Thesis Project Portfolio

Design of an Insulin Glargine Manufacturing Plant to Increase Affordability and Accessibility of Diabetes Medication in the Sub-Saharan Region of Africa

(Technical Report)

Issues of an Insular Insulin Industry

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree Bachelor of Science, School of Engineering

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Spring, 2024

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Sociotechnical Synthesis

Before the discovery of insulin therapy, children with type 1 diabetes resorted to counting calories, weighing food, and implementing starvation diets to stay alive. About 50% of type 1 diabetics died within two years of developing diabetes and more than 90% died within five years. However, due to the advances in insulin therapy over the past years, people with type 1 diabetes now have life expectancies of over 50 years. Although far less deadly, type 2 diabetes leads to serious health problems and affects millions of people as well. In 2021, in the US alone, 38.4 million people were diagnosed with type 1 and 2 diabetes accounting for 11.6% of the population, with another 8.7 million adults going undiagnosed. Diabetes is a global epidemic that affects over 420 million people worldwide, and this number continues to grow larger. With this projected rise comes the increased demand for insulin. However, affordability and accessibility of insulin remains a challenge in many parts of the globe. Many countries have made efforts to regulate insulin prices, but lowering the cost of insulin and making the drug more accessible remains a challenge. The thesis “Issues of an Insular Insulin Industry” addresses a few key actors that interact with each other, helping to explain the network created in the insulin industry that contribute to insulin accessibility issues in the US. The thesis paper also explores a few proposals to regulate the price of insulin in the US. The technical report details the costs, materials, and equipment needed to construct an insulin manufacturing facility in Ethiopia to increase insulin accessibility in the Sub-Saharan regions of Africa. Both the thesis and the technical report attempt to address issues of accessibility and affordability of insulin.

The technical report is written on creating an insulin glargine manufacturing facility in Sub-Saharan Africa. There were many factors in the materials, equipment, and cost analysis. The paper explored the necessary equipment, capital, and operating costs needed to operate the

facility to create insulin such as the different machinery, chemicals, utilities, and employee salaries. The paper also explored different locations and factors that made the different locations appealing. The report determined that it would not only be beneficial for diabetics in Sub-Saharan Africa for an insulin manufacturing facility to be constructed and operated as proposed in the paper but that it would also be economically viable and profitable to do so as well.

The thesis was written on a few of the actors within the insulin industry network. It focuses on the US government, insulin manufacturers, and illegitimate insulin sources and how each of the three interact with each other and how they contribute to some of the problems within the insulin industry. Insulin manufacturers take advantage of US patent laws to essentially create a monopoly within the insulin industry while the US government struggles to find a solution to regulate insulin prices. Many diabetics have grown impatient with the high, steady costs of insulin, so they have resorted to seeking insulin from illegitimate sources. These alternative sources pose a danger for diabetics as they are unlicensed drug distributors and lack the services provided by traditional and licensed insulin distributors. While many people call for change, the paper demonstrates that the issue is complex with the many different actors involved and requires careful consideration.

The technical draft was successful in its analysis of the economic viability of creating an insulin manufacturing facility, but the thesis was not as successful at proposing a solution and could only explore the existing problems and propose a few flawed solutions. Regulating the price of insulin is a difficult task that is still yet to be fixed, so it would be difficult to discover a viable solution. However, it would be interesting to collaborate with UVA's economics

department to better understand the effects of implementing change and regulations within the insulin industry.

First of all, I would like to thank the members of my capstone group, Jack Dunleavy, Bella Recce, and Vadaysha Jefferson, for all the hard work and dedication that they put into all the work. I would not have been able to accomplish this work without them and all the time and research they contributed. I would also like to thank my capstone advisor, Eric Anderson, for the guidance and knowledge he imparted on us throughout the entire process. Finally, I would like to thank my STS professors, Rider Foley and Caitlin Wylie, for their guidance throughout the STS portion of this project.