding
  - Survey on the attitude of villagers in Queen Elizabeth National Park, Uganda towards the threat of lions, leopards and hyenas
  - Epidemiology of human injuries resulting from wildlife in ten villages with- in Queen Elizabeth National Park, Uganda
  - Rural Ugandan village perspective on lion, leopard and hyena conservation
  - Epidemiology of human injuries by wildlife in six villages within Queen Elizabeth National Park, Uganda
  - Prevalence of *Campylobacter fetus* subspecies *venerealis* and other microorganisms in the reproductive tracts of cattle from the southern region of Santo Domingo, Dominican Republic
  - Antimicrobial properties of skin secretions from *Eleutherodactylus johnstonei* on bacteriological isolates
  - Examination and analysis of prostate cancer in Grenada
  - A Church-based intervention to improve hypertension prevention and control among women in Grenada
  - Occupational Health Problems among Nutmeg Factories Workers, SGU Small Research Grant Initiative
  - Sport for Health Programme
  - Grenada School Nutrition Study: Evidence to Inform Policy
  - Genetic Correlates of the Addictive Diseases: Cocaine, Alcohol and Marijuana Addiction -Grenada
  - Promoting Resilience Among Medical Students: A Comparison of Mindfulness, Yoga, and Exercise
- Infectious Diseases**
- LaBeaud, Waechter, Blackmon, Noël, Landon, & Macpherson. Zika and Neurodevelopment among Infants in Grenada: 36- month Assessment. Stanford University
  - LaBeaud, Noël, & Macpherson. Engaging Young People as Agents of Change. Stanford University.



- Neurodevelopment and Vector-borne Diseases: Building Research Capacity in the Tropics. National Institutes of Health - Fogarty International Center. \$298,938.
- Assessment of Neurocognitive Functioning in 2-year-old ZIKV-exposed Children. USAID via jhpiego. \$63,867.
- The Spectrum of Zika Disease in Grenada. Stanford University. \$13,601.
- The Spectrum of Zika Disease in Grenada. Stanford University. \$34,992.
- Zika Surveillance in the Southern Caribbean and Reference Lab Support. Naval Medical Research Center. \$80,000.
- Investigation of the prevalence of SIV in the mona monkey (*Cercopithecus mona*) in Grenada
- Seroprevalence of HIV-I and HIV-II in pregnant women in Grenada, W.I. –their knowledge of AIDS and their exposure hazards to the virus
- A cross sectional study of the current status of *Schistosoma mansoni* in St. Lucia by field surveys and supplementary data collection
- Identification and characterization of hantaviruses among the mammal population of Grenada
- HIV/AIDS health education and evaluation program in Grenada
- The seroprevalence of *Toxoplasma gondii* in a population of pregnant women and cats in Grenada, West Indies
- The efficiency of diagnosing women of *Toxoplasma gondii* using PCR techniques in comparison with ELISA
- Dengue virus in Grenada: seroprevalence and associated risk factors
- A current appraisal of dengue virus in Grenada –serotype analysis and vector assessment
- A site receptivity study determining the threat of reintroduction of malaria into Grenada through the study of *Anopheles* spp. mosquito vectors
- Chlamydial infection among STD clinic attenders in Grenada
- Fever in Grenada
- Mosquitoes and tourism in Grenada
- Effectiveness of a formula feeding/weaning intervention program in preventing transmission of HTLV-1 from seropositive mothers to newborns in Grenada
- A multi-center longitudinal research study of the behavioral significance of the prevalence of HIV-1 infection in pregnant women and their babies on the islands of Grenada and St. Vincent
- A multi-center longitudinal research study of the ethical analysis of informed consent of the prevalence of HIV-1 infection in pregnant women and their babies on the islands of Grenada and St. Vincent
- Determining the role of IL-15 in mediating function of viral-specific CD8+ T cells in the myelopathogenesis of HTLV-1: symptomatic versus asymptomatic patients
- Intestinal protozoan infections in 6-12 year old children in Grenada
- Intestinal helminth infections in 6-12 year old children in Grenada
- The prevalence of intestinal parasites in school children in rural Guyana
- The prevalence of filariasis and its effects on children aged 8-14 in the central corentyne region of rural Guyana
- The prevalence of streptococcal infection in school children aged 5 –15 years in Grenada, Carriacou and Petit Martinique
- Studies examining the elimination of lymphatic filariasis as a public health

- problem in Guyana
- Seroprevalence of heartworm infection in dogs in Grenada
- Dengue in Grenada
- Assessing the potential risk factors of dengue and dengue hemorrhagic fever in the tri-island state of Grenada, Carriacou and Petit Martinique
- A comparative study to find out if there is an association between sexual practices and knowledge in adult populations of Botswana and Grenada with the prevalence of HIV/AIDS
- HIV/AIDS in rural Botswana differentiating between informing and educating
- Evaluating the level of perceived fear and desensitization towards HIV/AIDS in Botswana
- Rheumatic Fever in Grenada
- Streptococcal program in St. Vincent
- Isolating T cells from Rheumatic Fever positive blood: immunofluorescent assay of T lymphocytes via fluorescently labeled monoclonal antibodies
- Possible genetic predisposition to Rheumatic Fever: demonstrating the inheritance fashion of non-HLA B lymphocyte alloantigen D8/17, a marker for Rheumatic Fever
- ELISA antibody titres against group A streptococcal M protein moiety and cell wall N-Acetyl-D-Glucosamine in Grenadian Rheumatic Fever patients
- Evaluating the effectiveness of educational methods in the prevention of Rheumatic Fever and knowledge, awareness and practices
- Prevalence of intestinal helminth infections in rural Grenadian school children
- Cystic echinococcosis in Morocco and Uganda
- Macpherson, C.N.L.. Elimination of Lymphatic Filariasis in Guyana Program
- Noël, T. Neglected Tropical Diseases and Rheumatic Fever in Grenada: A project to prevent/eliminate helminthic and rheumatic fever infections among children (5-15 years of age)
- Ferguson, H. (2011-2014). Investigation of Disease in Pre-growout Fish in a Commercial Aquaculture Operation in Ecuador. Produmar, S. A.
- Heath, C., LaBeaud, D., Macpherson, C., & Noël, T. (2016). Characterization of Immune Factors of Chronic Chikungunya Disease. American Society for Tropical Medicine & Hygiene Robert E. Shope International Fellowship.

#### Unique Projects

- Cox Macpherson, Waechter & Macpherson. Caribbean Research Ethics Education Initiative. NIH-Fogarty International Center.
- McGlade, Gibb, Temmerman, OkelloOrale, Michieka, Forrester, & Macpherson. Health, Polluted Water and Soils: Pathways to Impact. UK Research and Innovation, Global Challenges Research Fund, Global Engagement Networks.
- Penny Light & Colket. The Center for Research on Storytelling in Education - Spring 2021 Research Conference. Spencer Foundation
- Caribbean Research Ethics Education Initiative (CREEi)
- Knowledge, Attitudes, and Practices Regarding Rabies in Grenada: A Cross Sectional Study. Pan-American Health Organization/Government of Grenada. \$10,007.

- Building Climate Resilient Health Systems in the Caribbean: A One Health Approach. Pan-American Health Organization (PAHO). \$20,380.
  - Janicke, H., & Stone, D. (2018). Microgrant Award - Council on International Veterinary Medical Education. \$9,500.
  - In-country Project Coordinator for the Eastern Caribbean Marine Managed Areas Network (ECMMAN) Project. The Nature Conservancy. \$68,109.
  - Caribbean Research Ethics Education Initiative (CREEI). Fogarty International Center –National Institutes of Health. \$1,100,000
  - Conservation Leadership in the Caribbean (CLiC). U.S. Fish and Wildlife Service, Division of International Affairs, via the International Fund for Animal Welfare (IFAW).\$325,205.
  - Characterization of five amphibians inhabiting Grenada and subsequent isolation and antimicrobial assay of potential antibiotics derived from their skin
  - Mona monkey studies in West Africa
  - Investigation of medicinal plants in Grenada
  - Use of medicinal plants in Grenada
  - Medicinal drugs from the sea: what do Grenada’s waters have to offer?
  - Beekeeping in Grenada: effects of the mite *Varroa jacobsoni* and its control
  - Effects of Grenadian medicinal plants on endemic microbial causes of diarrhoeal diseases
  - The neurobiological basis of hypoglycemia-associated autonomic failure
  - Stimulation of angiotensin 4 in cardiac fibroblasts activates matrix metalloproteinases through MAP kinases pathways: A model for astrocytes
  - REM sleep and memory
  - “NDA Toolkit & No -Objection Procedure and the Establishment of a Monitoring, Reporting and Verification System (MRVS) -Saint Vincent and the Grenadines”
- WINDREF Associated Research Publications (57)**
- Ahmed M, McPherson R, Abruzzo A, Thomas SE, Gorantla V (2021). Carotid Artery Calcification: What We Know So Far. *Cureus*, 2021, 13(10): e18938. doi:10.7759/cureus.18938
- Alexander P, Visagan S , Issa R, Gorantla VR, Thomas SE (2021). Current Trends in the Duration of Anticoagulant Therapy for Venous Thromboembolism: A Systematic Review, *Cureus*, 2021, 13(10): e18992. doi:10.7759/cureus.18992
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### **Abstracts/Presentations at International Conferences (0)**

### **Thesis Defenses (8)**

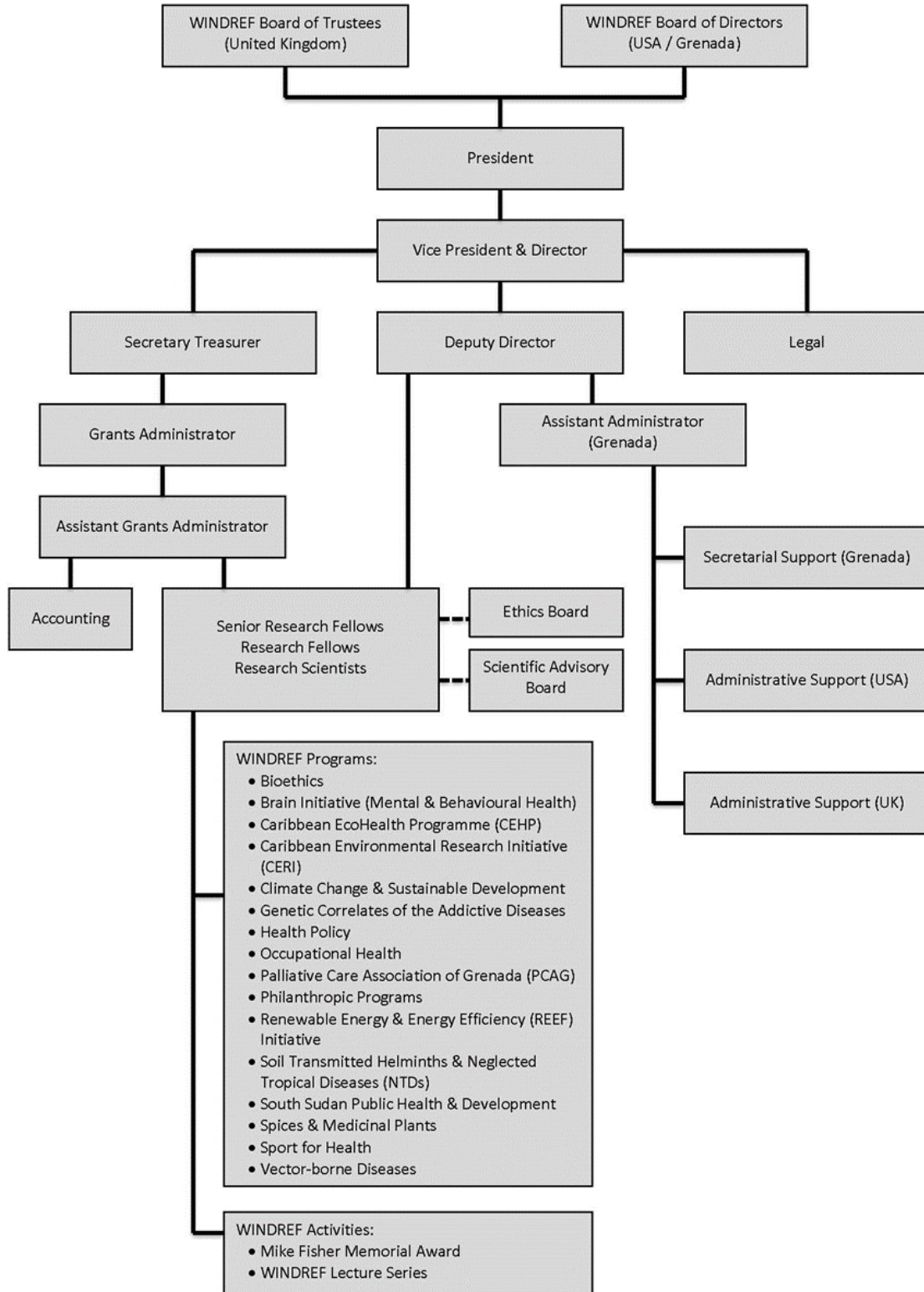
- Cristina Mastromonaco (MSc Student): "Prevalence and transmission of *Staphylococcus pseudintermedius* and the emergence of Methicillin-resistance in the Grenadian dog population " February 3rd 2021
- Inga Emma Karasek (MSc Student): "Practical and affordable tick prevention in horses in Grenada, West Indies " February 10th 2021
- Shekinah Morris (MSc Student): "Evaluation of the Anti-bacterial efficacy of plant extracts against an Escherichia coli O157:H7 bacterial strain isolated from a goat in Grenada " April 28th 2021
- Glenna Lacey Maur (MSc Student): "Evaluating Oxybenzone and Tetrabromobisphenol A as Endocrine Disruptors in Teleost Fish " April 26th 2021
- Nicholas Jennings (PhD Student): "Palliative and end of life care in a small English-speaking Caribbean country, the case of Trinidad and Tobago " July 8th 2021

- Maira Du Plessis (PhD Student): "The anatomical autonomic ganglia of the abdomen: A Comprehensive Study of their Morphology, Histology, and Interconnections" August 20th 2021
- Kate Charles (MSc Student): "Environmental Influences on the Atlantic Leatherback Sea Turtle (*Dermochelys coriacea*) Embryonic and Hatchling Success Rates in Grenada, West Indies" November 30th 2021
- Narindra Roopnarine (MSc Student): "Sperm structure and spermiogenesis in the cattle egret (*Bubulcus ibis*)" December 15th 2021
- Jane Noel: "Surviving the Tokyo 2020 Olympic Games Covid Free" November 19th 2021
- Madison Kucinick (MSc Student): "Establishing plasma biochemical reference intervals and monitoring the physiologic health of free ranging sea turtles in Grenada, West Indies" November 22nd 2021
- Camila Julia Landron (MSc Student): "Herpesviruses in Mona Monkeys (*Cercopithecus mona*) in Grenada, West Indies" November 24th 2021
- Vanessa Matthew Belmar (PhD Student): "Evaluation of Diagnostic Approaches and Molecular Epidemiology of SARS-CoV-2" December 1st 2021

### Graduate Seminars ( 13)

- Paul Pounder "Responsible Leadership and COVID 19: Small island making big waves in Cruise Tourism" February 17th 2021
- Daniel Fitzpatrick: "Grenada's mosquitoes and their microbiomes" March 3rd 2021
- Cheryl Cox-Macpherson: "One Health and Bioethics" March 10th 2021
- Krisy Kelley: "Health surveillance of feral tilapia to assess pathogen and disease risks to aquaponics in Grenada, West Indies" March 17th 2021
- Satesh Bidaisee: "Humor in Education: No Laughing Matter!" April 14th 2021
- Cheryl Cox-Macpherson "CREEi" April 21st 2021
- Wayne Sylvester (PhD Student): "Strategies for the elimination of the vertical transmission of *Toxocara canis* in Grenada, West Indies" May 19th 2021
- Andrea Gomez Ortiz (MSc Student): "Determining Bat's Pregnancy Rate in Grenada during Rainy and Dry Seasons using Ultrasound Imaging" October 20th 2021
- Maira Du Plessis: "Pain" November 12th

## WINDREF Organizational Chart





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