

Chapter 17

IoT and Big Data in Public Health: A Case Study in Colombia

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ABSTRACT

Technology can transform lives, and nowadays, the internet of things and big data are helping developing countries to improve healthcare outcomes and deliver better services. In Colombia, a lot of municipalities do not have reliable healthcare information systems, and still, a lot of the current processes that collect critical information related to public health are being made manually. Small groups of researchers are trying to include different stakeholders in active IoT and big data projects by using connected sensors and other IoT technologies that drive improvement in healthcare. According to the World Health Organization, hypertension is considered one of the most prevalent chronic diseases in Latin America today, and it has had an exponential growth in the last 10 years. This chapter utilizes data acquisition sensors, large medical datasets, and machine-learning methods to perform predictive analytics in a hypertensive population in Cartagena to assist public health organizations to create proactive care programs to prevent the increase of this disease in Cartagena.

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INTRODUCTION

In Colombia, a lot of municipalities do not have reliable healthcare information systems, and still, a lot of the current processes that collect critical information related to public health and patient treatments have been made manually. In Cartagena, where this research has taken place, just a few healthcare organizations guarantee the correct collection and control of the information used by the government to generate epidemiological profiles, clinical studies, and reports that help to create checks and policies for population's social development and healthcare management.

The population in Cartagena has increased by 35 percent in the last ten years, and unfortunately, this increase happened in sub-developed areas, areas without health care facilities and poor access to health treatment. This population is moving from rural areas to Cartagena looking for better healthcare treatment. This increase in the population affects long-range planning of community health and medical facilities. By law, Colombian government should be able to provide opportunely and confidently primary care, dental, behavioral health, emergency and public health services to the entire population and the healthcare facilities are obligated to accept all patients and provide prevention of disease, detection, and treatment of any illness and quality of life.

In addition, and due to the low capacity of the health care centers to treat and retain patients, healthcare professionals are allowing patients to be moved home to continue with their recovery or treatments and the need for monitoring their statuses at home is evident. Cartagena's local government and other stakeholders are supporting small scale interconnected devices to allow monitoring and operations to facilitate a better engagement between healthcare facilities and population. In this scenario, distributed computing, cloud computing, big data analytics and Internet of Things provide efficient solutions and cost-effective results driven by IoT monitoring.

Healthcare providers and healthcare organizations may want these patients to have monitoring devices that can monitor blood pressure, blood sugar levels, oxygen levels and environmental temperature in everyday activities and, report it in real-time to secure cloud platforms.

Advances in sensor data collection and processing are allowing to perform data analytics in real-time (Aggarwal, 2013). Leading incredible advances in patient monitoring that can be used to improve how patient's health is being monitored in their homes and how public health is using technology to increase their capabilities to capture data and generate meaningful proactive treatments for the population.

Some researchers in Cartagena are experimenting with systems that interconnect sensors with low power Wi-Fi enable IoT chips to measure variables that support public health studies. Placing IoT as the primary source for data, the main goal for the researchers is to assist the government and healthcare organizations in making better public health and healthcare decision support systems. Many different stake holders are directly involved in active big data and IoT projects including Universities, Hospitals and Startups companies. All these institutions are driving improvements to population well-being in healthcare and socializing with the population about the use of the technology to reach their goals because the cultural context is essential to the success of this type of technical projects.

The chapter will provide a clear and a high-level overview and background of the necessities in health care management in Cartagena, the needs of controlling and monitoring the health of patients in different areas of the city and the essential process of collecting data to understand the impact on blood pressure for a population with Hypertension. Later, the chapter describes some considerations to configure a basic low-cost sensor implementation to collect the data and the platforms and frameworks will be used for this project. The chapter will also mention some concerns and recommendations related to people that

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