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GLOBAL HEALTH
CASE COMPETITION
VANDERBILT INSTITUTE FOR GLOBAL HEALTH

Improving Health Outcomes Through Expanding Access to Emergency Medical Services in Rural Guyana

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Global Health Case Competition
Case Document

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*Terms in green are defined in glossary.

2017-2018 VIGH Case Competition

Background/ Introduction:

More than approximately 80% of Guyana's population is located in and around the capital of Georgetown.* The remainder of the population lives further from the coast in a remote region referred to as the Hinterlands. The majority of the people living in this region are Amerindian, or indigenous people, and are commonly referred to as the "Hinterland people." This region in the Amazon basin is largely undeveloped. It lacks roads, electricity, and communication services and completely lacks emergency medical services. This lack of connection results in isolation that presents a unique set of challenges for responding to the Hinterland people's emergency medical needs. Little reliable data specific to this region is available, but as the "tip of iceberg" paradigm goes, it can be assumed that issues may be much larger than is realized. Statistics are used throughout this case as available.[1]



Figure 1: A main road in the Hinterlands during the rainy season. Flooding, such as pictured here, makes roads relatively impassable for part of the year.

Before 2012, Guyana lacked an integrated Emergency Medical System entirely. Emergency Medical Services are necessary in situations that arise with little warning and cause a pressing threat to one's vitality. Most mortality in Guyana's Hinterland region stems from delayed access to medical attention. Examples of situations in which someone would need emergency medical treatment in Guyana include the following:

[1] The World Factbook: GUYANA [Internet]. Central Intelligence Agency. Central Intelligence Agency; 2017 [cited 2017Dec28]. Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/gy.html

- **Child Birth:** Guyana has a birth rate of 15.4 births/1,000 population. Child mortality rates in Guyana are rising, with 31.5/1000 deaths in 2016 for children and a maternal mortality rate of 229/100,000, which is almost three times the regional (Latin American and Caribbean) rate of 68/100,000[2]. Because of these high mortality rates, adequate medical care during childbirth is extremely necessary to sustain the country's population. Additionally, many of these deaths are preventable, emphasizing the need for the extension of EMS to the Hinterland region.

- **Snake Bites and other venomous circumstances:** Guyana has the 3rd highest incidence rate of snakebites out of any country in the world.[3] Most bites occur in the Hinterland region. The Hinterlands are home to over 10 species of venomous snakes, including the Brown labaria, Green labaria, Bushmaster, and Rattlesnake, among others. Bites from such snakes can lead to tissue decay, renal failure, infections, and death. However, no specific antivenom for the most common type of snakebite (labaria snake) is available in Guyana, so snakebites often lead to amputation or death. Timely access to hospitals is essential for minimizing the consequences of a venomous snake bite.

- **Suicide:** Guyana has one of the highest suicide rates in the world, averaging approximately 650 suicide attempts and 200 deaths from suicide each year for a population of only 773,000.[4] Although the government has attempted to reduce access to pesticides, which are frequently ingested as a means of suicide, there are few mental health or psychiatric resources available to Guyana's residents. Suicide from pesticides and other poisons is an extremely slow and painful experience. Nonprofits such as the Guyana Foundation are undertaking grassroots efforts at suicide prevention by reaching out to local police, family, and survivors and organizing collaboration with Canadian crisis hotlines, which are more equipped to handle these situations. Quick access to health services will help prevent a number of these deaths.

- **Tourist Injury:** Many adventure programs advertise hiking and rafting trips in Guyana's Hinterland region. In participating in such activities, tourists can face acute injury requiring immediate medical attention during these programs while exploring popular attractions such as Kaieteur Falls, a UNESCO World Heritage Site. Additionally, crime levels in Guyana are high, with many robbers specifically targeting tourists, which may necessitate emergency medical care in extreme cases.

- **Occupational Hazards:** In 2013, the Guyanese Ministry of Labor recorded ten fatalities and 530 workplace related incidents, with the most injuries concentrated in the mining, forestry, and agriculture industries located in the Hinterland region.[5] Workers in these industries are susceptible to physical risk factors from operating heavy machinery and

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[2] "Maternal Mortality - UNICEF DATA." UNICEF. Available from: https://data.unicef.org/topic/maternal-health/maternal-mortality/.
[3] Guyana Chronicle. "Snake! Snake!" [Internet]. Guyana Chronicle. Available from: http://guyanachronicle.com/2017/06/25/snake-snake.
[4] World Health Organization. "Suicide prevention in Guyana" [Internet]. World Health Organization. Available from: http://www.who.int/mental_health/suicide-prevention/guyana/en/.
[5] Bureau of Democracy, Human Rights, and Labor. "Guyana" [Internet]. U.S. Department of State. Available from: https://www.state.gov/j/drl/rls/irf/2007/90256.htm.

prolonged sun exposure. Specifically, workers in the mining industry are exposed to many harmful chemicals, such as mercury. Access to emergency medical services is imperative for the safety of these workers when occupational accidents occur.

Patient outcomes in these examples are highly dependent on timely access to a medical facility. Dispatch, transportation, pre-hospital care, and early communication with the emergency department can greatly improve patient outcome[6].

Guyana began to establish its Emergency Medical System in 2012 and has seen tremendous progress in the past five years. This system is primarily located in the capital, Georgetown, and the surrounding metropolitan areas, with the Hinterland region still lacking these services. In collaboration with Vanderbilt University Medical Center and the University of Guyana, the Georgetown Public Hospital Corporation has worked to launch a master's degree program in Emergency Medicine. The program graduates emergency medicine specialists into Guyana's health care workforce. Additionally, the Guyana Emergency Medical Services has also been recently established. There are currently three working ambulances centered in Georgetown with plans to add two more by the end of 2018. While they are not meeting the entirety of emergency medical demand, these vehicles are a significant improvement from what previously existed. Finally, the last five years has also seen substantial progress in creating cohorts of Emergency Medicine providers, including physicians, specialized nurses, and Emergency Medical Technicians (EMTs). Fire service dispatchers have also been trained in triage and dispatch.

Problem Statement

The Guyanese Hinterlands are disadvantaged due to lack of access to emergency medical services. This is especially true for occupational and environmental hazards associated with forestry and mining, venomous circumstances, and high-risk childbirths.

While the recent development of Emergency Medical Services has made tremendous progress in and around the Georgetown area, this progress has not translated into improved access for the Hinterland population. The challenge is to improve access in a vast landmass where the population is underserviced, without major healthcare facilities, few roads, and limited communication infrastructure.

Your Task

Develop a three-year plan to extend Emergency Medical Services to Guyana's Hinterland region and ensure sustainability of services into the future.

Expanding Guyana's Emergency Medical Services to the Hinterland region is complex. The World Bank has committed itself to addressing the problem and is prepared to offer a grant* to a team that proposes an interdisciplinary and sustainable solution. The most effective solution to this problem will encompass economic, political, and social aspects of the issue in addition to

[6] Morris ML, Bux Z, Langston S, Russ S, Morris JA. *The Creation of an Emergency Medical System in Guyana: Lessons Learned in 10 Years.* (Forthcoming).

public health considerations. Your team is charged to create a grant proposal that is actionable, realistic, and prioritized. The proposal should include a timeline that considers both immediate implementation and long-term sustainability needs. Please remember to thoroughly justify your decisions, plans, and priorities.

As you develop your proposal, consider possible expansion in areas of transportation, training facilities and equipment, quality improvement, and data collection. To function at the highest efficacy, transportation will need to include air, land, and water vehicles. Training facility improvements will need to consider recruitment, scope of practice, and sustainability. Finally, quality improvement and data collection will need to address cellular service and Wi-Fi access.

Your team should prepare an 10 minute oral presentation with supporting slides outlining your plan for the Guyanese Ministry of Health and the World Bank. Strong presentations will include elements such as a timeline or Gantt chart, a logistical framework (LogFrame), and a budget. Effective presentations will not exceed 10 presented slides (excluding citations). Additional appendix slides may be included for judge reference, but should not be presented orally All members of your group must be present for the final presentation and should be prepared to respond to questions from the judging panel, though it is not a requirement that all group members speak. There will be 5 minutes of Q&A immediately following your presentation. Remember to cite all sources that were consulted on a single slide at the end of your presentation. Bring four physical copies of your slide deck to the presentation for the judges to have in hand. Email your saved slide deck and budget to vigh.ghcc@gmail.com before 5PM on February 16th, 2018. No late entries will be accepted.

The Guyanese Ministry of Health, in conjunction with the World Bank, will view all proposal presentations on February 17th, 2018 and determine which team will move forward.

**Note details of this grant are fictitious but based on probable events.*

Country Profile

Population, topography, climate, and language:

Guyana is located in the northern part of South America and borders the Atlantic Ocean, Suriname, Brazil, and Venezuela. It is the 86th largest country in the world and slightly smaller than size of Idaho. Guyana is roughly 77% forest and highlands and 8% farmland, with the rest of the land split between a low coastal plain and savannah in the south.[1]

In Guyana, the temperature is typically tropical, hot, and humid, sparing for two rainy seasons from May to August and November to January. During the rainy seasons, flash floods are common, and they are most common in the Hinterland region where they can cause flooded roads that make the area nearly inaccessible to vehicles.[1]

Guyana has the 166th largest population in the world. Upwards of 80% of the country's 773,000 people are concentrated in and around the capital city of Georgetown and the nearby Berbice River (see Image 1). The remainder of the country is sparsely populated in the rainforest area, known as the Interior Region or the Hinterlands. The country's two largest ethnic groups are the Afro-Guyanese, descendants of African slaves, and the Indo-Guyanese, descendants of Indian

indentured laborers. The country's official language is English, but much of the population speaks a form of Guyanese Creole, Amerindian, or Indian languages.[1]

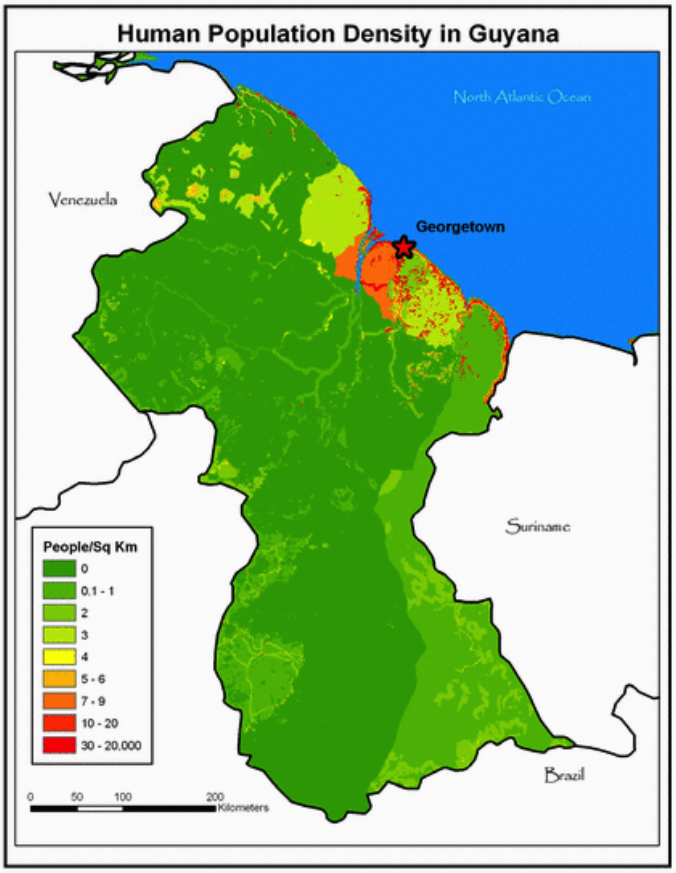


Figure 2: Map of the Population Density in Guyana

Health system and resources:

Currently, the government of Guyana has been working through the Ministry of Health to implement a comprehensive emergency medical response program that is geared towards providing sustainable, accessible care by training Guyanese to be medical first responders.

In the current model, there are three tiers of training that first responders can achieve. The first two tiers of training involve very basic medical functions, including starting IVs and administering drugs. The third level involves more complex procedures such as starting intraosseous infusions for children and administering seizure medications,conducting EKGs, and airway control.

In order for EMTs to be certified to administer care to individuals in the Hinterlands region, they must be certified to at least the second level of training. Because of this training requirement, there is often a shortage of available personnel who can travel to the Hinterlands to provide adequate emergency medical care. There are also currently very limited access and evacuation

routes as infrastructure leading to and inside of the region is very minimal and susceptible to natural disasters such as flash floods.



Figure 3: Many vehicles get trapped in the mud when trying to travel to and from the Hinterlands during rainy season

Education, economy, and religion:

Attendance rates at primary schools for Amerindian populations in the Hinterlands have been reported to be as low as 50%, although the country as a whole has a literacy rate of 89% and an average school attendance of ten years.[7] In 2014, Guyana's government launched a school uniform and school feeding program intended to improve school attendance in the Hinterlands.[1]

Though Guyana's economy has grown over the last few years, it is highly dependent on variable conditions such as the weather and global commodity prices as it is a large exporter of agriculture and commodities such as gold and timber.[8] The majority of resources exported by Guyana are found in the Hinterlands, so many Amerindians participate in logging or gold mining services. The mining industry is unregulated by the government, meaning workers may be at increased risk to injury, necessitating emergency medical attention. Recent government initiatives such as the Community Development Plan, implemented in 2015, are providing grants for Amerindian villages to start up income-generating projects that will renovate or restore infrastructure, enterprise, or transportation.[9]

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[7] Government of Guyana. "Ministry of Education, Guyana" [Internet]. Guyana Ministry of Education. Available from: http://education.gov.gy/web/index.php/about-moe.
[8] World Health Organization. "Suicide prevention in Guyana" [Internet]. World Health Organization. Available from: http://www.who.int/mental_health/suicide-prevention/guyana/en/.
[9] Guyana Chronicle. "The upward trajectory of Hinterland socio-economic life" [Internet]. Guyana Chronicle. April 06, 2015. Available from: http://guyanachronicle.com/2015/04/06/the-upward-trajectory-of-hinterland-socio-economic-life.

Protestantism is Guyana's most popular religion and is followed by 34% of the population, while another 25% of the country is Hindu, and the remaining 7% is Roman Catholic. Christianity's popularity is a consequence of Guyana's colonial history, as Christianity's acceptance was required by slave owners and missionaries. Missionary activity to Amerindian groups in the Hinterlands has been vigorous, which has led to the modification and disappearance of many Amerindian religious beliefs, many of which centered around Shamanism.[1]



Figure 4. Intersection of political, social, and economic influences on public health safety.

Judging Rubric

Category	Possible Points
Justification (data and evidence) Proposed intervention… ● Accounts for education, economic, political, and cultural factors ● Is evidence-based ● Includes relevant data to support project ● Analyzed strengths, weaknesses, opportunities, and threats/challenges (SWOT analysis)	20
Creativity and Innovation Proposed intervention… ● Integrates multiple disciplines ● Uses resources creatively ● Reflects "outside-the-box" thinking ● Is culturally acceptable ● Is feasible with regard to financial, human resource, and time constraints ● Has potential for expansion and growth	25
Clarity and Organization Proposed intervention has… ● Clear definition of problem ● Outcomes are specific, measurable, achievable, realistic, and time-bound (SMART objectives) ● Plan for assessment and evaluation of goals and outcomes ● Logical implementation of activities	20
Case Specific Information Proposal addresses … ● How it will alleviate the critical global health issue ● How it will impact education, economics, politics, and culture of Guyana ● Feasibility of implementation in Guyana ● Sustainability beyond funding period ● Cultural acceptability and involvement of local communities and leaders	25
Delivery (voice, body, eye contact) Presenters… ● Effectively use visual aids (PowerPoint, Prezi, etc.) ● Have a clear voice, appropriate use of body language, make eye contact with audience ● Demonstrate knowledge and command during Q & A session	10
Total possible points	100

Glossary

Child Mortality Rate -- The child mortality rate is the number of children who die by the age of five, per thousand live births per year. In 2015, the world average was 43 (4.3%), down from 91 (9.1%) in 1990[10].

Community Development Plan -- The Community Development Plan created a structure for training and implementing emergency medical responders to reduce mortality rates in the capital area of Guyana.

EKGs -- An EKG, or electrocardiagram,can show how fast a heart is beating, the rhythm of a heartbeat, and the strength and timing of the electrical impulses passing through each part of a heart. EKGs can be part of a routine exam to screen for heart disease or used to detect and study heart problems such as heart attacks, arrhythmia or irregular heartbeat, and heart failure. [11]

Emergency Medical Technicians (EMTs) – Emergency Medical Technicians are trained for rapid medical response and typically employ ambulances. Within the Guyanese EMT system, there are two levels of training (insert more info with infographic).

Emergency Medical System (EMS) -- Emergency medical services, also known as ambulance services or paramedic services, are a type of emergency service dedicated to providing out-of-hospital acute medical care, transport to definitive care, and other medical transport to patients.

High-risk childbirths – births especially prone to life-threatening complications for either the mother or the child, including adolescent pregnancy, undetected high blood pressure in mothers, or unsanitary childbirth conditions that lead to infections or severe bleeding.

Hinterlands -- The Hinterlands refer to the remote rainforest region in Guyana, located away from the nation's capital of Georgetown. They are primarily home to indigenous populations and Amerindians. The people living in this region are often referred to as the Hinterland peoples.

Georgetown -- Georgetown is the capital of Guyana and is the country's largest urban center. The capital is located on the Atlantic ocean and is culturally connected to the English-speaking Caribbean, featuring British architecture.

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[10] "Maternal Mortality - UNICEF DATA." Available from: https://data.unicef.org/topic/maternal-health/maternal-mortality/.

[11] Electrocardiogram [Internet]. National Heart Lung and Blood Institute. U.S. Department of Health and Human Services; [cited 2017Dec28]. Available from: https://www.nhlbi.nih.gov/health-topics/electrocardiogram

Guyana Foundation -- The Guyana Foundation is a charitable trust that has been created to contribute meaningfully to the rebuilding of Guyana. The Guyana Foundation has developed sunrise centers – community-based centers are located in various regions with a high incidence of suicide. They also work on village renewal, which involves networking and lobbying to get assistance and support from local authorities, then assisting with fundraising locally and internationally to reach project goals.[12]

Guyanese Ministry of Health -- The Guyanese Ministry of Health, led by Minister of Public Health Ms. Volda Lawrence, is an organization whose mission statement is to "strive to improve the physical, social and mental health status of all Guyanese by ensuring that health services are as accessible, acceptable, affordable, timely and appropriate as possible given available resources and enhance the effectiveness of health personnel through continuing education, training and management systems."[13]

Guyana Ministry of Labor – This Guyanese Ministry Department regulates labor laws, human services, and social security.

Logistical Framework (LogFrame) -- Below is an example of a LogFrame, which outlines elements of the project.

Project Description	Indicators	Source of Verification	Assumptions
Overall objective: The broad development **benefit** to which the project contributes – at a national or sectoral level	Measures the extent to which a contribution to the overall benefit has been made. Used during evaluation. However, it is often not appropriate for the project itself to try and collect this information.	Sources of information and methods used to collect and report it (including who and when/how frequently).	
Purpose: The development **outcome** at the end of the project – more specifically the expected benefits to the target group(s)	Helps answer the question 'How will we know if the purpose has been achieved'? Should include appropriate details of quantity, quality and time.	Sources of information and methods used to collect and report it (including who and when/how frequently)	Assumptions (factors outside project management's control) that may impact on the purpose-objective linkage
Results: The direct/tangible results (**products**, good and services) that the project delivers, and which are largely under project management's control	Helps answer the question 'How will we know if the results have been delivered'? Should include appropriate details of quantity, quality and time.	Sources of information and methods used to collect and report it (including who and when/how frequently)	Assumptions (factors outside project management's control) that may impact on the result-purpose linkage
Activities: The **tasks** (work programme) that need to be carried out to deliver the planned results (optional within the matrix itself)			Assumptions (factors outside project management's control) that may impact on the activity-result linkage

[12] The Guyana Foundation. "What We Do – The Guyana Foundation" [Internet]. The Guyana Foundation. Available from: http://www.guyanafoundation.com/what-we-do/.
[13] Government Ministries [Internet]. DPI | Department of Public Information. 2017 [cited 2017Dec28]. Available from: http://gina.gov.gy/government-ministries/#ffs-tabbed-116

Maternal Mortality Rate -- The Maternal Mortality Rate refers to the death of a woman during pregnancy or within 42 days of termination of pregnancy, irrespective of the duration or site of pregnancy from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. It is abbreviated as MMR and is represented as a rate per 100,000 women.

Mortality -- Death, especially on a large scale.

Renal Failure -- A condition in which the kidney's lose the ability to remove waste and balance fluids.

Shamanism -- Shamanism is a religious phenomenon centred on the shaman, a person believed to achieve various powers through trance, who is typically thought to have the ability to heal the sick, to communicate with the otherworld, and often to escort the souls of the dead.[14]

UNESCO World Heritage Site – UNESCO World Heritage Sites are designated as sites of importance to global cultural and natural heritage. These sites are protected under global treaties.[15]

World Bank -- The World Bank is not a bank in the ordinary sense, but a unique partnership to reduce poverty and support development and is a vital source of financial and technical assistance to developing countries around the world.[16]

[14] Eliade M, Diószegi V. Shamanism [Internet]. Encyclopædia Britannica. Encyclopædia Britannica, inc.; 2017 [cited 2017Dec28]. Available from: https://www.britannica.com/topic/shamanism
[15] UNESCO World Heritage Center. "UNESCO World Heritage List" [Internet]. UNESCO. Available from: http://whc.unesco.org/en/list/.
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World Health Organization. “Suicide prevention in Guyana” [Internet]. World Health Organization. Available from: http://www.who.int/mental_health/suicide-prevention/guyana/en/.