**Chapter Six**

# **Conclusions and Recommendations**

This section contains the discussions of the conclusions and researcher recommendations based on the results of the study.

**6.1 Conclusions**

Based on the stated objectives of the study, the researcher concludes the following:

1. Blockchain was instrumental in maintaining a reliable source of transaction that can be accessed by various parties. The immutable nature of the ledger made it possible to add a unique layer of security for the vaccine certificates’ transactions. This is in combination with the usage of IPFS which also maintained an immutable file system. The researcher was able to develop an application that took advantage of these technologies.
2. The usage of hashes as reference for files and patient information was both convenient and secured. It ensures uniqueness and does not explicitly reveal information at first glance. As also shown with the Merkle Tree algorithm, generating a hash was pivotal in locating a file within IPFS’ file system.
3. The security scans used to examine the smart contract of the application ensured that it is less vulnerable to the weaknesses specified in the Smart Contract Weakness Classification Registry (SWC Registry). The researcher was able to assess the vulnerabilities flagged by the scans and made efforts to eliminate and lessen the weaknesses for blockchain transactions.

**6.2 Recommendations**

This study recommends the use of blockchain in keeping medical records as it provides the following benefits:

1. Blockchain-based electronic health records would give medical personnel control over the flow of information from a single, trusted platform.
2. Eliminates the need to have multiple system to consolidate other transactions as blockchain can handle and validate different types of transaction logs.
3. When used with IPFS, provides a better file storage implementation for systems that need file upkeeps.

Further development and enhancement of the system is thereby recommended to future researchers, especially to include the following:

1. The domain of this study was on vaccine certificates, future work can look into integrating the other phases of vaccination such as scheduling or vaccine management.
2. The potentiality of processing large quantities of blockchain data makes it promising to use Artificial Intelligence to provide insights and reports.
3. Since the application is web-based and creates a web-responsive viewport to mobile users, it will be a good addition to create a dedicated mobile application to patients to enhance their user experience.