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# A Mobile-based drugs and alcohol addiction self-assessment and management scheme

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A Mobile-Based Drugs and Alcohol Addiction Self-Assessment and Management Scheme

Mutua Lewis Mwangi

Submitted in partial fulfilment to the requirements for the Degree of Masters of Science in  
Mobile Telecommunication and Innovation at Strathmore University

Faculty of Information Technology

Strathmore University

June, 2017

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Mutua Lewis Mwangi

6<sup>th</sup> June 2017

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Thank you all!

## **Abstract**

The number of people dying of drugs and alcohol induced causes is alarmingly high and is gradually rising. One reason for the high numbers is that most drugs and alcohol users are not aware when they transition into addicts. However, some users believe that they are in control of their drugs and alcohol usage. Other users might be aware of their addiction but may not get help due to: the high cost of getting help, the absence of help, or the fear of stigmatisation. Some of those aware might have accepted the addiction as part of their life, or might have other personal reasons for not seeking help. To reduce the deaths, drugs and alcohol users need to know if they are addicted, the severity of the addiction and how to manage the addiction. To identify and manage an addiction, a drugs and alcohol assessment is done by a trained clinician who then recommends ways to help manage the addiction. This could be costly to most drugs and alcohol users, and family or friends might get involved which can lead to stigmatisation.

A review on drugs and alcohol assessment tools and existing applications was done to get an understanding of how the tools work and how they can be improved. Existing drugs and alcohol assessment and management mobile applications were analysed to identify their strengths and areas of improvements. The review of the tools and analysis of the assessment applications provided the requirements needed for the research. The identified requirements helped in designing a scheme that was implemented to help the users and addict. The solution was verified and validated to make sure that it meets the users' requirements through accurate assessment results on drugs and alcohol use, and enabling addicts manage their addictions.

The methodology used was applied research through prototyping. This was done by using a quantitative and qualitative research approach using: interviews, observation, questionnaires and documentary analysis. Interviews with drugs and alcohol users, addicts and clinicians was done to find out the need of the application and their expectations and suggestions. Observation was used to see how drugs and alcohol assessment is done, and questionnaires was given to addicts and users to identify their needs and the need of the application, existing gaps and their expectations. Documentary analysis was used to gather information on the assessment and diagnosis tools, and information on existing applications to identify their strengths and areas of improvement.

**Keywords: drugs and alcohol users, addicts, addiction awareness, drugs and alcohol assessment.**

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## **List of Abbreviations/Acronyms**

ASI	-	Addiction Severity Index is an assessment approach
ASI-MV	-	Addiction Severity Index Multimedia Version is an assessment approach
CIDI	-	Composite International Diagnostic Interview
DSM	-	Diagnostic and Statistical Manual
MVC	-	Model-View-Controller
PRISM	-	Psychiatric Research Interview for Substance and Mental Disorders
SCID	-	Structured Clinical Interview for DSM-IV
SSADDA	-	Semi-Structured Assessment for Drug Dependence and Alcoholism
TDD	-	Test-Driven Development
UML	-	Unified Modelling Language

## **CHAPTER 1: INTRODUCTION**

### **1.1. Background of the Study**

Deaths resulting from alcohol consumption alone rose from 2.5 million in 2011 to 3.3 million internationally in 2012 according to the World Health Organisation (WHO), (2014). WHO (2016) suggested that early symptoms detection could help prevent an addiction from fully developing and assist in the treatment process. This implies early detection could have helped avoid some of the deaths reported. However, self-detection is not simple because drugs and alcohol are psychoactive (Shubin et al., 2016). This means that repeated use can alter the way the brain looks and functions.

Drugs and alcohol addiction is a complex disorder characterized by obsessed drug use. Taking drugs or alcohol causes a rush in the levels of dopamine in the brain that trigger feelings of pleasure (Shubin et al., 2016). Shubin (2016), also stated that the brain remembers these feelings and wants them repeated. If a person becomes addicted, the substance they are using takes on the same significance as other survival behaviours, such as eating and mating. These changes on the brain interfere with the ability to think clearly, exercise good judgment, control behaviour, and feel normal without drugs (Shubin et al., 2016).

The uncontrollable craving to use grows more than anything else, including family, friends, career, and even health and happiness. The impulse to use becomes so strong that the mind finds many ways to deny or rationalize the addiction. A person may significantly underestimate the quantity of drugs they are taking, how much it impacts their life, and the level of control they have over their drug use (Shubin et al., 2016). Also most people are not aware of the transition, that is, when their substance use start developing into an addiction. Potential addicts often assume that they are in control of their substance use until it is too late to take proper control. At this stage it becomes very difficult to stop or manage the addiction. Most addicts need intervention in identifying the symptoms early. When intervened they are taken for treatment where they are taken through an assessment (ProjectKnow, 2016).

According to the First Step Referral Services (2016), a drugs or alcohol assessment can establish past and present substance use patterns and make commendations for managing and possibly treating the addiction. Addictions are influenced by different things happening around an addict's

life. That is why a good assessment tool looks at areas that could have influenced the addiction for example, family, medical, employment or psychiatric status (McLellan et al., 1980).

It was discovered that 23.1 million Americans from 12 years and older, 8.3% of the population, needed treatment from a specialty facility. But only 2.3 million (0.98%) of those received treatment. These statistics are from a report by the United States (US), National Survey on Drug Use and Health (NDSUH), (2008). More than 95% (95.2%) of the 23.1 million felt that they did not need treatment. However, the need for treatment could only be determined through a medical tool (Collins et al., 2010). Some of the people who felt that needed treatment but made no effort to get it had the following reasons: not ready to stop using (38.8%), lack of health coverage/could not afford cost (32.1%), fear of possible negative effect on job (12.3%), not knowing where to go for treatment (12.9%), and concern that receiving treatment might cause neighbours/community to have negative opinion (11.8%) (NDSUH, 2009).

The instruments to carry out the assessment unfortunately are not easy to come by for most individuals. However, if one is able acquire any of the tools, they still need an expert to translate the results. It is also unfortunate that all these resources are provided mostly to addicts at critical conditions. To assess an addiction individuals need to go to a hospital or an addiction management institution with a good assessment tool. Some of the tools are: the Addiction Severity Index (ASI), the Structured Clinical Interview for DSM-IV (SCID), the Drug Abuse Screening Test (DAST), and the Michigan Alcoholism Screening Test (MAST). Tools like the ASI and the SCID require experts for interpreting the results while some like the DAST and the MAST the assessment results can be easily computed (Samet et al., 2007).

Research findings by Gustafson (2014), suggested that a multi-featured smartphone application may have substantial benefit to patients during their care for alcohol-use disorders (AUD). Rooke (2016), however pointed out that the capability to change health service delivery over the globe has not yet been realised, somewhat because of the absence of evidence for viability and cost-effectiveness of mobile application. Some other noteworthy gaps in the health service delivery is a lack of trials on smartphone applications for example for drugs and alcohol use. She concluded by noting that mobile phones have unmatched ability to support behaviour change in the natural environment (Rooke, 2016).

## **1.2. Problem Statement**

The death toll resulting from drugs and alcohol consumption is on the rise. A drugs and alcohol related addiction being an embarrassing and sensitive issue makes some drugs and alcohol users be afraid of approaching others for help. They are afraid of sharing their addiction with psychiatrists or are not sure of how effective a psychiatrist would be in providing help. Most of the drug users are not aware of their addiction while others do not see the need of getting help and believe that they can control their use. Some live in denial while others are afraid of stigmatisation. For the rest, sharing their personal information with a stranger like a psychiatrist is difficult.

Drugs and alcohol users need to be made aware of their impending or current addictions in a convenient way. This can be made possible by providing an affordable and easily accessible drugs and alcohol self-assessment and management tool like a mobile application. This tool could also make it possible for people with drugs and alcohol problems that want help, know where to find help and support near them. The application can be helpful for individuals and the government in the prevention and fight against drugs and alcohol abuse.

## **1.3. Research Objectives**

The research objectives include:

- i. To review drugs and alcohol addiction assessment tools,
- ii. To analyse existing drugs and alcohol assessment and management mobile applications,
- iii. To design, develop and test a mobile-based drugs and alcohol addiction self-assessment and management scheme,
- iv. To validate the functionality of the mobile-based application with addicts.

## **1.4. Research Questions**

- i. What are some of the tools used in drugs and alcohol addiction assessment?
- ii. Which are some of the drugs and alcohol assessment and management mobile applications in use?
- iii. How can a mobile-based drugs and alcohol addiction self-assessment and management scheme be designed, developed and tested?
- iv. Does the mobile-based drugs and alcohol addiction self-assessment and management scheme developed provide a useful assessment and management tool?



### **1.5. Justification of the Research**

Most people are not aware of the severity of their addictions or if they are actually addicted and need help. This is because, the tools used to carry out alcohol and drugs addiction assessment are not easily accessible. Most of the tools that can be easily assessed still require an expert to translate the results. The assessment tools can be found in addiction treatment institutions and at that point the addiction has already developed and they are rarely used to prevent the addiction from developing.

Most alcohol and drugs users find the process costly and are afraid of stigmatisation thus there is need for having an easily accessible, simple to use, private and smart tool for addiction assessment like a mobile application. The tool should be able to assess the addiction severity and then provide treatment plans or control measures without the need of an expert which can be very helpful for individuals and the government in its fight against addiction.

### **1.6. Scope of the Study**

Most of the tools used for alcohol and drug addiction assessment and management are internationally accepted so the application can be used anywhere. The mobile application however, will only target individuals with an Android smartphone. The institutions selected for the purpose of this research are the National Authority for the Campaign against Alcohol and Drug Abuse (NACADA) and the Support for Addiction and Prevention in Africa (SAPTA).

### **1.7. Limitations of the Study**

Drugs and alcohol assessment interviewers are normally trained and experienced clinicians. Therefore, the results from the self-assessment was a close estimate highly dependent on how motivated an addict is to work on their addiction.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1. Introduction**

Nearly 3.3 million deaths worldwide in 2012 were the result of alcohol consumption alone (WHO, 2014). Fry (2016) showed that early detection of the symptoms of drugs and alcohol addiction can prevent developing of significant harm like diseases or death to the addict. However, only 5% of the drugs and alcohol addicts' population accepted their addiction status and the need for help according to the findings of the NDSUH (2009) report. The purpose of the research was to find a way to make more people aware of their addiction and help them manage it.

This chapter will look at the symptoms of drugs and alcohol addiction and explore why only 5% could identify their symptoms when the rest could not. This will also help find out if there is a need for the application. This chapter will also review existing drugs and alcohol assessment tools to help identify the best tool that can act as a guide in the design and development of the application. The chapter will then review existing similar applications to help find out components and technologies employed in their implementation, their features, strengths, weaknesses and improvement opportunities.

The remaining section will review technologies and tools that will make the application possible. Generally, this review will be used to understand ways technology can be used to develop a self-assessment application and it will also act as a foundation for the initial requirements elicitation.

### **2.2. Symptoms of Drugs and Alcohol Addiction**

According to HelpGuide.Org (2016), the people who experiment with drugs and alcohol, continue using them because the substance either makes them feel good, or stops them from feeling depressed. However, Marsh (2016) believes that there is a fine line between regular drugs and alcohol use and drugs and alcohol abuse. This line was implied by Berge (2016) and Taughinbaugh (2013), when looking at the different stages of addiction. The line is found at the stage where the symptoms of drugs and alcohol addiction begin to appear or through assessment (Berge, 2016).

It was discovered that addiction symptoms develop in stages. This stages can be used to detect the level and severity of the addiction by relating the symptoms shown to a stage. Berge (2016), Taughinbaugh (2013), and a report by the Washington, US, Department of Human Health and Services (1999) had four similar stages of addiction. But Drugs.ie (2016), had the fourth stage as,

abstainers, instead of, addiction, as the last stage. The stages by Drugs.ie (2016) were ignored because abstaining, according to Dictionary.com (2010), is refraining from use, in this context refraining from use of drugs and alcohol. An addiction cannot develop when one is not taking drugs. And also because their stages were not in coherence with the stages from the other, three sources. According to Berge (2016), young people move more quickly through the stages than adults. Berge (2016), Taughinbaugh (2013), and the Department of Human Health and Services (1999) were all in agreement on the stages and symptoms. Below are there summarised findings.

### **2.2.1 Experimental Use**

The Department of Human Health and Services (1999) also referred to this stage as the drug experimentation stage. The initial introduction to drugs and alcohol mostly influenced by peers for entertainment or done out of defiance towards authority. The symptoms are not yet showing at this stage.

### **2.2.2 Regular Use**

The Department of Human Health and Services (1999) also referred to this stage as the social drug use, stage. The downhill journey towards addiction begins at this stage. Some symptoms begin to show. The symptoms that the victims show include: neglecting other activities like school and work, desperation to keep drug sources, using drugs and alcohol for emotional purposes, developing family and relationship issues, finding new friends that support the addiction, and having an increase in tolerance towards the addiction.

### **2.2.3 Problem Use**

The Department of Human Health and Services (1999) also referred to this stage as the risky use stage. At this stage, the victims lose any motivation towards work, school, and towards life in general. The victims develop the following symptoms: stops caring about school and work, shows obvious changes in behaviour, thinking about drug use becomes more important to them than all other interests including relationships, they become secretive, they may begin dealing drugs to help support their habit, they may develop use of other harder drugs, and legal problems may increase.

#### **2.2.4 Addiction**

The Department of Human Health and Services (1999) also referred to this stage as the chemical dependency stage. At this stage the victims become addicts. The victims show the following symptoms: they cannot face daily life without using drugs, denies their problem, their physical condition gets worse, loss of control over use, may become suicidal, financial and legal problems get worse, may have broken ties with family members or friends.

### **2.3. Drugs and Alcohol Assessment Tools**

Treatment for a drug or alcohol problem typically begins with an addiction assessment (ProjectKnow, 2016). Samet et al. (2007) showed that, drugs and alcohol abuse detection can be done using a number of assessment tools. According to the 1st Step Referral Services (2016), an assessment establishes past and present substance use patterns and make recommendations essential for treatment planning (Alcohol & Drug Assessments, 2016). Further addiction laboratory screening that includes, liver function tests, complete blood count and vitamin B12 and folate levels can be done (NIH, 2015). To administer these tools it is very important that a trained clinician is used. The interviewer is the most important part in assessment (McLellan et al., 1980). The assessment tools can be either unstructured, structured or semi-structured (Samet et al., 2007). This section will look at some of the common tools to identify the best approach to act as a guide for the design and development of the application.

#### **2.3.1 Unstructured, Structured and Semi-Structured Tools**

With unstructured interviews, the interviewer guides the interviewee by adding their own questions or probing were clarification is needed. Structured interviews are standardized and the interviewer cannot probe beyond the answer received (Edwards, 2013). Structured assessment tools consist of specified questions as well as choices for responses while in semi-structured, the interviewer can add probe based on the response (Samet et al., 2007). Since the research is looking to implement a self-assessment approach were the client goes through the questions by themselves, it will only focus on structured or semi-structured assessment tools. Probing based on responses can be added to the application.

#### **2.3.2 Structured and Semi-Structured Tools**

Samet et al. (2007) showed that coming up with a structured or semi-structured addiction assessment approach requires years of medical research and extensive experience in the same field.

After the approach is developed, it is verified through the test-retest method (Samet et al., 2007). There are different versions of the different assessment tools because of the changes in society like the introduction of new drugs (McLellan et al., 1980). The Center for Substance Abuse Treatment (2005) argued that regardless of the fact that some of these tools are very good tools, no one tool is the equal to a comprehensive clinical assessment (CSAT, 2005). However, as pointed out by Collins et al. (2010), they are only used for the initial assessment further clinical assessment can be done.

### **2.3.3 Diagnostic and Statistical Manual of Mental Disorders Version Four**

The Diagnostic and Statistical Manual of Mental Disorders Version Four (DSM-IV) was published by the American Psychiatric Association (APA) in 1994 to offer a common language and standard criteria for the classification of mental disorders. Addiction co-occurs with mental disorders. It is used because it provides standardized definitions and diagnostic measures for more than 297 psychiatric disorders, including substance abuse and dependence disorders. The DSM is now in its fifth edition, DSM-V, published on May 18, 2013 (Zarin et al., 2008). Some of the drugs and alcohol assessment tools make use of the DSM-IV.

### **2.3.4 The Assessment Tools**

According to Samet et al. (2007), some of the common drugs and alcohol assessment tools used are: Addiction Severity Index (ASI), Composite International Diagnostic Interview (CIDI), Structured Clinical Interview for DSM-IV (SCID), Alcohol Use Disorders and Associated Disabilities Interview Schedule (AUDADIS), Psychiatric Research Interview for Substance and Mental Disorders (PRISM), Semi-Structured Assessment for Drug Dependence and Alcoholism (SSADDA) and the Addiction Severity Index Multimedia Version (ASI-MV). The Alcohol Use Disorders Identification Test (AUDIT), the Michigan Alcohol Screening Test (MAST) and the Drug Abuse Screening Test (DAST-20) are also popular but they only measure, either alcohol addiction alone or drugs addiction alone, not both.

### **The Addiction Severity Index**

The Addiction Severity Index (ASI), is a semi-structured interview for substance abuse assessment and treatment planning (McLellan et al., 1980). Semi-structured means it can allow new ideas to be brought up (Edwards, 2013). Instead of just considering the client's substance use, the ASI also looks at individual's medical, employment, legal, family, social and psychiatric status. This wide

angle view is designed to help the interviewer and the client get a better understanding not just of the substance use, but also other problems that affect the client and their recovery. ASI seems to have applicability for matching patients to appropriate levels or intensities of rehabilitation services. The trained evaluator of the ASI calculates a composite score from a subclass of the distress and treatment that need responses. This score becomes the base for treatment planning. The ASI takes approximately 45 to 60 minutes to administer, plus 10 to 20 minutes for post-interview scoring (ASI, 2015).

The Addiction Severity Index is a consistent and accurate tool for assessing clients and their substance abuse issues (Samet et al., 2007). However, according to acoholrehab.com (2015), as society changes, future studies of the ASI will be needed to demonstrate its value as an important assessment tool. There is however, no self-administered version sanctioned yet (ASI, 2015).

### **The Composite International Diagnostic Interview**

The Composite International Diagnostic Interview (CIDI) is a comprehensive, fully-structured interview used by trained interviewers for the assessment of mental disorders including drugs and alcohol addiction (Samet et al., 2007). Fully-structured means it does not allow diverting (Edwards, 2013). It follows the definitions and criteria of International Statistical Classification of Diseases and Related Health Problems (ICD-10) and DSM-IV. It is intended for use in epidemiological and cross-cultural studies as well as for clinical and research purposes (Samet et al., 2007).

The CIDI, formerly developed by the World Health Organisation, assesses 22 DSM-IV diagnoses, including mood, anxiety, and substance use disorders. For each substance use disorder, the CIDI elicits other information useful for treatment planning, such as the patterns and course of alcohol and drug use. The fully structured instrument takes approximately 120 minutes to administer in its entirety (Kessler, 2004). Studies of the original CIDI and the paper versions have demonstrated, good to outstanding reliability for DSM-IV diagnoses of any drugs and alcohol abuse or addiction and fair to good reliability for drugs and alcohol abuse assessment (Wittchen, 1998). The CIDI has no computerized version yet.

### **Structured Clinical Interview for DSM-IV**

The SCID is available in different versions. It is available in formats for patients, non-patients, and patients with psychotic disorders. The Structured Clinical Interview provides lifetime and current diagnostic assessments for many DSM-IV disorders, including substance use disorders (Zarin et al., 2008). After an open ended overview and brief general screening, the extensively experienced evaluator takes the patient through the questions on the form, following up as needed to clarify responses. The alcohol and drug segments contain open ended screening questions as well. Administration can take up to several hours, depending on the complication of the patient's substance and psychiatric history. The instrument is modular, so medics can make use of only those sections that relate to assessment aims (Samet et al., 2007). The SCID has demonstrated excellent reliability for diagnosing drugs and alcohol addiction (American Psychiatric Association, 1987).

### **Alcohol Use Disorders and Associated Disabilities Interview Schedule**

The Alcohol Use Disorders and Associated Disabilities Interview Schedule (AUDADIS) provides for the last 12 months and lifetime DSM-IV diagnoses of major mood, anxiety, personality, and drugs and alcohol abuse (Grant, 1995). Medics can use the comprehensive descriptive data obtained by the AUDADIS to structure treatment based on a patient's specific drugs and alcohol related behaviours. In addition to alcohol, tobacco, and other drug use, its modules address treatment and family history. Frequent queries address the frequency and quantity of use of each type of alcohol for example beer, wine and liquor and each illicit drug during three time periods that of heaviest use, the past 12 months, and the interviewee's lifetime.

The AUDADIS showed high reliability in a study in clinical settings where comorbidity (present simultaneously in a patient) was expected to be high (Hasin, 1996). Its test-retest reliabilities for alcohol and drugs consumption, abuse, and addiction, as well as those for other modules, were good to excellent (Grant, 1995). The AUDADIS interview can be downloaded. It has a computer-assisted version.

### **The Psychiatric Research Interview for Substance and Mental Disorders**

The PRISM is a semi-structured diagnostic interview designed expressly for assessing comorbid (present simultaneously in a patient) psychiatric disorders in individuals who abuse drugs and alcohol (Hasin, 2006). The instrument's strength is in differentiating self-determining psychiatric

disorders, such as depression, from the effects of intoxication and withdrawal. Along with abuse and dependence diagnoses for specific substance categories, clinicians and researchers can use the PRISM to make current and lifetime DSM-IV diagnoses of the disorders that commonly occur with drugs and alcohol abuse, such as mood, anxiety, and psychotic disorders. It can determine how often the interviewee has made use of the drugs and alcohol in the last 12 months or ever. It is administered in around 80 minutes (Samet et al., 2007).

A recent test-retest study of 285 heavy substance users showed good to excellent reliability for most dependence diagnoses, including alcohol, cocaine, heroin, cannabis, and sedative dependence (Hasin, 2006). A computer-assisted version, that include questions on marijuana withdrawal and modules for nicotine-related disorders, pathological gambling, and attention deficit hyperactivity disorder, became available in 2008 (Samet et al., 2007).

### **The Semi-Structured Assessment for Drug Dependence and Alcoholism**

The SSADDA was developed for use in studies of genetic influences on cocaine and opioid dependence (Pierucci-Lagha, 2005). Derived from the Semi-Structured Assessment for the Genetics of Alcoholism, the SSADDA provides extensive coverage of the physical, psychological, social, and psychiatric manifestations of cocaine and opioid abuse and dependence in addition to a number of disorders. A standout feature of the SSADDA is its inclusion of questions about the onset and recentness of individual alcohol and drug symptoms, permitting a temporal assessment of symptom clusters. Information about the timing of symptoms is particularly helpful in distinguishing comorbid disorders from intoxication or withdrawal effects (Samet et al., 2007).

The reliability of individual dependence criteria in the SSADDA has been tested to determine the extent to which independent interviewers arrive at the same diagnostic conclusions. Overall, the inter-rater reliability estimates were excellent for individual DSM-IV criteria for nicotine and opioid dependence; good for alcohol and cocaine dependence; and fair for dependence on cannabis, sedatives, and stimulants (Pierucci-Lagha, 2007). A computer-assisted version of the SSADDA is available for free.

### **Addiction Severity Index Multimedia Version**

The Addiction Severity Index Multimedia Version (ASI-MV) is a computer-administered comprehensive substance use assessment instrument. Using a self-administered, interactive format, the ASI-MV provides composite scores and severity ratings for seven substance-related



domains: alcohol use, drug use, employment, family/social relationships, legal status, medical status, and psychiatric status. Questions are delivered via video-based virtual interviewers (ASI-MV, 2014). According to their website, ASI-MV provides (ASI-MV, 2014); interactive, self-administered evidence-based interviews & assessments that promote more honest client feedback, comprehensive clinical reports that speed up data collection and enhance your treatment planning, and analytic tools to monitor trends, characteristics and outcomes of your population. Since it has not been approved by the ASI its reliability cannot be determined.

### **Michigan Alcohol Screening Test**

Developed in 1971 and older than the ASI, the Michigan Alcohol Screening Test (MAST) is one of the oldest and most accurate alcohol screening tests available, effective in identifying dependent drinkers with up to 98 percent accuracy. Questions on the MAST test relate to the patient's self-appraisal of social, vocational, and family problems frequently associated with heavy drinking. The test was developed to screen for alcohol problems in the general population (Buddy, 2016). The MAST has 22 self-administered questions. The quiz is scored by allocating 1 point to each yes answer except for questions 1 and 4, where 1 point is allocated for each 'no' answer and totalling the responses (MAST, 2016). From the total an assessment is given.

### **Drug Abuse Screening Test**

The Drug Abuse Screening Test (DAST-10) is a 10-item brief screening tool that can be administered by a clinician or self-administered. Each question requires a yes or no response, and the tool can be completed in less than 8 minutes. This tool assesses drug use, not including alcohol or tobacco use, in the past 12 months (Skinner, 1982). The DAST has a lot of similarities with the MAST.

## **2.4. Existing Drugs and Alcohol Assessment and Management Mobile Applications**

Several applications for treating and managing alcohol and drugs addictions exist that operate on mobile phones. The applications are categorised in four groups: text-messaging monitoring and reminder applications, text-messaging intervention applications, game-based applications, and comprehensive recovery management applications (Quanbeck, 2014). Text-messaging monitoring and reminder applications enable continuous monitoring, text-messaging intervention applications promote abstinence and recovery, and game-based applications engage the user using video games. Comprehensive recovery management applications use the capabilities of smartphones to provide

various tools like assessments and access to peer discussion groups. They have the strongest theoretical base and have produced the strongest and long lasting effects. However, they still face some challenges including cost, understanding the features that account for effects, and keeping up with technological advances (Quanbeck, 2014).

The proposed application will be a comprehensive management application. The literature identified three comprehensive applications: LBMI-A, A-CHESS and Assess, Plan, Track, and Tips (APTT). LBMI-A, and A-CHESS are for alcohol addiction management while the APTT for cannabis addiction management.

#### **2.4.1 LBMI-A**

The LBMI-A was created to motivate a change in drinking through awareness of drinking and drinking-related problems and provide intervention options for the user to choose from (Dulin et al., 2013). The application provides assessment and feedback, daily interviews which are summarized on a weekly feedback report. Alcohol users then receive suggestions and tools for managing their triggers. The application also focuses on providing social support through social networking (Dulin et al., 2014). After testing, participants who utilized the LBMI-A system reduced the number of days spent drinking dangerously by approximately 60 percent over the course of 6 weeks. The results of this drove to the creation of a new app called Step Away that is running on an iPhone platform (Dulin et al., 2014).

#### **2.4.2 A-CHESS**

In contrast to LBMI-A, A-CHESS was designed to be integrated into the traditional treatment system. It requires an individual who has already identified their addiction and are seeking medical help. The individual's counsellor sets up the device so that the information and settings are tailored to the patient and his or her specific situation and interests. A-CHESS provides contacts for emergency and non-emergency situations, feedback and information services, addresses issues such as cravings, and includes a service that reports to the clinic staff and warns them of imminent relapse and signals of intervention (Chih et al., 2014). Patients assigned to A-CHESS had 57 percent fewer heavy drinking days compared with the control group (Gustafson et al., 2014).

#### **2.4.3 Assess, Plan, Track, and Tips Application**

Assess, Plan, Track, and Tips (APTT) is an iPhone smartphone application for assisting people to quit or reduce their cannabis use. Seeking help for cannabis use can be difficult due to accessibility

issues and stigmatisation concerns. The availability of an evidence-based app for reducing or quitting cannabis encourages treatment seeking among individuals who would otherwise not receive treatment (Rooke, 2016).

## **2.5. Summary**

Most of the experts and researchers referred to in this section like Fry (2016), emphasised the importance of detecting drugs and alcohol addictions early. And if undetected, or left untreated, drugs and alcohol use and abuse can develop into drugs dependence or alcoholism that can lead to the development of substantial harm to the addict. It is therefore important to recognise the symptoms of drugs and alcohol abuse through drugs and alcohol assessment (NCADD, 2016).

The tool used for assessment should also be detailed enough to provide the correct assessment. To demonstrate the medical significance of detailed assessments, McLellan (2007), developer of the ASI, used an example of two patients with different backgrounds. One patient was a physician very physiologically addicted to opiates and the other, a young woman with minor physiological addiction. An assessment that focuses on drug abuse history would stop here, concluding that the physician faces the greater challenge to recovery. However, a detailed evaluation such as that used by the ASI finds that the physician's interpersonal relationships, are a bit troubled, but are still in place, and he is still working. On the other hand, the young woman, has no social supports except for other drug abusers, she is not employed, and she has never kept a job for long. This shows that she is the one with more service needs specifically in, training in social and occupational skills (Samet et al., 2007). The MAST and DAST were selected for this research because they can be self-administered and the additional details will be required for proper diagnosis and management of the addictions. Different comprehensive recovery management applications exist for alcohol and cannabis addiction management. The applications however have their shortcomings, for example most are just for one platform that is for iPhones while are others are only used for treatment. Their strengths will be used and their weaknesses addressed on the proposed application.

## CHAPTER 3: RESEARCH METHODOLOGY

### 3.1. Introduction

This chapter describes how the research was able to achieve its objective of coming up with a self-assessment application. It describes the methods used in conducting the research, how the solution was implemented, and the tools and techniques used.

### 3.2. Software Development Process

The research methodology elected was the waterfall methodology as shown by Figure 3.1: Research Methodology Steps. It was done using 5 steps to create the mobile application.

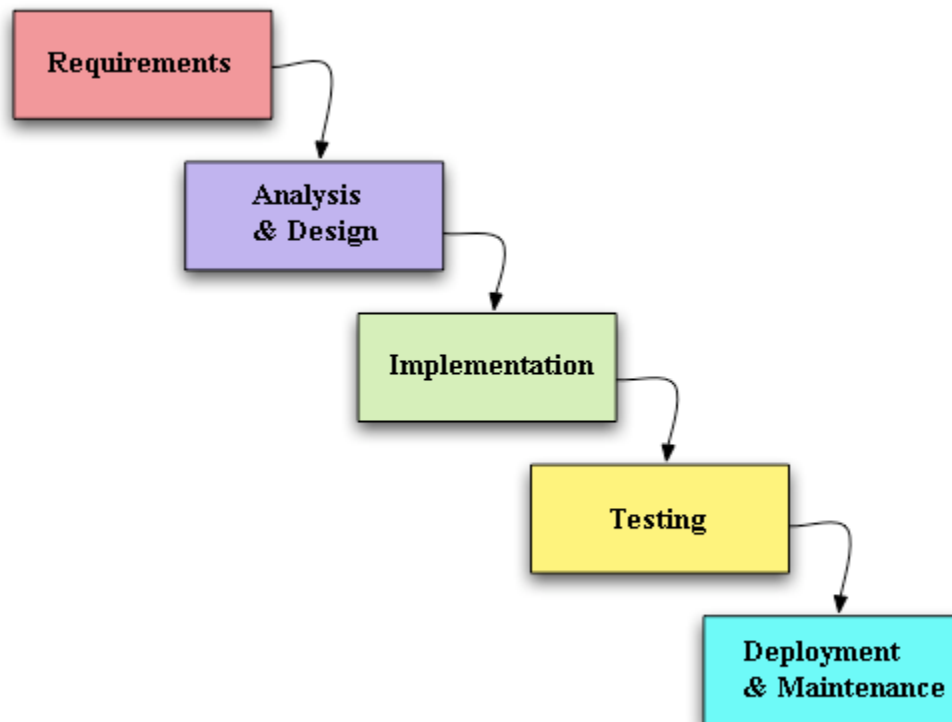


Figure 3.1: Research Methodology Steps (Suryanarayana, 2015)

The first step as shown by Figure 3.1: Research Methodology Steps, was requirements elicitation done to determine the feasibility of the research and how it could help addicts. This was done through identifying the problems faced by addicts, how the problems could be solved, and the different tools used to help them. To identify the requirements, a sample population was identified for the pre-questionnaire and the post-questionnaire. Research on the current tools and

applications was also done to determine the viability of the proposed scheme and identify weakness and challenges the existing tools and application face that could be improved. The second step was analysing the data to determine the needs of the scheme, and designing the scheme following the data analysed and then the design was implemented into a scheme. After implementing the scheme, testing was done to see if the scheme does what it was supposed to do and if it actually helped addicts recover. The scheme was deployed and maintenance done by improving the scheme given the feedback from the users of the scheme. Lastly the scheme was discussed with regards to the set up objectives and see that they were achieved and conclusions and recommendation with regards to the scheme built. Also, recommendations were given for future studies.

### **3.2.1 System Requirements**

Requirements were elicited and analysed to help come up with a design that was later implemented into a working solution. The requirement elicitation was done in different addiction prevention institutions, rehabilitation centres, and support groups found within Nairobi, Kenya, and its environs. The selection criteria of the different locations was based on popularity and good track records in the management of addictions. Within these locations a sample population was identified for the requirement elicitation.

### **Population and Sampling**

Two addiction prevention institutions were selected and some of the clinicians interviewed and their assessment approach observed. Four rehabilitation centres, and support groups where the respondents were other clinicians, sponsors, addicts and recovering addicts were chosen. For the purpose of this research simple random sampling was used because it is easy to implement, easy to analyse and gives equal opportunities to everybody in the population. It also allows researchers to use statistical methods to analyse sample results. The objects were selected through the lottery method and to avoid repetition, sampling without replacement was imposed (Simple Random Sampling, 2016). The objects in this context are clinicians, sponsors and addicts. The total population of the institutions was around 250. The population selected for the survey was 50 because of the high level of similarities of responses that was expected from the population because they were all either clinicians or addicts. Further classification on the selection was based on: gender, age groups, family background, area of residence, social background, employment history, legal history, and medical history.

The requirements were elicited from the selected population through both a quantitative and qualitative research approach using: interviews, questionnaires, observation and documentary analysis.

### **Data Collection**

Interviews were used to obtain information from the clinicians and sponsors regarding demand, requirement and the common tools used for assessment. This will help in understanding the symptoms of drugs and alcohol addiction, the assessment tools, similar applications and processes used in detail. The questionnaire shown at Appendix A: was given through an online-survey sent to addicts and was administered by the help of clinicians and sponsors. This was done to gather information about the demand and requirements of the application. Observation was used to look at and understand how an assessment is done. This helped in understanding the skills needed for a successfully assessment in order to see if they can be transferred to the proposed scheme. Documents were used to get more information on the requirements like: how an addiction develops, drugs and alcohol assessment and diagnosis tools, existing drugs and alcohol assessment and management applications their strengths and weaknesses, and the architectural design of the application.

### **3.2.2 System Analysis and Design**

After the data was collected, it was analysed using SPSS analytic software and Google Analytics. For online-surveys, Google Analytics was instrumental in analysing the data entered while SPSS was used to analyse data collected through observation and interviews ( Bodleian Libraries, 2017). The analysed data helped develop the logical and physical models of the application using the Unified Modelling Language (UML). The models developed include: wireframes, use case diagrams, use case descriptions, Sequence Diagram, an Entity Relationship Diagram (ERD), a class diagram, and a deployment diagram. Wireframes were used to display the functional elements of schemes applications. Use case diagram and user stories were used to map out the requirements and sequence diagrams were used to show the sequence of activities. A use case description will also be used to describe different scenarios in the different use cases and the data used to draw data flow diagrams showing how data would flow. An Entity Relationship Diagram was used to design the database and lastly the class diagram was used to describe the structure of the system. To represent the architecture a deployment diagram was used to demonstration the

deployment of software artefacts to deployment targets. Microsoft Office Visio 2013 and StarUML were used for modelling because it could be used to draw UML diagrams. Adobe Photoshop was used for the user interface design (Sacha, 2012).

### **3.2.3 System Implementation**

At this stage development was done following the designs provided. The scheme was implemented as two application, a mobile-based application and a website based application. The development was guided by the Model View Controller (MVC) design pattern. The model component relates to all the data logic that the user will work with. The view represents the user interface of the application that the user interacts with. The view will include buttons, label, images and other components. The controller is an interface between the model and the view that handles the application logic and user input from the view, then manipulates the input using the model and renders output to the view (Arthur, 2016).

The mobile programming language selected was Android from API 17 onwards, because it has the most users (Kidman, 2014). For the backend, the Laravel framework which is a PHP MVC implementation for the web was used (Laravel, 2017). The development environment selected for Android was Android Studio because it is light on computer resources, easy to create interfaces with and easy to debug and test using the JUnit test (Kidman, 2014). For PHP Sublime Text was used for the scripts because it is also very light on computer resources and provide support when developing through hints, code formatting and a lot more. For database management, SQLite was used in Android for offline backup, and MYSQL was used for both Android and PHP for online backup. MySQL Workbench was used for managing the database and developing the schema (Toma, 2017).

### **3.2.4 System Testing and Validation**

In the waterfall methodology testing is done after implementation. The following tests where done to find out if the specified goals where met:

#### **Functional Tests**

Functional testing was done to ensure the functional and non-functional requirements were met and the modules were communicating how they were supposed to.

### **Compatibility Tests**

Compatibility tests were done on different Android Platforms with different Operating System versions and of different screen sizes for the mobile application and for the application backend different web browsers were tested.

### **User Test**

User tests were done after the major requirements were developed and tested, the application was presented to the same clinicians, sponsors, and addicts to measure their satisfaction and get their feedback.

### **Validation**

Validation was done by sending clinicians the self-assessment application and asking them to administer it along with the current method to 20 addicts and the results from the two methods recorded and compared.

### **3.2.5 System Deployment and Maintenance**

After passing the tests the website backend was uploaded online to provide access to anyone willing to help in assisting addicts. The Android-based mobile application was uploaded to the Google Play Store with free access provided to everybody. Continuous maintenance was done upon receiving feedback from the users.

### **3.3. Ethical Measures**

The University has issued the researcher with a letter to identify the researcher as one of their students' and to request for assistance on behalf of the researcher to conduct their research. This was very helpful considering how sensitive an addiction is. Anonymity and confidentiality was guaranteed to the institutions and the research subjects. No names were written and the subjects were referred to by a unique identification system.



## CHAPTER 4: SYSTEM ANALYSIS AND DESIGN

### 4.1. Introduction

To come up with the mobile-based drugs and alcohol addiction self-assessment and management scheme, data collected was analysed to determine the feasibility of the research and gather requirements. This chapter goes through the requirements identified from the analysis of the data elicited from the previous chapter and the design and structure of the proposed scheme. The models used for the design and structure were: wireframes, use case diagrams, use case descriptions, Sequence Diagram, an Entity Relationship Diagram (ERD), a class diagram, and a deployment diagram.

### 4.2. Data Analysis

Initial requirements were collected to identify the need of the solution. They were collected using the survey on Appendix A, which was delivered through Google Forms and analysed by Google Analytics.

#### 4.2.1 Population

The analysis from the respondents showed a vast majority to be men at 77% compared to 23% women were at the institutions seeking help for their drugs and alcohol addictions where the survey was done. This can be seen on Figure 4.1.

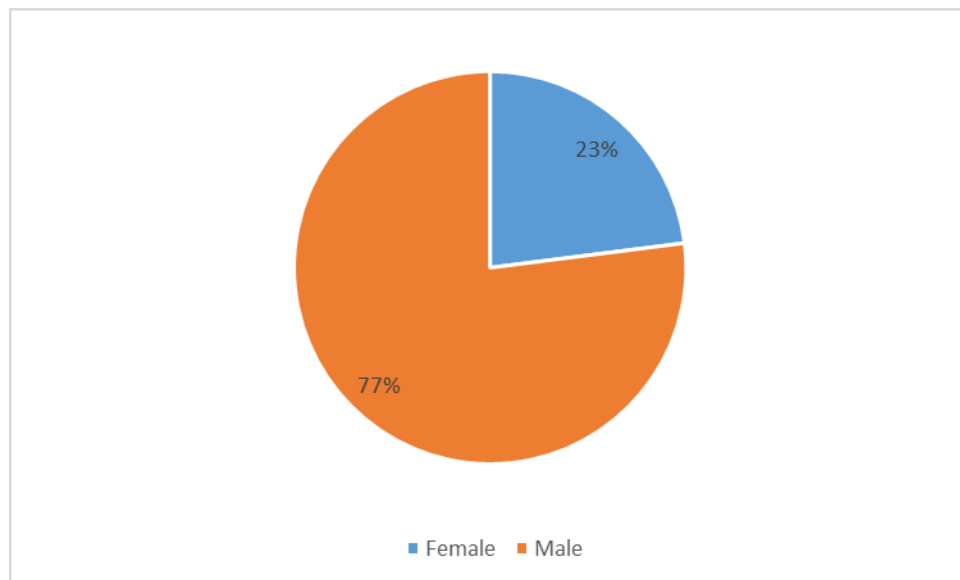


Figure 4.1: Analysis of the Selected Population Gender

The age group of between 18 and 24 had more respondents closely being followed by the 13 and 17 age group as illustrated by Figure 4.2.

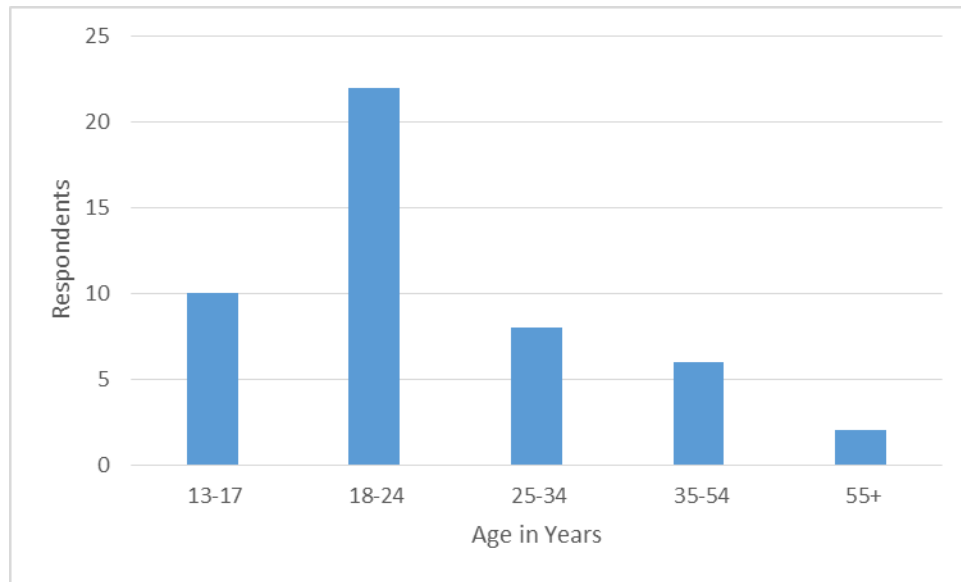


Figure 4.2: Population Age Group

#### 4.2.2 Common Substance Addictions

The respondents were asked to select the substance (drugs and alcohol) addiction that they were having and 50% said it was alcohol as seen on Figure 4.3.

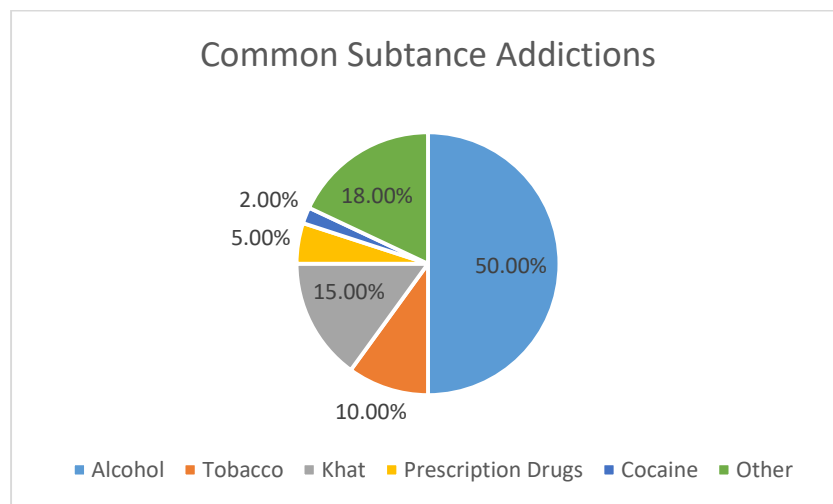


Figure 4.3: Common Substance Addictions

### 4.2.3 Detecting Substance Addiction and Self-Assessment

Figure 4.4 below shows how most addicts got to know of their addictions.

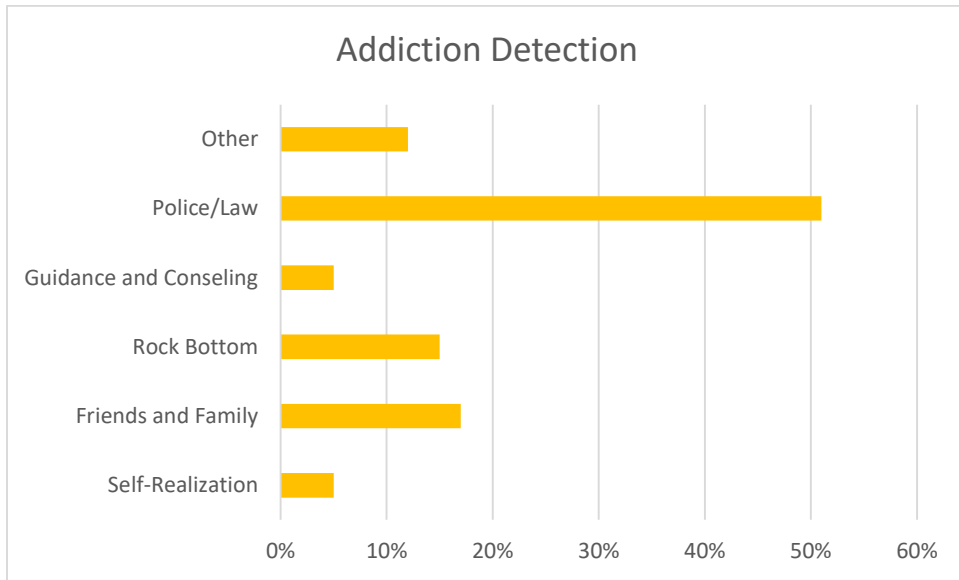


Figure 4.4: Detecting an Addiction

When asked if early detection through self-assessment would have helped, 83% said yes while 17% were not sure as shown on Figure 4.5.

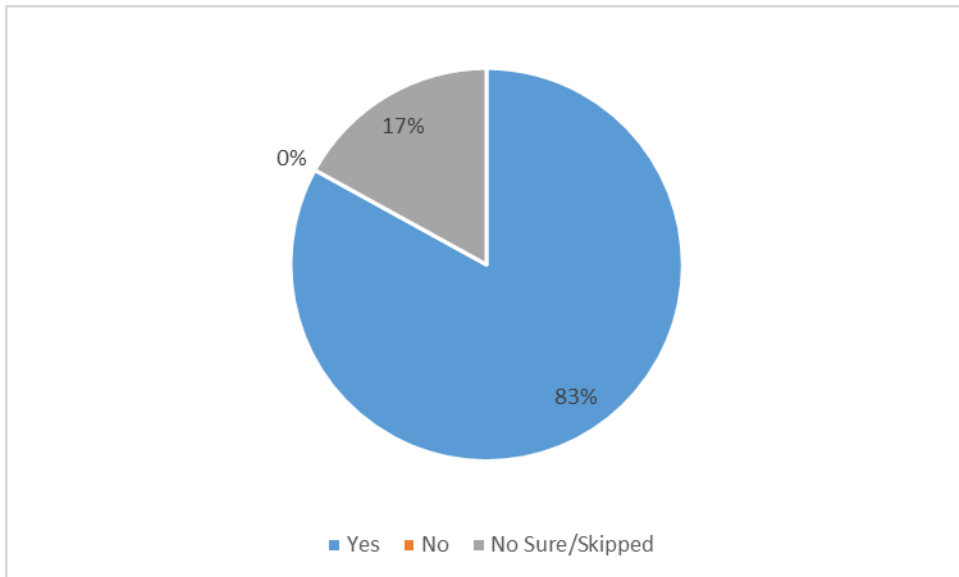


Figure 4.5: Would Self-Assessment Have Helped?

#### 4.2.4 Assessment Tools

From interviews and documentary analysis it was discovered that the most common assessment tool was the ASI at 44%, followed by the CIDI 27%, then the DAST at 19% and lastly the MAST at 10% as shown by Figure 4.6.

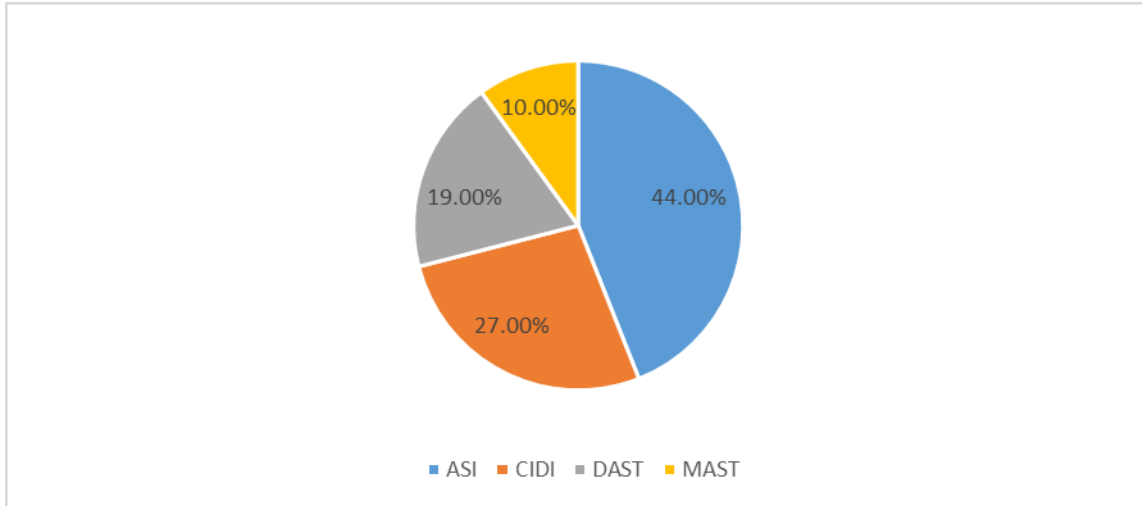


Figure 4.6: Drugs and Alcohol Assessment Tools Usage Statistics

#### 4.2.5 Operating System

The most popular phone operating system as seen on Figure 4.7 was found to be Android with 83% of the respondents, Windows at 8%, then IOS at 6%, and Blackberry with 3% with Symbian having none.

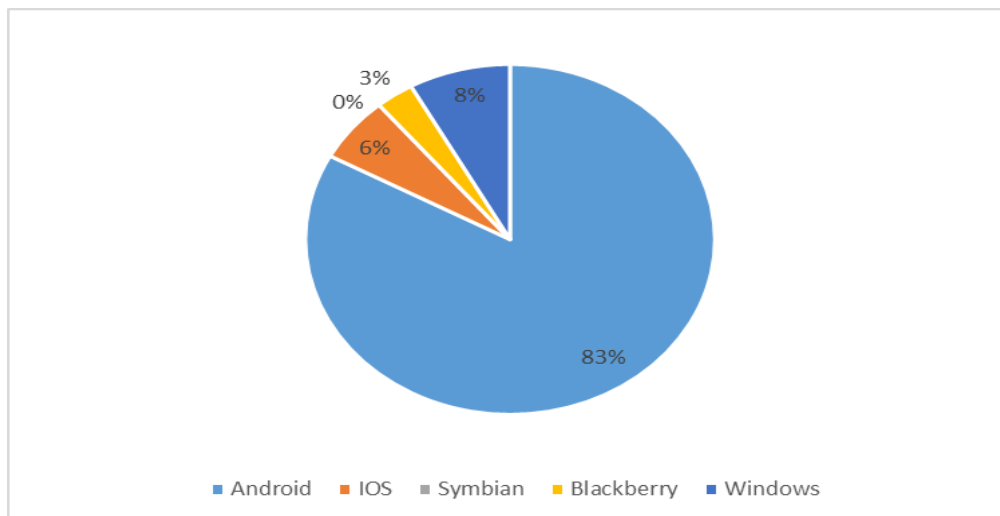


Figure 4.7: Popular Mobile Phone Operating System

### **4.3. Requirement Analysis**

The requirements were elicited from different people that included: clinicians, sponsors, drugs and alcohol addicts and users, and institutions fighting against drugs and alcohol abuse. Data was collected through different data collection tools and analysed to come up with the requirements for the proposed scheme to meet their requirements. From the analysis the following requirements were identified and divided into functional and non-functional requirements.

#### **4.3.1. Functional Requirements**

Functional requirements are the requirements that the application should fulfil to satisfy all the needs required by the scheme users. The requirements include: user management, assessment management, providing diagnosis, help manage addictions, find and validate clinicians or sponsors nearby, provide intervention options, display and analyse results from assessments and generate graphs, and create awareness of drugs and alcohol related problems.

User management includes enabling users to register, login and manage their profiles, and ensuring their anonymity. Assessment management involves all assessment related activities like: adding, updating, or deleting assessments, assessment questions and answers, and editing the assessment scores and diagnosis. Drugs and alcohol users, should be able to take an assessment, view their results, get notified of a follow-up and take the follow up. They should also be able to get their assessment results and diagnosis based on past similar diagnosis. Addicts can be helped to manage their addictions by: continuous monitoring, suggesting tools for managing their triggers, provide support through providing a platform for them to communicate with clinicians and supervisors, notify an addict when at high-risk locations, and help the track the days when they are sober. Intervention and social networking can be done through a messaging interface.

#### **4.3.2. Non-Functional Requirements**

These are requirements that are not necessary to the core functions of the scheme but they still are part of the scheme and they improve the user experience. The first requirement for the scheme is a feedback mechanism that allows the developer to be notified of bugs and improvement opportunities. The scheme should provide seamless and fully unified experience. It should also allow growth and provide security to the scheme users' data as it is very sensitive. The scheme should be well designed to be appealing and to enable users to navigate without much assistance.

#### 4.4. System Architecture

The deployment diagram shown by Figure 4.8 was used to represent the architecture of the scheme. The scheme users could access the scheme either through an Android based phone or a computer with a web browser. The Android-based mobile application receives and sends data in JSON format from the web server. The mobile application temporarily can store the schemes user data when the phone is offline in SQLITE and uploads it once it is back online. When using the browser the schemes user will communicate to the web server which will redirect them to a website. The web server sends and receives data to the database server as instructed or requested by the mobile application or the browser. The assessment will be done through the Android mobile application while the website will be used for managing the assessments and the assessments results.

#### 4.5. System Design

From the requirements identified the researcher was able to come up with the logical and physical design for the proposed scheme. The following design will act as a blueprint in helping the researcher develop the proposed scheme.

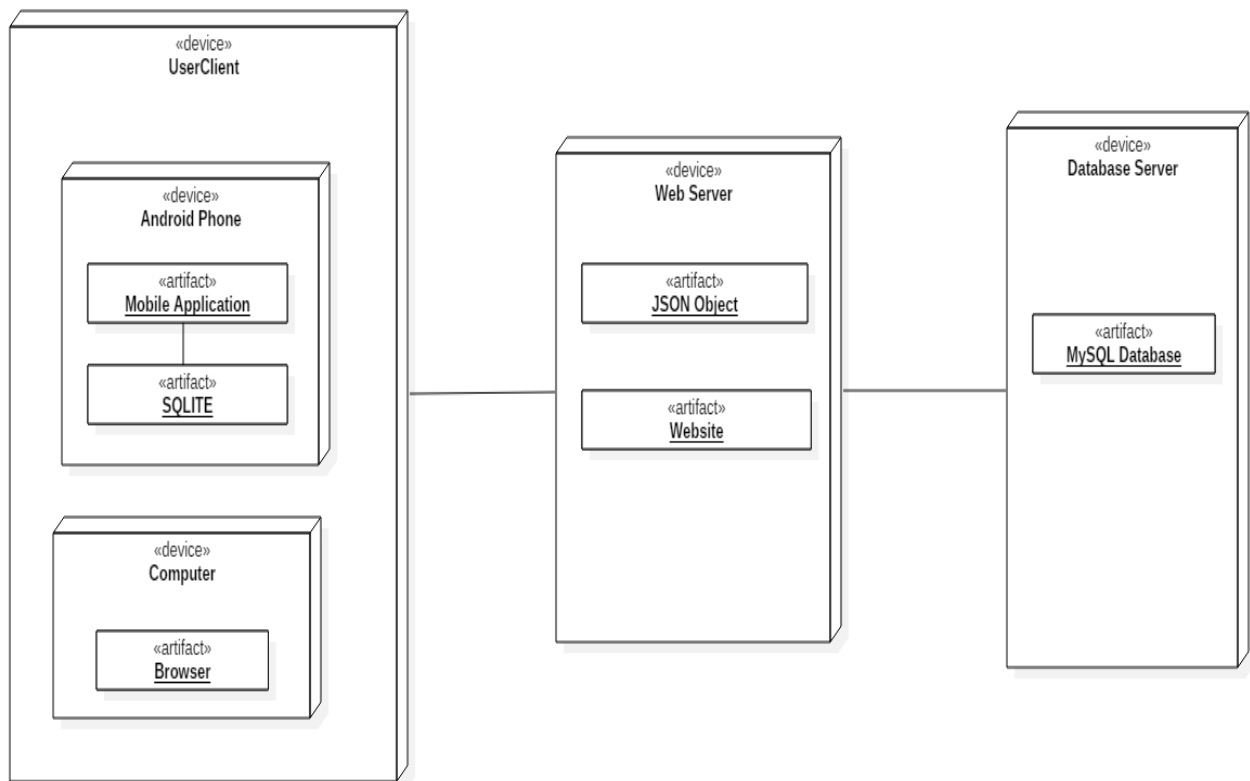


Figure 4.8: Deployment Diagram

### 4.5.1. Use Case Diagram

The actors identified for the scheme were: the administrator, clinicians, sponsors, drugs and alcohol addicts and users, and institutions fighting against drugs and alcohol abuse. The drugs and alcohol users and addicts will interact with the scheme through the mobile application while the clinicians and sponsors will interact with the scheme through the web backend. The use case shown by Figure 4.9 shows how the actors will interact with proposed scheme.

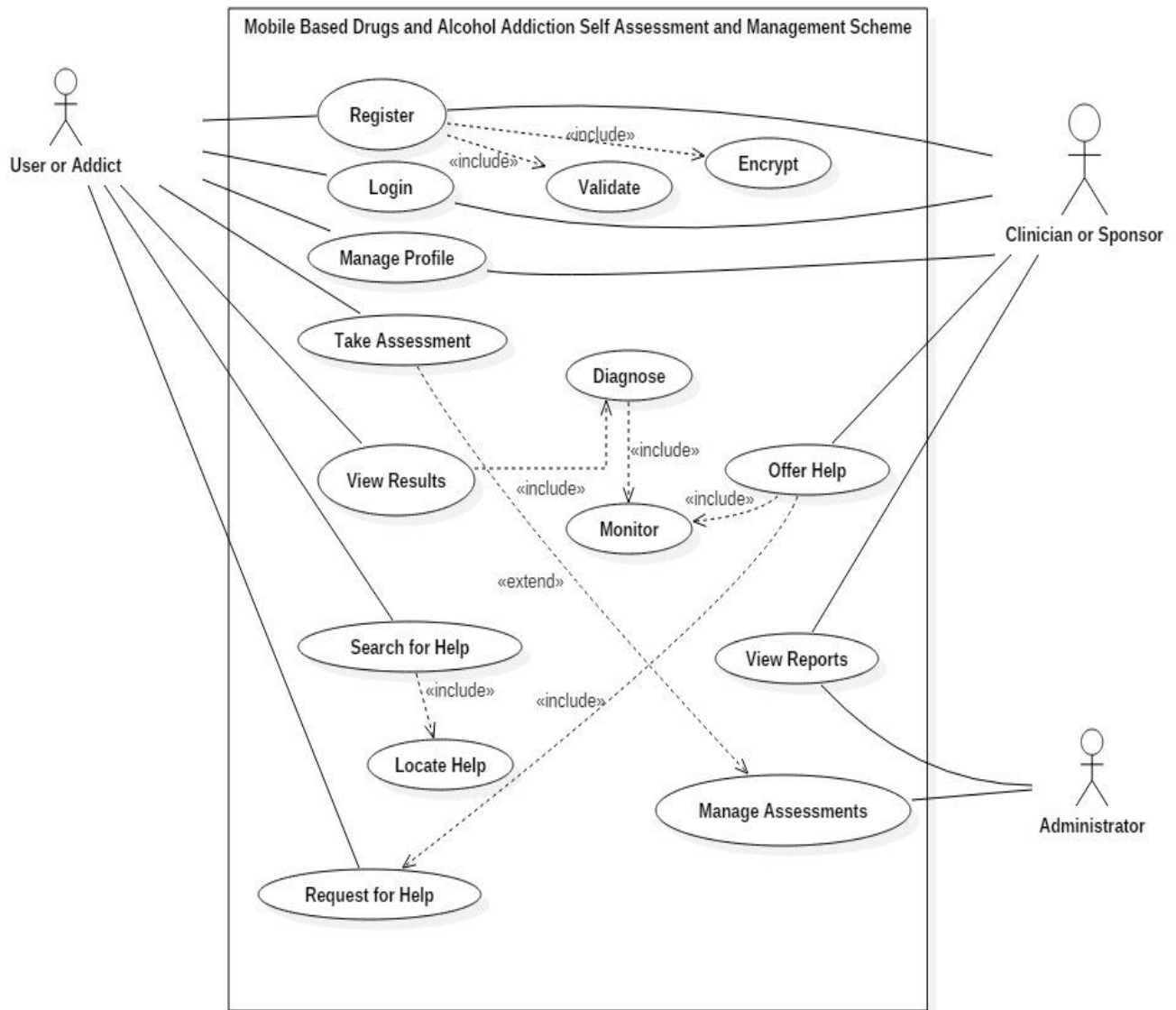


Figure 4.9: Use Case Diagram

#### 4.5.2. Use Case Description

The use case descriptions of the main features of the scheme which is self-assessment and management of drugs and alcohol addictions as represented by Figure 4.9 are described in detail. Those features are used by mostly drug and alcohol users and addicts. Table 4.1 describes the registration process of a user which is followed by the login process as described by Table 4.2. Table 4.3 describes how an assessment is taken which will be submitted as defined by Table 4.4 and their results diagnosed as described by Table 4.5. The users can then be able to view their results as described by Table 4.6.

Table 4.1: Register Use Case Description

Title:	Register
Description:	Users registers to the scheme on their mobile device to view their full results.
Primary Actor:	User
Preconditions:	User has no valid credentials or failed login attempt.
Post-conditions:	User is registered into the system.
Main Success Scenario:	<ol style="list-style-type: none"> <li>1. User selects “Register” from the login screen.</li> <li>2. User fills in their details.</li> <li>3. User clicks “Submit”.</li> <li>4. System registers the user and displays a success message.</li> </ol>
Extensions:	<p>3a. Invalid input.  --3a1. System displays error message saying invalid registration.  --3a2. User either backs out of this use case or provides valid details and tries again</p> <p>3b. Existing user.  --3b1. System displays error message saying the user exists.  --3b2. User backs out and goes to the login use case.</p>
Frequency of Use:	Once



Table 4.2: Login Use Case Description

<b>Title:</b>	Login
<b>Description:</b>	User enters their credentials to gain access to the system.
<b>Primary Actor:</b>	User
<b>Preconditions:</b>	User is registered to the system.
<b>Post-conditions:</b>	Login success.
<b>Main Success Scenario:</b>	<ol style="list-style-type: none"> <li>1. If not logged in system directs user to login page.</li> <li>2. User provides their credentials: username and password.</li> <li>3. User clicks “Submit”.</li> <li>4. System sends user credentials to the authentication use case.</li> <li>5. System returns a success message after authentication.</li> <li>6. User is redirected to their profile.</li> </ol>
<b>Extensions:</b>	<p>4a. Invalid Credentials/Input.</p> <p>--4a1. System displays an error message saying invalid credentials, please register to continue or try again.</p> <p>--4ab. User either provides valid credentials or goes to the register use case.</p>
<b>Frequency of Use:</b>	Until session expires or is deleted.

Table 4.3: Take Assessment Use Case Description

<b>Title:</b>	Take Assessment
<b>Description:</b>	A user completes an assessment.
<b>Primary Actor:</b>	System
<b>Preconditions:</b>	User has selected an assessment type.
<b>Post-conditions:</b>	Completed assessment.
<b>Main Success Scenario:</b>	<ol style="list-style-type: none"> <li>1. User requests for an assessment.</li> <li>2. System returns the questions one at a time.</li> <li>3. User provides their answer to a given question.</li> <li>4. User moves to the next question.</li> </ol>
<b>Extensions:</b>	<p>1a. Not first time to take the assessment.</p> <p>--1a1. System skips the introduction section.</p> <p>1b. User already started another assessment but not finished.</p> <p>--1b1. System redirects the user to the open assessment.</p> <p>2a. Invalid answer.</p> <p>--2a1. System displays an error message saying invalid answer, please fill in the blank, or use text/numbers as instructed.</p> <p>--2a2. User provides a correct answer.</p>
<b>Frequency of Use:</b>	Used for every assessment started and lasts as long as the assessment questions.

Table 4.4: Submit Assessment Use Case Description

Title:	Submit Assessment
Description:	User submits the assessment for scoring.
Primary Actor:	User
Preconditions:	User should have completed the assessment.
Post-conditions:	Assessment submitted successfully for scoring.
Main Success Scenario:	<ol style="list-style-type: none"> <li>1. User clicks the “Submit” button.</li> <li>2. System displays message saying form has been submitted successfully.</li> </ol>
Extensions:	
Frequency of Use:	Often.

Table 4.5: Diagnosis Use Case Description

Title:	Diagnosis
Description:	System scores and diagnose the users’ assessment.
Primary Actor:	System
Preconditions:	The user should have finished taking the assessment and submitted.
Post-conditions:	Correct score and diagnosis given.
Main Success Scenario:	<ol style="list-style-type: none"> <li>1. System receives the submitted answers from the user.</li> <li>2. System retrieves the scoring system for the assessment.</li> <li>3. System scores the users assessment.</li> <li>4. System retrieves the most similar diagnosis from the database.</li> <li>5. System stores the score and diagnosis of the user.</li> </ol>
Extensions:	<p>4a. No similar diagnosis to that user.</p> <p>--4a1. System provides diagnosis based on score alone.</p> <p>--4a2. System notifies an available clinician or sponsor.</p>
Frequency of Use:	Often.

Table 4.6: View Results Use Case Description

Title:	View Results
Description:	User views the results of their assessment.
Primary Actor:	User
Preconditions:	
Post-conditions:	User able to view their results/diagnosis.
Main Success Scenario:	<ol style="list-style-type: none"> <li>1. User visits their home page.</li> <li>2. Users clicks on “Show Results”.</li> </ol>

	3. System displays assessment results.
Extensions:	1a. Login required. --1a1. System displays an error message saying, login is required to access the home page. --1a2. Users should login to view this page.
Frequency of Use:	Very often.

### 4.5.3. Sequence Diagram

The sequence diagram at Figure 4.10 shows how events take place in respect to the main users of the scheme who are the drugs and alcohol users and addicts. After downloading the mobile application the users can take an assessment directly and given partial results but receive their full results once they have registered and logged in. When the users requests for an assessment the application checks if it is their first assessment and whether they have another assessment that they started but never completed. Once verified they receive the assessment details. They then get one question at a time, and moves to the next once there answers are validated. After they are done, their score and diagnosis are computed and their assessment details are saved to the database.

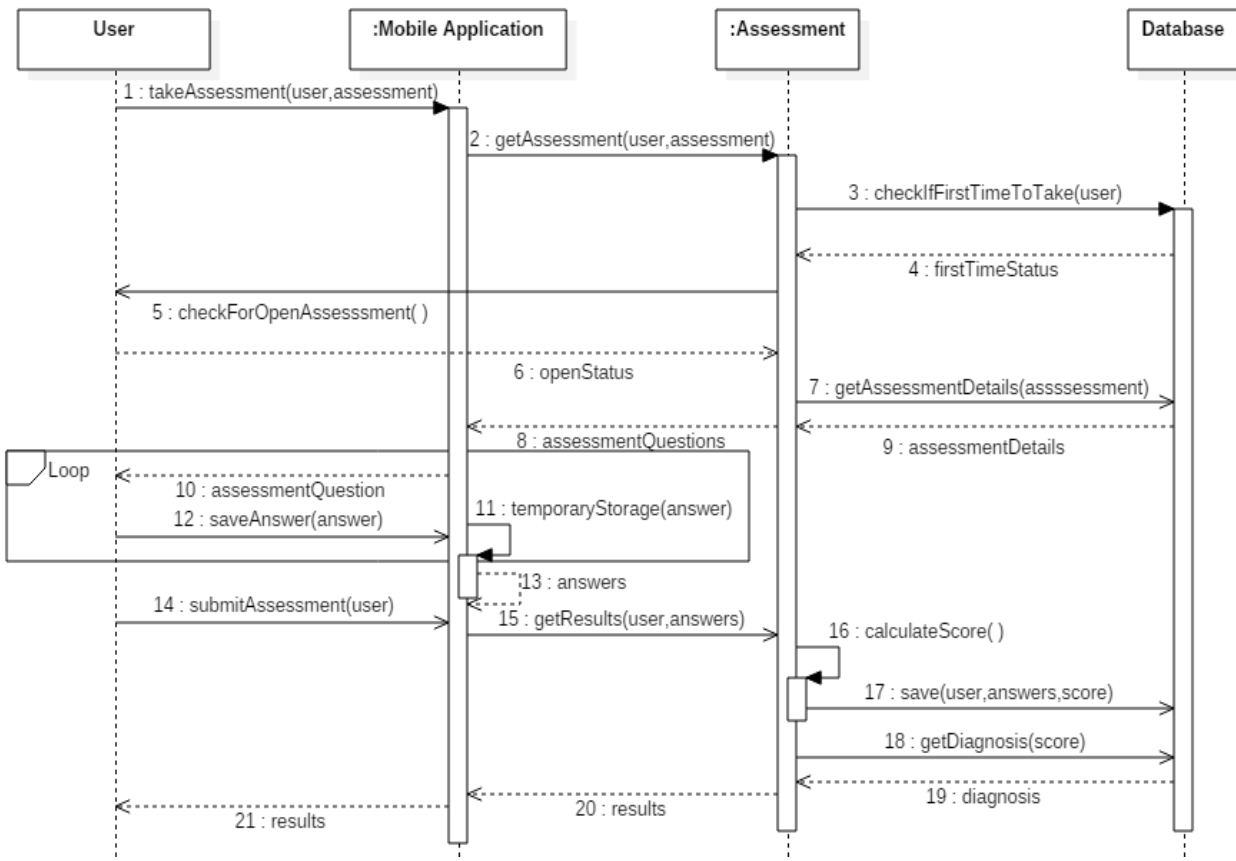


Figure 4.10: Sequence Diagram

#### 4.5.4. Class Diagram

The class diagram was used to design the proposed system structure with regards to its classes and how they interact together as shown by Figure 4.11. The figure shows the classes to manage a user, classes to manage an assessment, and the classes to manage user interaction with the assessment.

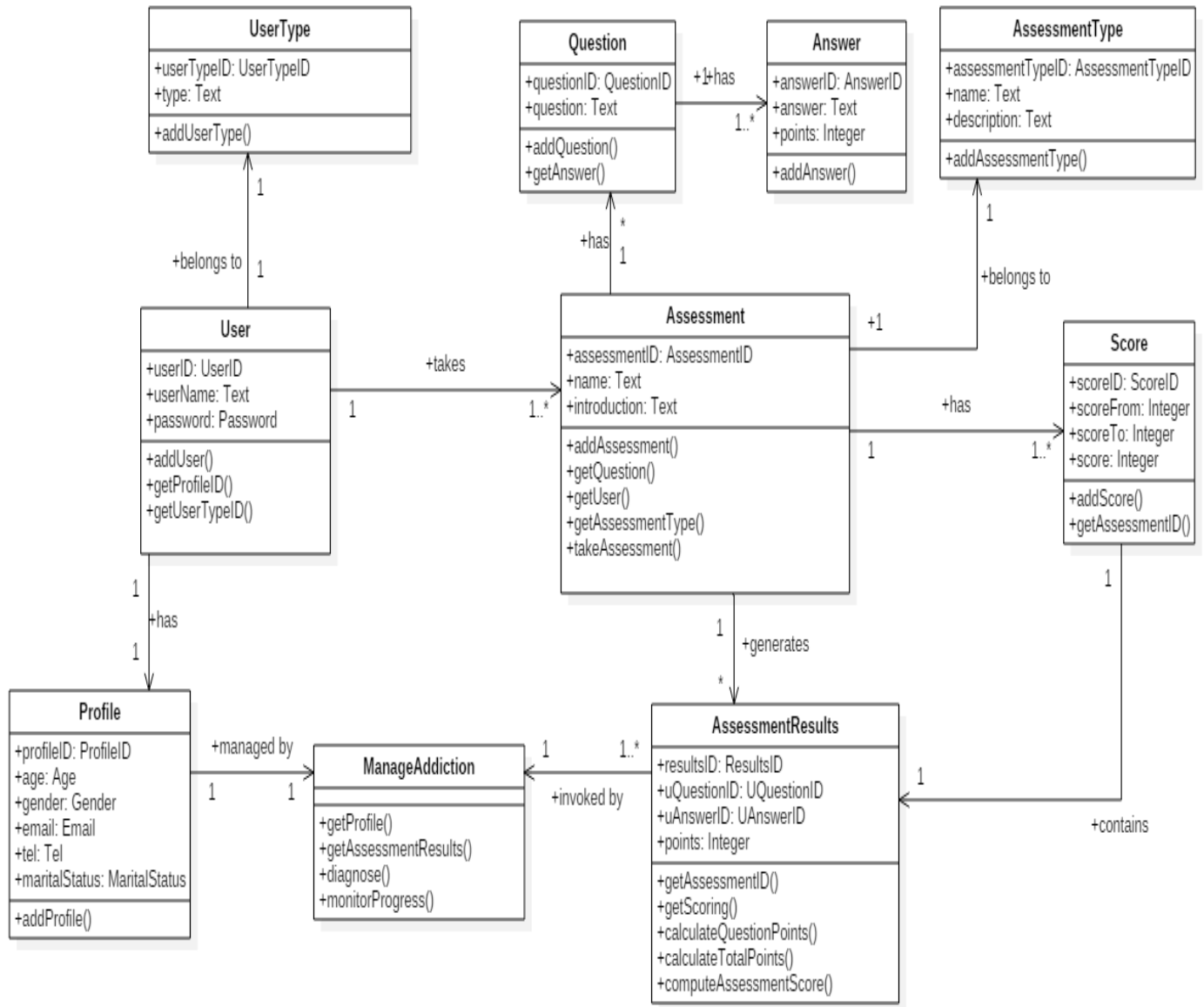


Figure 4.11: Class Diagram

#### 4.5.5. Database Schema

##### Entity Relationship Diagram

The mobile-based application and the web backend communicate with the same database. The Entity Relationship Diagram (ERD) shown by Figure 4.12 was used to represent the database entities and their relationships.

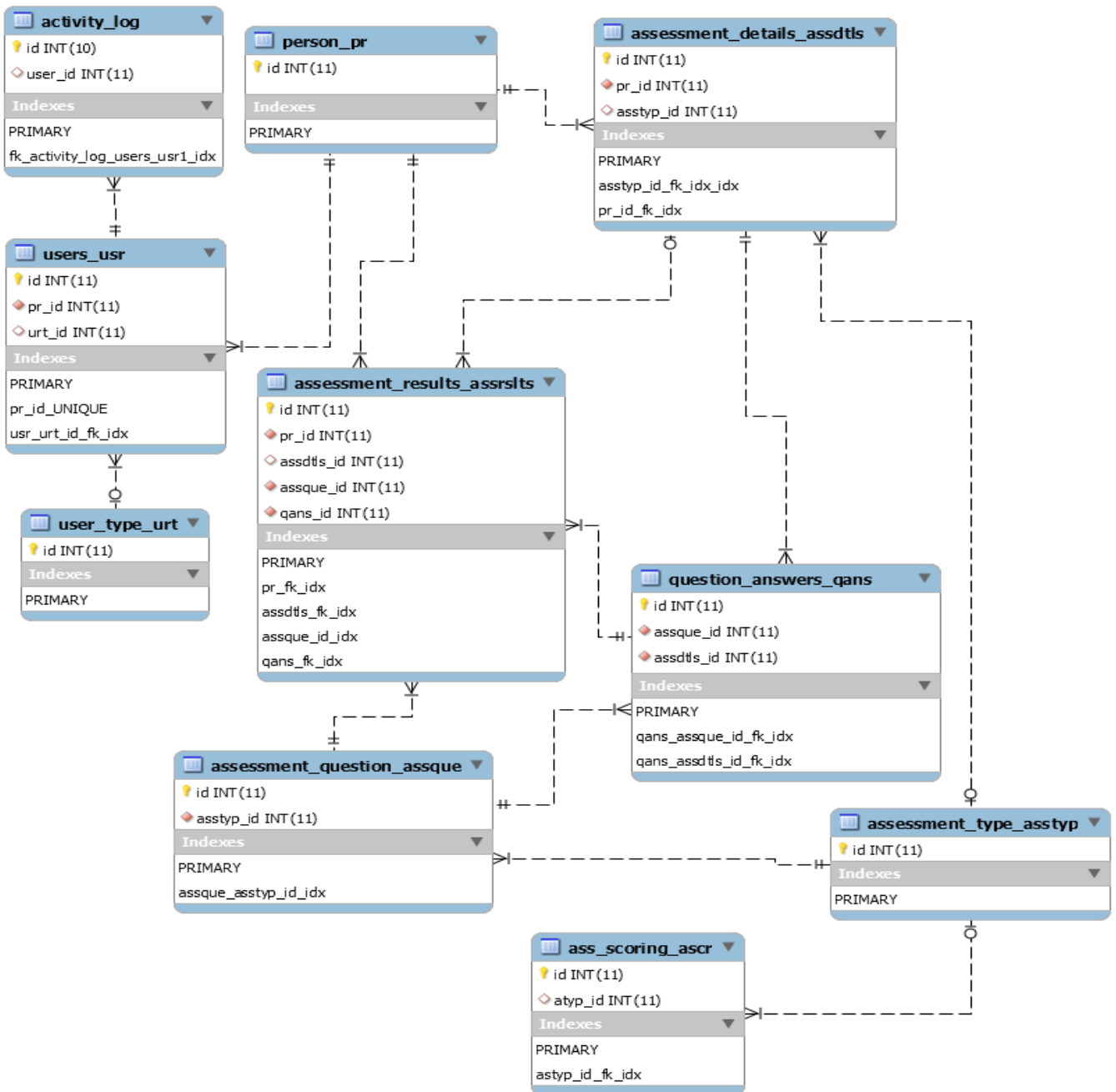


Figure 4.12: Entity Relationship Diagram

## Database Description

The description of the database, detailing the entities, attributes, primary keys, and foreign keys will be given in this section. The description given in this section represents the main tables used while the other tables can be found on Appendix B. Table 4.7 shows the overview of the entities of the database and their description.

Table 4.7: Database Tables Overview

Table Name	Description
activity_at	This table records the activity logs for all the users.
ass_scoring_ascr	This table holds the different score groups allocated to a given assessment type.
assessment_details_assdtls	This table holds the general information about an assessment.
assessment_question_assque	This table links with the assessment details to hold the assessments' questions.
assessment_results_assrslts	This stable will store the users' assessment results.
assessment_type_asstyp	The assessment type table holds the different assessment types. The current types are alcohol and drugs.
person_pr	This table keeps the personal details for the users.
question_answers_qans	This table stores all the possible answers to the assessment question and the points allocated to each.
user_type_urt	This table has the different user types: administrator, clinician, addicts e.t.c.
users_usr	This table holds the registered users.

Table 4.8 shows the assessment type table that holds the different assessment.

Table 4.8: Assessment Type Table (assessment\_type\_asstyp)

COLUMN NAME	DATA TYPE	INDEX
id	int(11)	Primary key
asstyp_name	varchar(50)	
asstyp_description	varchar(1255)	
created_at	timestamp	
updated_at	timestamp	

Table 4.9 shows the questions table that holds the different questions for each assessment.

Table 4.9: Questions Table (assessment\_question\_assque)

<b>COLUMN NAME</b>	<b>DATA TYPE</b>	<b>INDEX</b>
id	int(11)	Primary key
asstyp_id	int(11)	Foreign key
assque_number	int(11)	
assque_question	varchar(255)	
assque_description	varchar(255)	
created_at	timestamp	
updated_at	timestamp	

Table 4.10 shows the results table that holds the results from each addicts' assessment.

Table 4.10: Results Table (assessment\_results\_assrslts)

<b>COLUMN NAME</b>	<b>DATA TYPE</b>	<b>INDEX</b>
id	int(11)	Primary key
pr_id	int(11)	Foreign key
assdtls_id	int(11)	Foreign key
assque_id	int(11)	Foreign key
qans_id	int(11)	Foreign key
created_at	timestamp	
updated_at	timestamp	

Table 4.11 shows the assessment scoring table which hold the scores given to each question.

Table 4.11: Assessment Scoring Table (ass\_scoring\_ascr)

<b>COLUMN NAME</b>	<b>DATA TYPE</b>	<b>INDEX</b>
id	int(11)	Primary key
atyp_id	int(11)	Foreign key
ascr_from	int(11)	
ascr_to	int(11)	
ascr_severity	varchar(45)	
ascr_diagnosis	varchar(45)	
ascr_recommendation	varchar(255)	
created_at	timestamp	
updated_at	timestamp	

#### 4.5.6. Wireframes

The user interface was modelled using wireframes. A wireframe is a low-fidelity representation of a system design. The wireframe diagrams can be found at Appendix C. Figure C.1 shows the first screen when the users starts the application. They are then taken to the selection page as shown by Figure 4.13 where they select the type of addiction assessment they would like to take. After selecting the addiction they are taken through an introduction of the assessment and what is expected from them. A follow-up date is then calculated for them which they can change as shown by Figure C.2.



Figure 4.13: Selecting Addiction Wireframe

After selecting the follow-up they are taken to the assessment questions one question at a time as shown by Figure 4.14.



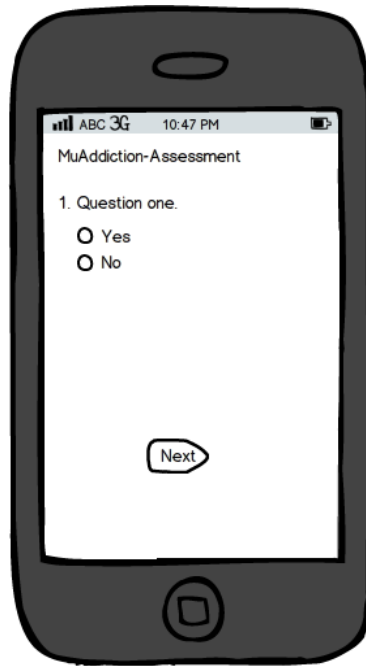


Figure 4.14: Assessment Wireframe

After completing the assessment they are given partial results as shown by Figure 4.15 but receive the full results after logging in or registering as shown by Figure 4.16.

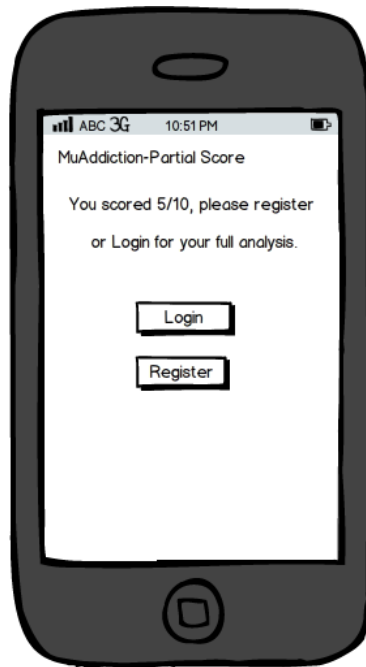


Figure 4.15: Partial Results Wireframe

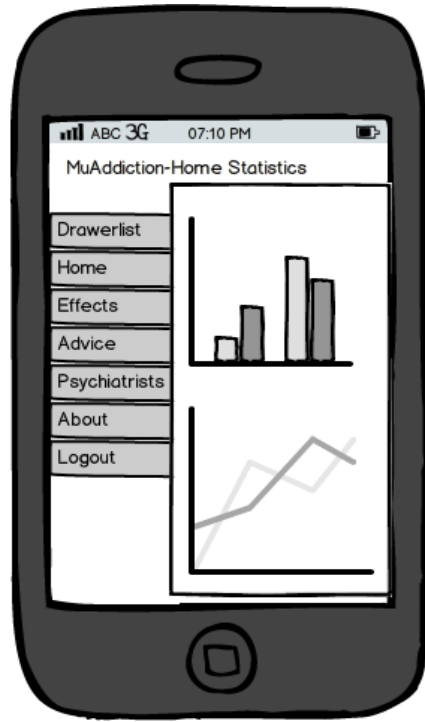


Figure 4.16: Mobile Home Page Wireframe

The users can access other functionalities of the application like viewing the effects of either drugs or substance abuse as shown by Figure 4.17.

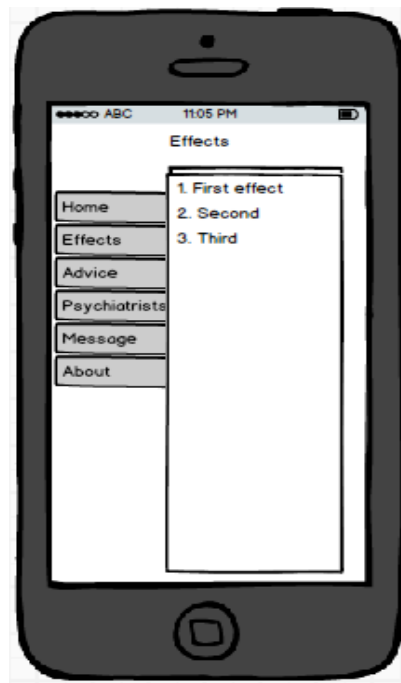


Figure 4.17: Effects Wireframe

If an addict is in need of help they can search for a psychiatrist near them as shown by Figure 4.18.

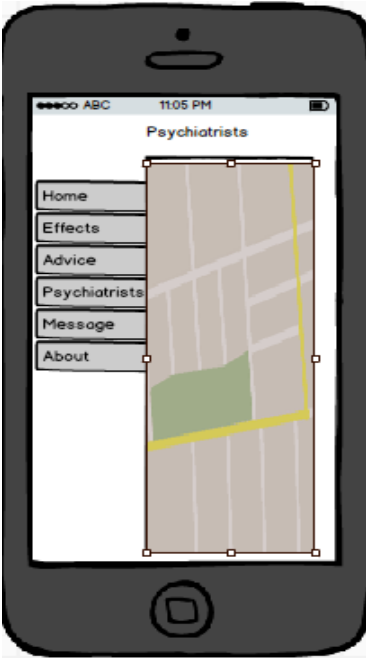


Figure 4.18: Psychiatrist Wireframe

The addict can also communicate with clinicians or psychiatrist through the mobile application as shown by Figure 4.19.

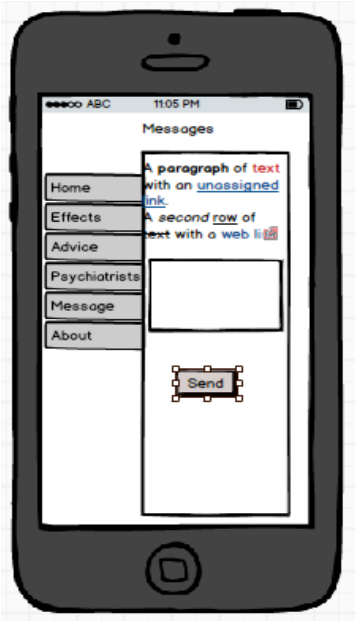


Figure 4.19: Messages Wireframe

The scheme will also have a website backend where the application will be showcased and a link to the Google Play Store application given. The website will have a registration and login for the administrator, clinicians and sponsors as shown by Figure C.3 and C.4. Once logged in the administrator will be able to set-up assessments as shown by Figure 4.20.

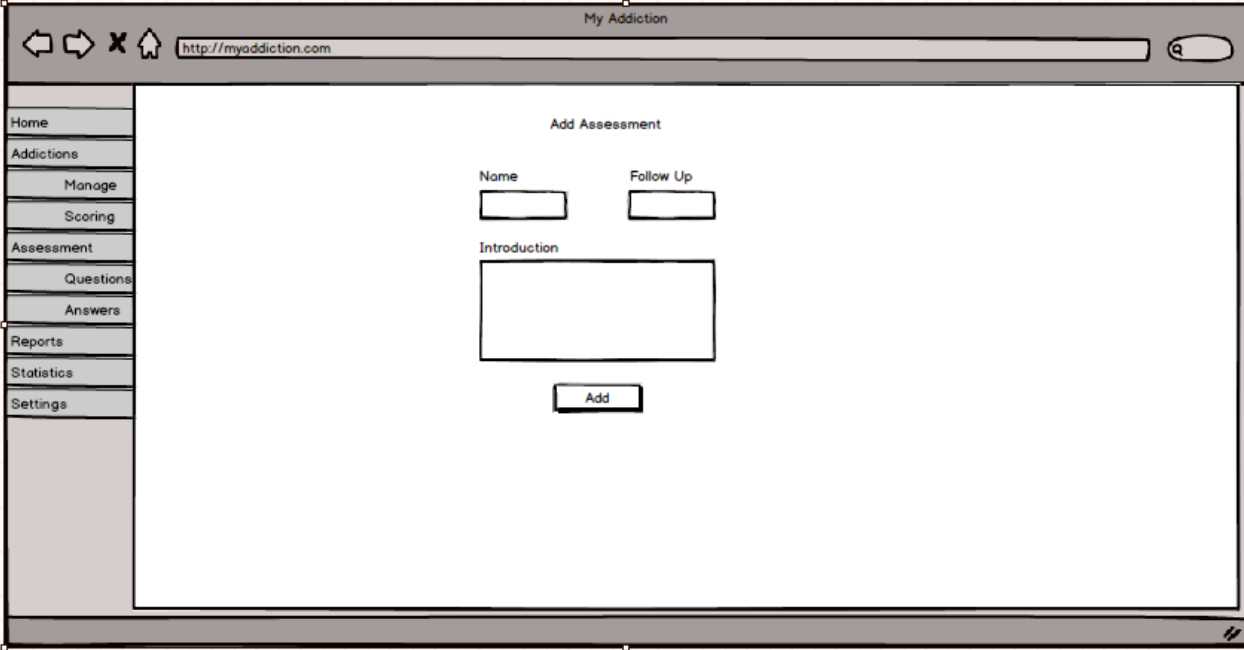


Figure 4.20: Adding Assessment Wireframe

After setting the assessment the administrator can add, edit, and delete questions and their answers as shown by Figure 4.21.

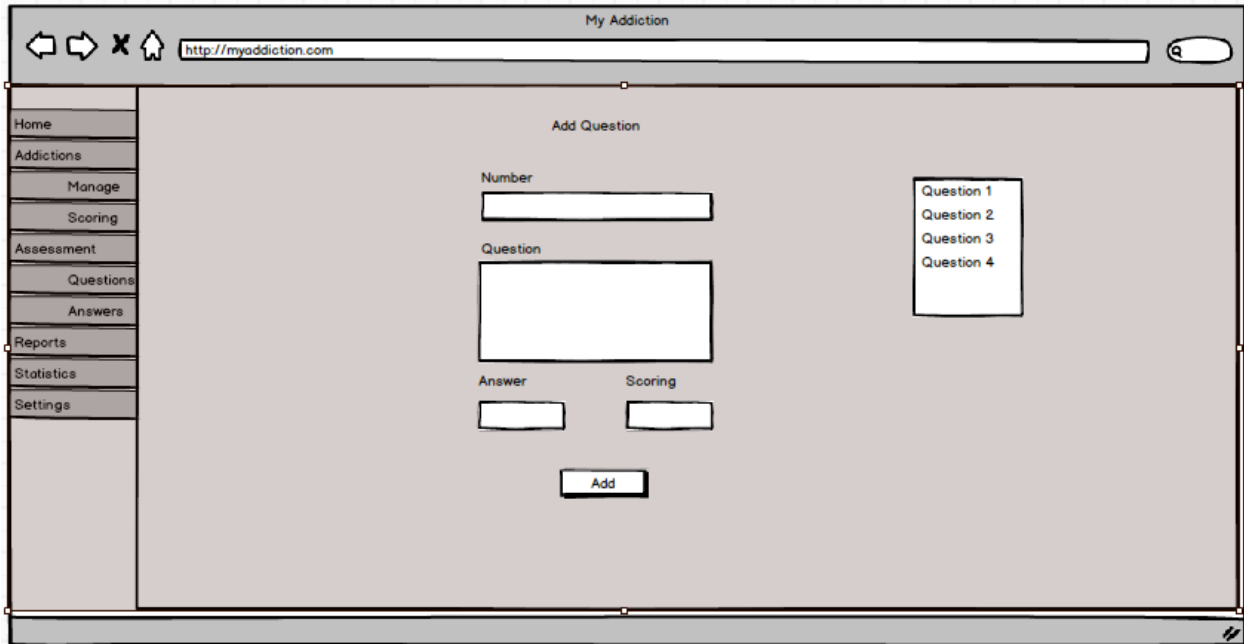


Figure 4.21: Adding Questions Wireframe

The clinicians can help addicts manage their addiction by directly sharing messages with them as shown by Figure 4.22.

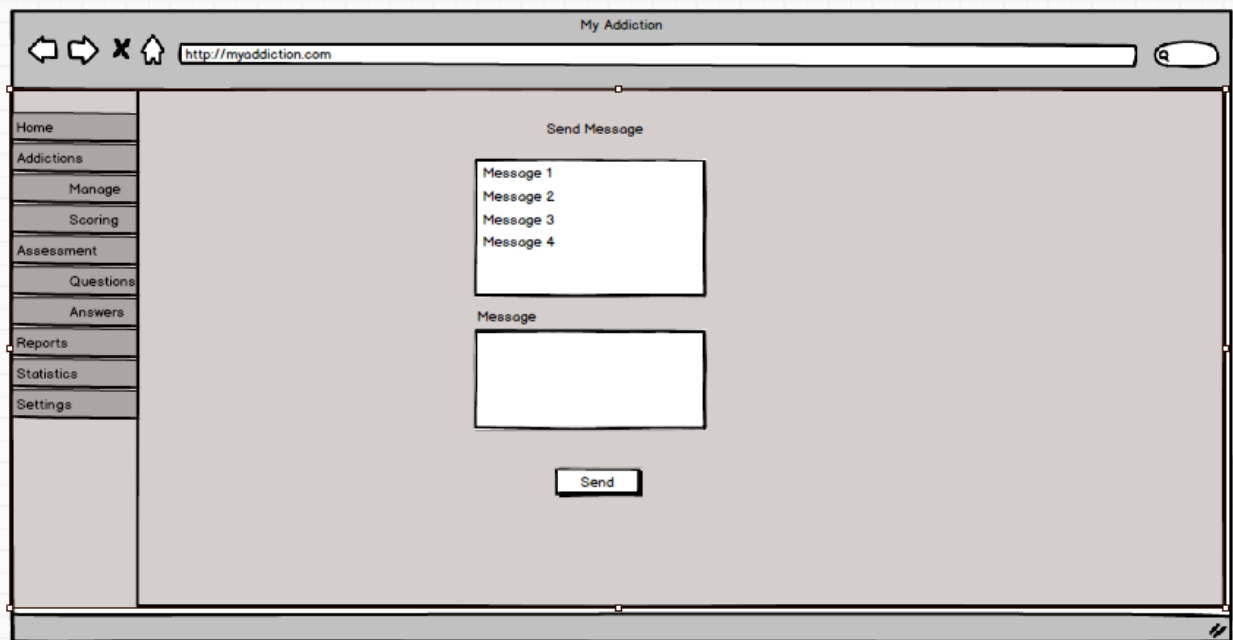


Figure 4.22: Messaging Backend Wireframe

The administrator and clinicians can view stastics from the assessment taken by the addicts as shown by Figure 4.23.

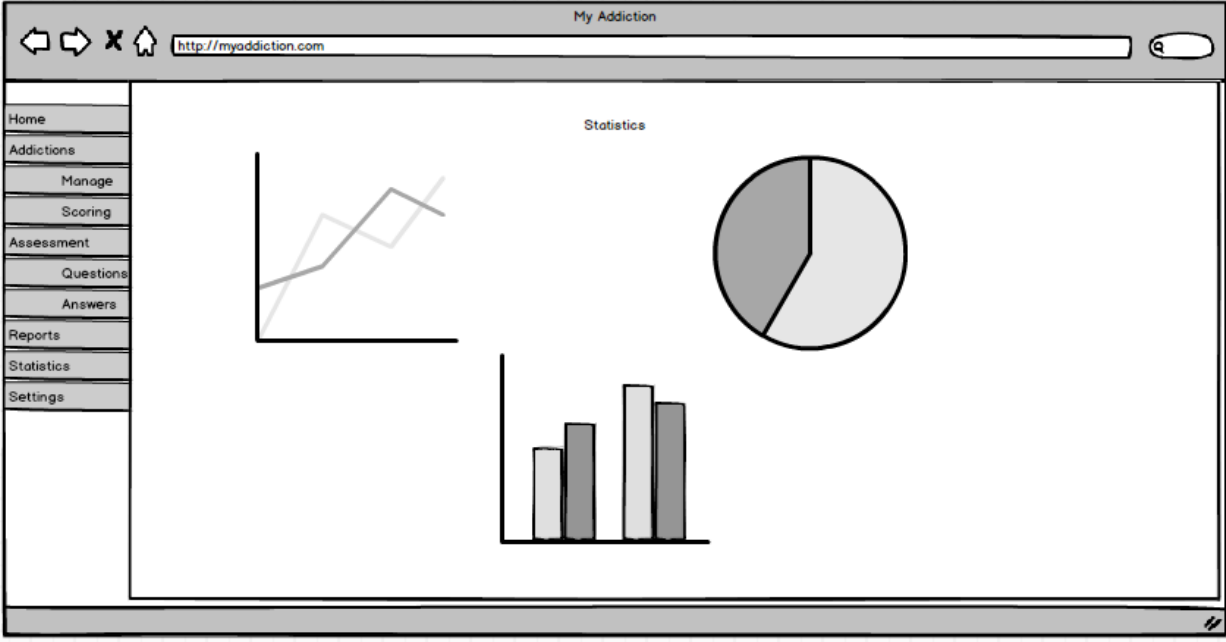


Figure 4.23: Statistics Wireframe

## **CHAPTER 5: SYSTEM IMPLEMENTATION AND TESTING**

### **5.1. Introduction**

The purpose of the research was to come up with a mobile-based drugs and alcohol addiction self-assessment and management scheme. This chapter will go through how the implementation of the scheme was done and the finished application was tested.

### **5.2. System Implementation**

The scheme was implemented as both an Android mobile application and a website backend known as My-Addiction. The website backend enabled the administrator to manage the application and view reports and statistics and enabled the sponsors and clinicians assist addicts manage their addiction, and also view reports and statistics.

#### **5.2.1. Mobile Application**

The My Freedom mobile application allows drugs and alcohol users and addicts: to perform an assessment, to view their diagnosis, register, login and manage their profile, to view a summary of their results and past results, to locate clinicians or sponsors nearby, to get notified of follow-up interviews. The mobile application also helps addicts manage their addictions by: creating awareness of drugs and alcohol related problems to users, providing addicts with advice, suggestions of handling their addicts and tools for managing their addictions, providing a platform for them to communicate with clinicians and supervisors, notifying an addict when at high-risk locations, and help addicts track the days when they are sober.

After downloading and installing the application the user will be taken through a splash screen introducing the application for only the first time using the application. After the splash they will be taken to a welcome screen, Figure D.2 from where they can opt to take the assessment, or to sign in. If the user selects to start the assessment they are taken to Figure D.3, a screen where they select the kind of assessment they want to take. After selecting the addiction they are taken through an introduction of the assessment and how they are supposed to take the addiction as illustrated by Figure 5.1.

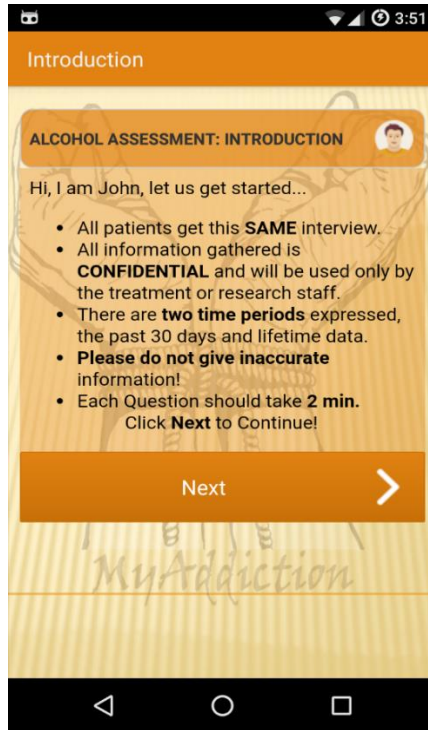


Figure 5.1: Assessment Introduction Screenshot

A follow-up date is then calculated for them which they can change as shown by Figure 5.2. After selecting the follow-up they can start the assessment.

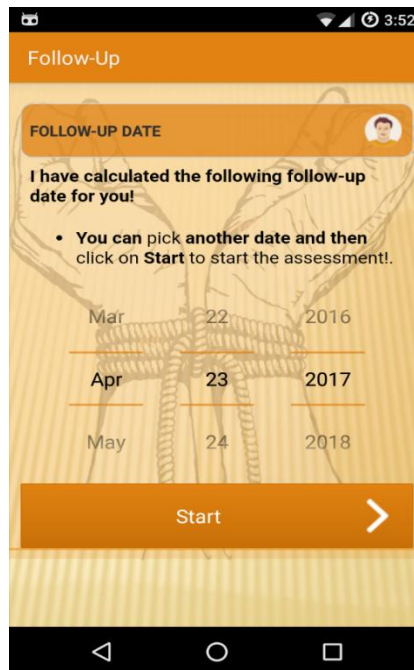


Figure 5.2: Follow-Up Date Screenshot



Once they start the assessment a timer counting down to two minutes begins that refreshes for every question and the time for every question is stored. The application user is taken through the assessment questions one question at a time as represented by Figure 5.3.



Figure 5.3: Assessment Questions Screenshot

After completing the assessment they are given partial results similar to those on Figure 5.4 but receive the full results after signing in like in Figure D.4 or registering like in Figure D.5 and then signing in.

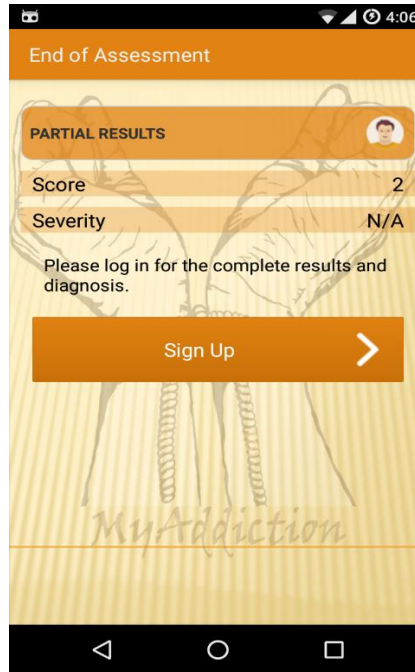


Figure 5.4: Partial Results Screenshot

Once they sign in they are taken to Figure 5.5, the home page where they see their full results and can access the other applications' functionalities as shown by Figure D.6 and Figure D.7.

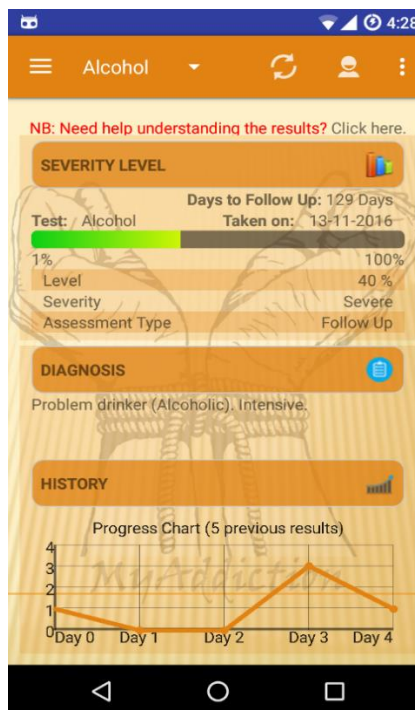


Figure 5.5: Home Screenshot

## 5.2.2. Web-Backend

The landing page for the website backend shown on Figure D.8 will advertise, showcase and explain the functionalities of the mobile application and what will be expected. A link to the mobile application on the Google Play Store application will also be given. The website will have a login and registration for the administrator, clinicians and sponsors as shown by Figure D.9 and D.10 respectively. Once logged in, a backend home page will appear as shown by Figure D.11 the administrator will be able to set-up assessments as shown on Figure 5.6.

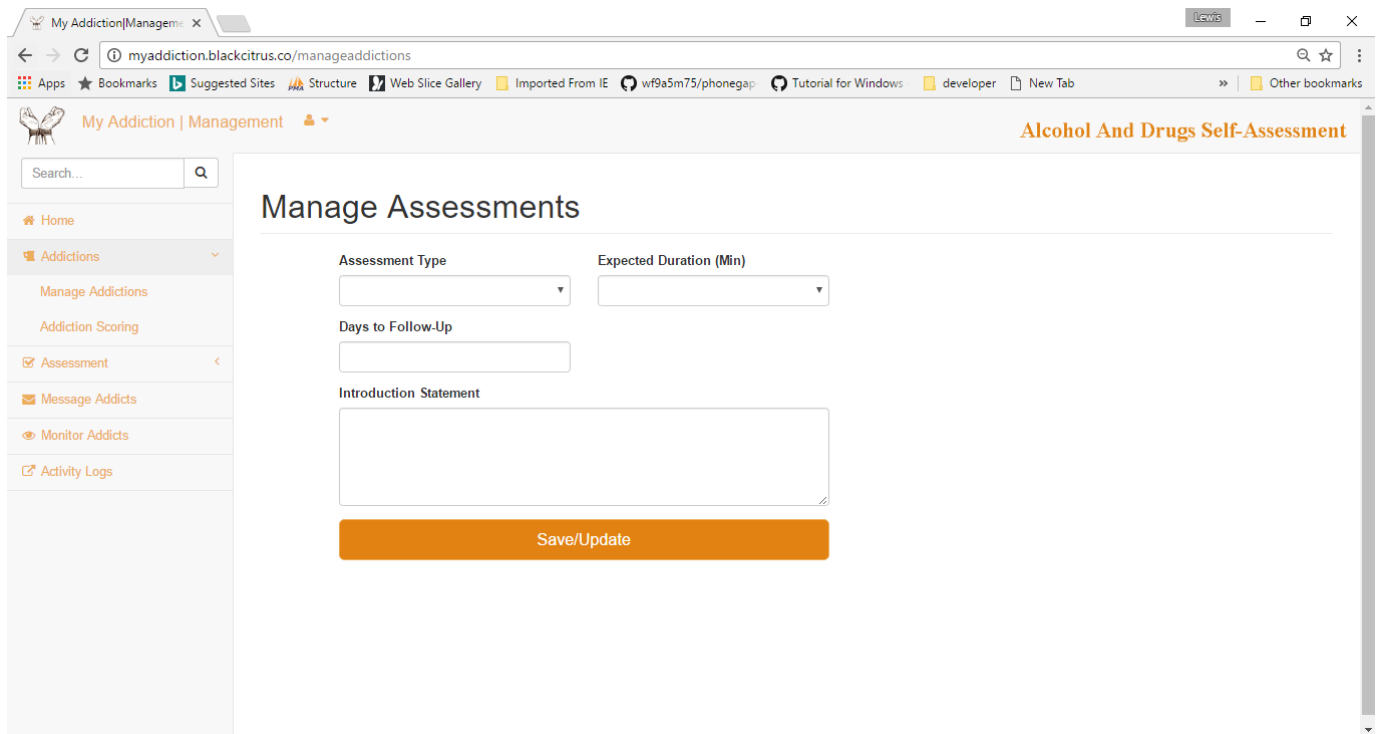


Figure 5.6: Website Manage Assessments Screenshot

After setting up the assessment the administrator can add questions and their answers as shown by Figure 5.7.

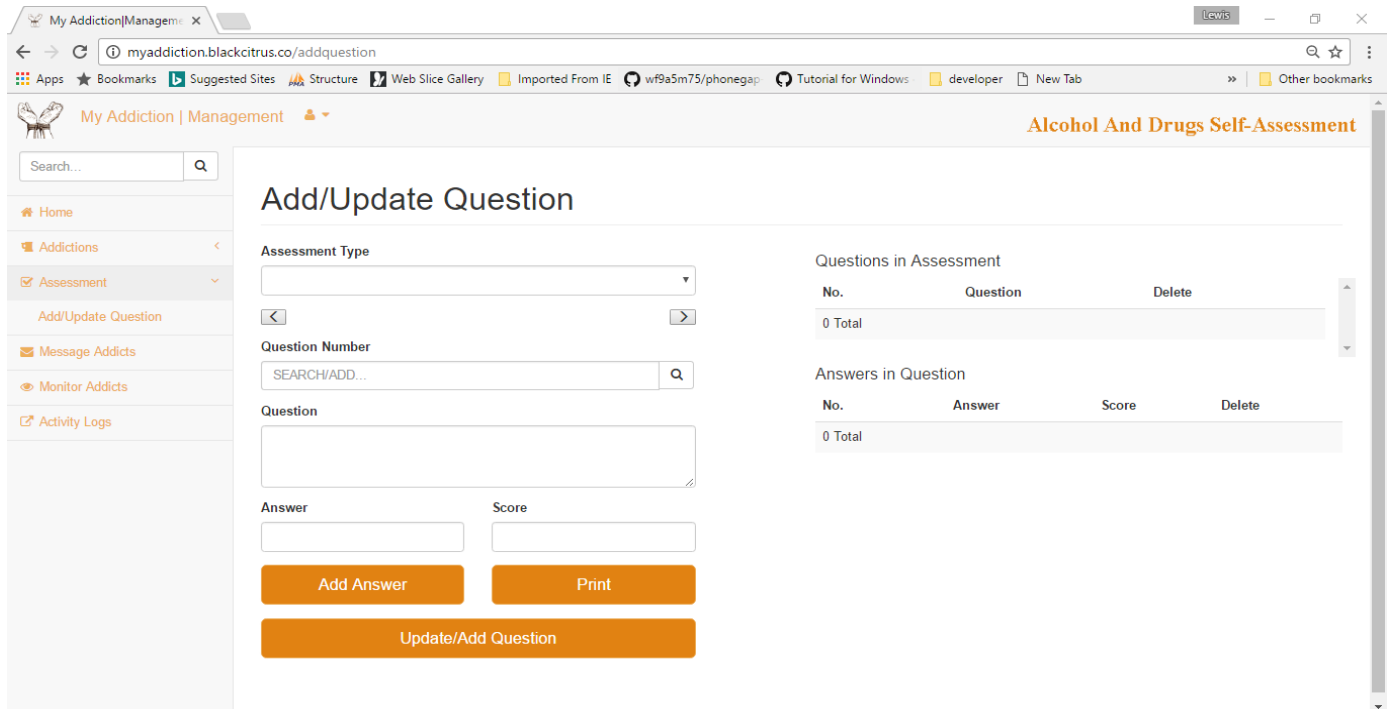


Figure 5.7: Website Manage Assessment Questions Screenshot

To help addicts manage their addictions the clinicians once logged in can view messages sent by addicts as shown by Figure 5.8 and decide to respond to them as shown by the module on Figure 5.9.

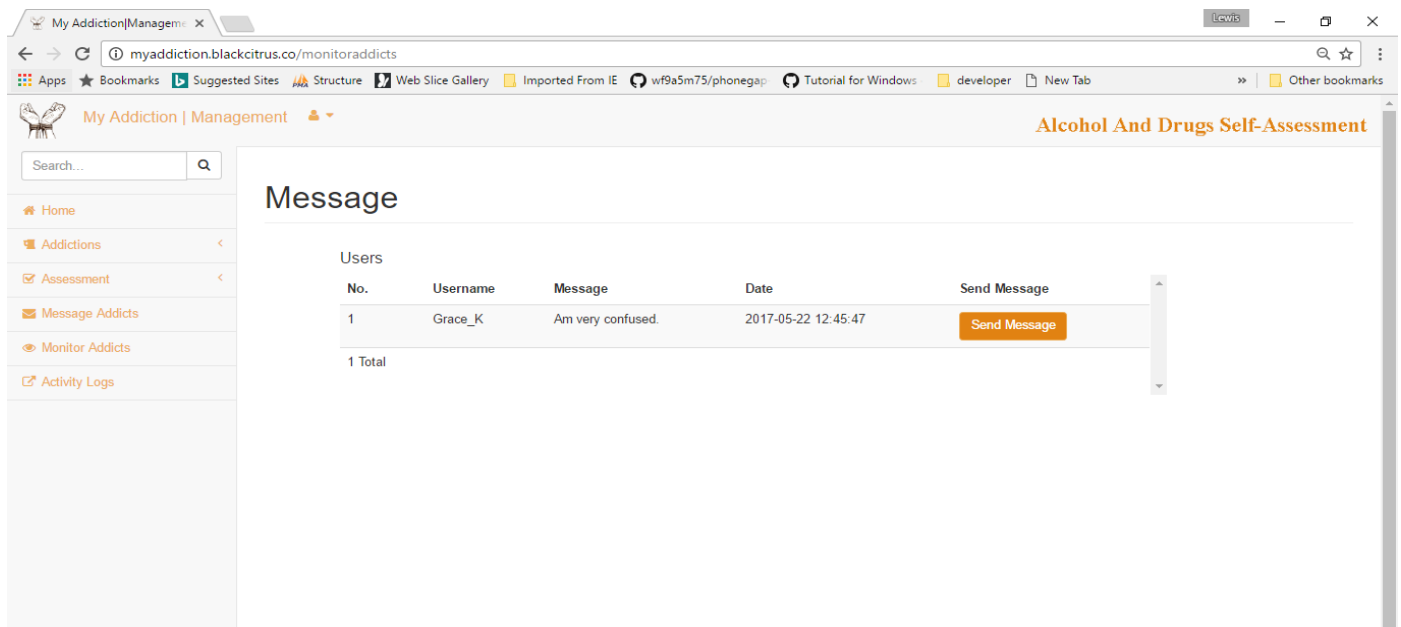


Figure 5.8: Website View All Messages Screenshot

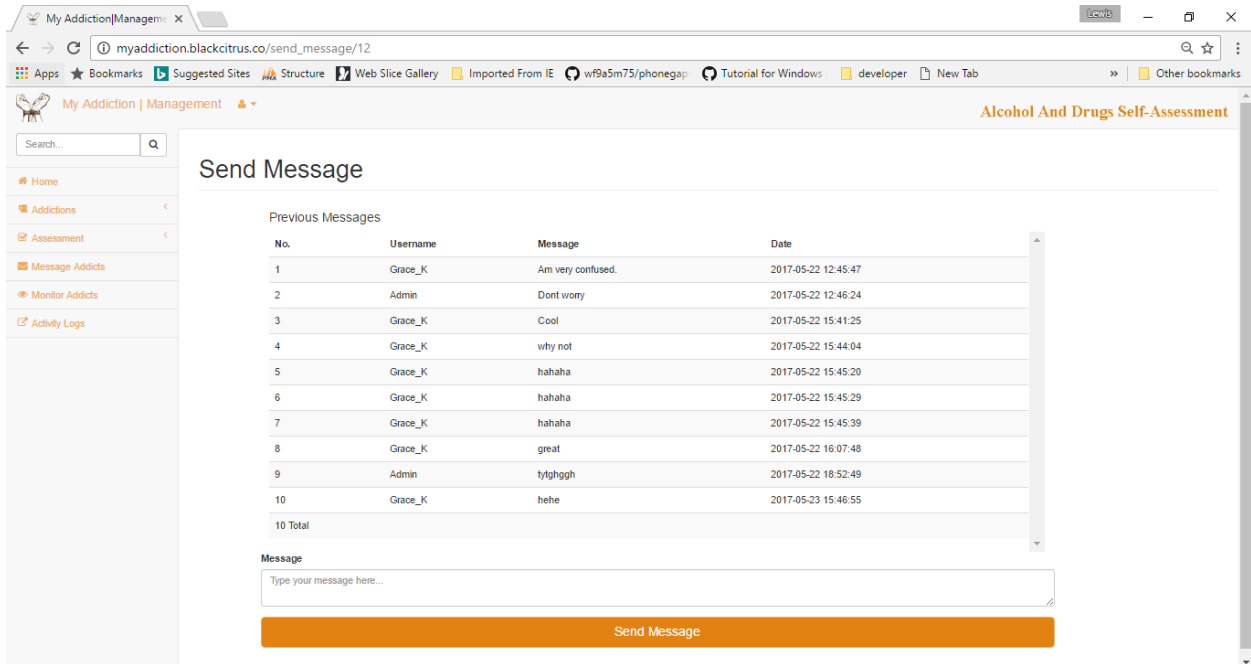


Figure 5.9: Website Sending Message Screenshot

Clinicians can be able to monitor addicts as shown by Figure 5.10.

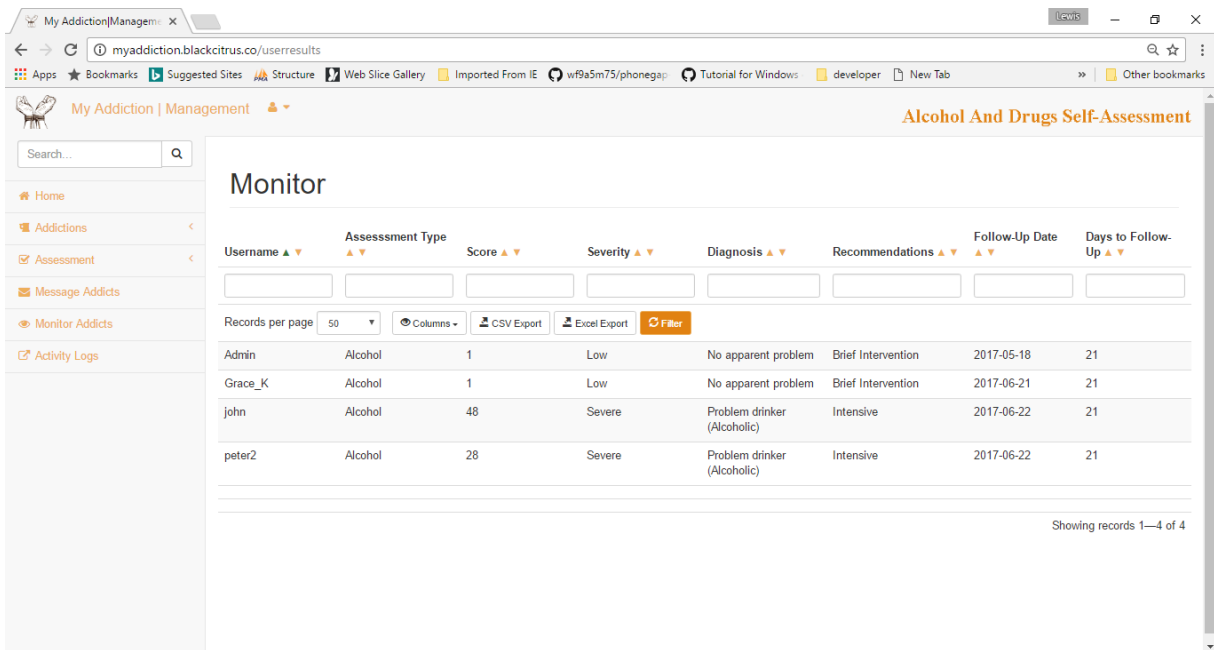


Figure 5.10: Website Monitoring Screenshot

### 5.3. System Testing

Verification and validation was done to check that the scheme met its specification and it fulfilled its intended purpose. The tests done were functional testing, usability testing, and compatibility testing.

#### 5.3.1 Functional Testing

Functional tests focused on the functional and non-functional components of the applications. Test cases were used to test the functionality of the applications for both the mobile application and the back end as shown by Table 5.1 and Table 5.2.

Table 5.1: Mobile Application Test Case

<b>Setup</b>	<ol style="list-style-type: none"><li>1. Upload the application to Google Play Store</li><li>2. Notify the respondents and provide them with the following instructions</li></ol>
<b>Instructions</b>	<ol style="list-style-type: none"><li>1. Search the Play Store for the application “MyFreedom” and install it</li><li>2. Select and start an assessment</li><li>3. Complete the assessment without skipping a question</li><li>4. View the partial results</li><li>5. Register</li><li>6. Login with the credentials</li><li>7. View the complete results</li><li>8. Take a follow-up assessment</li><li>9. View progress results</li><li>10. Logout</li></ol>
<b>Expected Results</b>	<ol style="list-style-type: none"><li>1. Application installation through the Google Play Store</li><li>2. Assessment done with no problems</li><li>3. All questions were answered else display an error message</li><li>4. Registration successful when all the details are provided</li></ol>

	<ol style="list-style-type: none"> <li>5. Accurate results representation</li> <li>6. Able to do a follow-up</li> <li>7. Accurate progress results representation</li> <li>8. Successful logout</li> </ol>
--	--

Table 5.2: Website Backend Application Test Case

<b>Instructions</b>	<ol style="list-style-type: none"> <li>1. Go to “MyFreedom” website</li> <li>2. Follow the registration link and register as either an administrator (Selected few) clinician or sponsor</li> <li>3. Login with details used to register</li> <li>4. If administrator, edit assessment details</li> <li>5. If clinician or sponsor, monitor addicts</li> <li>6. View reports and statistics</li> <li>7. Logout</li> </ol>
<b>Expected Results</b>	<ol style="list-style-type: none"> <li>1. Website able to open properly</li> <li>2. Able to register under the different user types</li> <li>3. Login successfully</li> <li>4. Administrator able to edit assessments details</li> <li>5. If clinician or sponsor, able to monitor addicts</li> <li>6. Reports and statistics viewed with no problems</li> <li>7. Logout successfully</li> </ol>

### 5.3.2 Usability Testing

After the development of the scheme usability testing was done to. The researcher identified 25 respondents and provided them with a survey to fill in data that could be used to analyse the usability of the application. The test was taken by 20 addicts and facilitated by the 5 clinicians and their feedback recorded. 96% of the respondents said that they would recommend the scheme to a friend while 4% would not as shown on Figure 5.11.

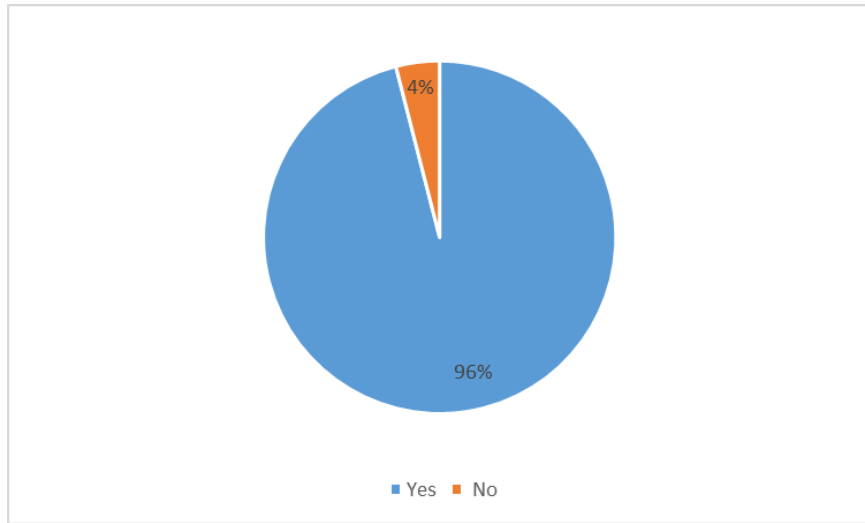


Figure 5.11: Recommend to Friend

The scheme was reviewed on a rating of 1 to 5 and 6 respondents gave it a 5, 15 gave it a 4, 3 gave it a 3, and 1 gave it a 1 as shown by Figure 5.12.

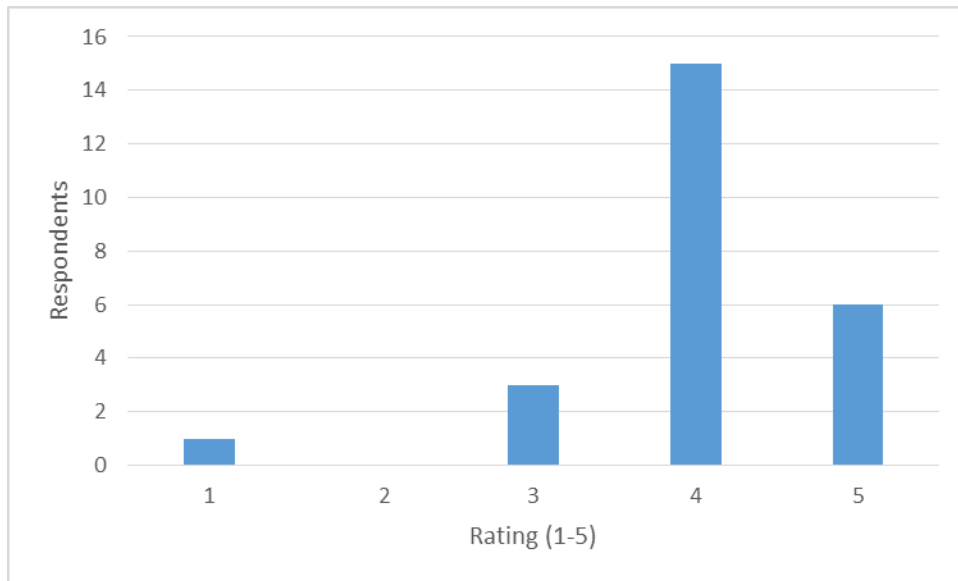


Figure 5.12: Application Review (1 - 5)

When asked how easy the scheme was to use on a scale of 1 to 5, 8 respondents gave it a 5, 16 gave it a 4, and 1 a 3 as illustrated by Figure 5.13.



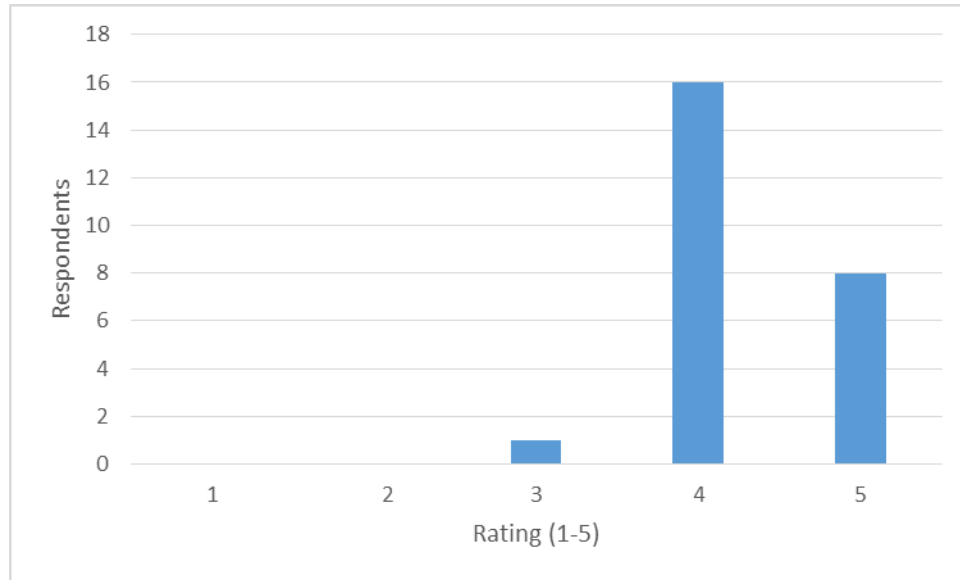


Figure 5.13: Application Ease of Use Rating (1 - 5)

### 5.3.3 Compatibility Testing

Compatibility testing was done to ensure the application could be used on different devices with running on different platforms. For the mobile application different devices were used with different Operating System version and different screen sizes while the back end was tested on different web browsers.

#### Android Testing

The mobile application targeted Android API 17 onwards. Table 5.3 shows the test done on different platforms.

Table 5.3: Test Done on Available Android Operating System Platform

Android Platform	Compatible
Android 10 – 2.3.3	NO
Android 11 – 3.0	NO
Android 12 – 3.1	NO
Android 13 – 3.2	NO
Android 14 – 3.0	NO
Android 15 – 4.0	NO
Android 16 – 4.0.3	NO

Android 17 – 4.1	YES
Android 18 – 4.2	YES
Android 19 – 4.3	YES
Android 20 – 4.4	YES
Android 21 – 4.4W	YES
Android 22 – 5.0	YES
Android 23 – 6.0	YES
Android 24 – 7.0	YES
Android 25 – 7.1.2	YES

Table 5.4 shows tests done on the different existing Android mobile phones screen sizes.

Table 5.4: Test on Android Mobile Phones Screen Sizes

Screen Size	Dimension	Compatible
Xlarge	960dp * 720dp	YES
Large	640dp * 480dp	YES
Normal	470dp * 320dp	YES
Small	426dp * 320dp	YES

### Web Browser Testing

Table 5.5 shows test done on different web browsers.

Table 5.5: Test Done on Web Browsers

Web Browser	Compatibility
Internet Explorer – Version 4 and above	Yes
Mozilla Firefox – Version 4 and above	Yes
Chrome – all versions	Yes

#### 5.4. System Evaluation and Validation

The evaluation and validation was done to ascertain whether the system was helpful in assessment and management of drugs and alcohol use. The clinicians administered the mobile based self-assessment along with their old method and the scores compared. The scores from the 20 respondents calculated through the scheme and through the manually administered approach showed that the scheme was a 100% accurate. Both methods gave the same scores for all the respondents as shown by Figure 5.14 hence validating the scheme.

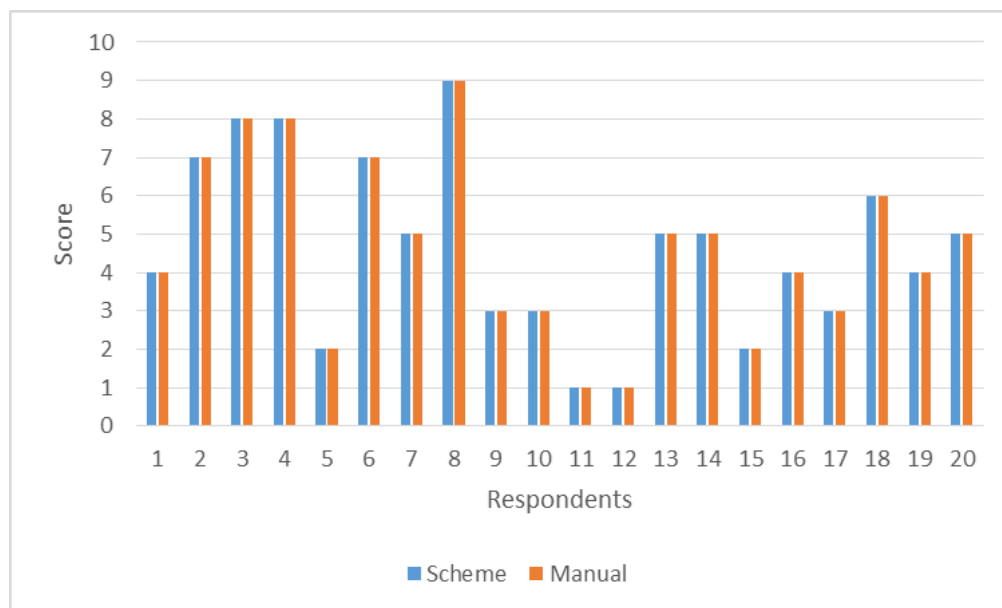


Figure 5.14: Comparison of the Self-Assessment Scheme and the Manually Administered Approach

Asked how helpful the scheme was, 4 said very helpful, 15 said helpful, 5 moderately helpful and 1 not helpful as seen on Figure 5.15.

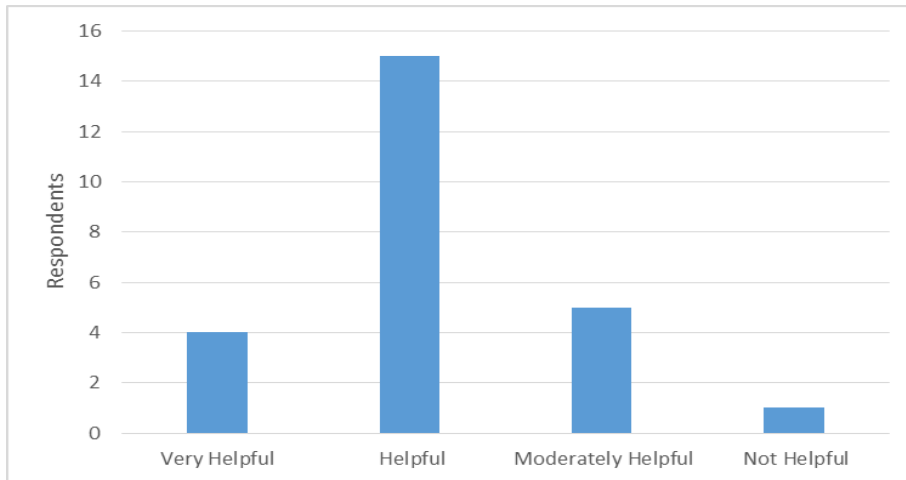


Figure 5.15: Feedback on the Schemes Helpfulness in Self-Assessment

## CHAPTER 6: DISCUSSION OF RESULTS

### 6.1. Introduction

The research aimed at developing a mobile-based drugs and alcohol assessment and management scheme. To develop the scheme a deeper understanding was needed which was achieved through data collection and analysis. With the help of that data the scheme was designed, implemented and the solution tested. This chapter will discuss all the findings in this dissertation and analyse the findings in relation to the research objectives.

### 6.2. Results from Requirements Elicitation

Initial requirements were collected to identify the need of the solution. The analysis from the respondents showed more men and women were institutionalised as shown on Figure 4.1. This was understandable as more men than women take either drugs or alcohol. The age group of between 18 and 24 had more individuals who were addicted closely being followed by the 13 and 17 age group as illustrated by Figure 4.2. This is because that is the experimental stage and peer pressure is common. The most commonly abused substance was alcohol as shown by Figure 4.3 and so more emphasis needed to be placed on alcohol addictions.

### 6.3. Symptoms of Drugs and Alcohol Addiction

Drugs and alcoholic addition symptoms vary from one addict to the other. Moreover, they manifest themselves in stages as pointed by (Taughinbaugh, 2013; Berge, 2016). From the data collected, it was found out that most of the addicts are not aware of their addiction status. This was in agreement with a study conducted by NDSUH (2008) and the findings indicated in **Error! eference source not found.** The addicts therefore did not seek any intervention in time. Furthermore, the stage at which an addiction begins to show was, the symptoms could easily be mistaken for a hobby (DiPirro, 2013). To distinguish between a hobby and an addiction, and enable an addict get awareness of their addiction, it was pointed out by Berge (2016) that an assessment was required.

Most addicts got to determine that their addiction needed more attention after being arrested or warned by the police or the law either for misconduct or driving under the influence. The next that followed was through family and friends or hitting rock bottom as displayed by Figure 4.4. However, they were all grateful that they realised in time.

The next objective was to look at different assessment approaches in a bid to get the best approach to act a guide and provide data in developing a self-assessment algorithm.

#### **6.4. Drugs and Alcohol Addiction Assessment Tools**

Drugs and alcohol assessment tools have different properties that differentiate them from one another. This properties include time taken for training, assessment areas, time taken to administer, and their reliability. Only one assessment tool allowed self-administration, that is the Addiction Severity Index Multimedia Version (ASI-MV), (ASI-MV, 2014). However, it is web based and it requires subscription. An important aspect noted about the ASI-MV was that it made use of video recordings of people taking a person through the assessment. The chief developer of the original ASI, McLellan (2007), compared two individuals to show how important a good assessment is. One individual was a lady with minor psychological issues, the other a physician very psychologically addicted to opiates. An assessment that would solely focus on addiction will stop there by concluding that the physician is the one who faces a greater challenge to recovery. However, looking at their background would show a significant difference between the two. The physician is employed, has a family to support him, generally a good background. On the other hand, looking at the young lady, the only support she has are her fellow drug addicts, she is not employed and she has never kept a job for long. With a deeper assessment it is possible to detect all this and recommend help were a problem exists.

From interviews and documentary analysis it was discovered that the most common assessment tool was the ASI at 44%, followed by the CIDI 27%, then the DAST at 19% and lastly the MAST at 10% as shown by Figure 4.6. The ASI and CIDI are among the best but they have one huge disadvantage discovered in the literature; they have a lot of follow up questions that require a trained profession to administer. For this reason the research opted for DAST and MAST.

#### **6.5. Drugs and Alcohol Addiction Self-Assessment and Management Scheme**

Based on these findings a mobile based drugs and alcohol self-assessment and management scheme was developed. It had a mobile application that enabled addicts and drugs and alcohol users take an assessment and manage their addictions and a backend to manage the assessment and assist users and addicts in managing their assessment while viewing reports and statistics. Android based mobile phones were targeted as they had the most users as shown by Figure 4.7.

## **6.6. Testing Results**

After the development of the scheme testing was done to determine the usability and functionality of the scheme. The researcher created functionality test cases and identified 25 respondents and provided them with a survey to fill in data that could be used to analyse the usability of the application. The test was taken by 20 addicts and facilitated by 5 clinicians and their feedback recorded. Asked how helpful the scheme was, 4 said very helpful, 15 said helpful, 5 moderately helpful and 1 not helpful as seen on Figure 6.8. 96% of the respondents said that they would recommend the scheme to a friend while 4% would not as shown on Figure 5.15. The scores from the 20 respondents calculated through the scheme and through the manually administered approach showed that the scheme was a 100% accurate. Both methods gave the same scores for all the respondents as shown by Figure 5.14 hence validating the scheme.

## **CHAPTER 7: CONCLUSIONS, RECOMMENDATIONS AND FUTURE WORK**

### **7.1. Introduction**

The research developed a mobile-based drugs and alcohol self-assessment and management scheme. This chapter will look at the conclusion, recommendations and future work that the researcher identified during the research.

### **7.2. Conclusions**

Literature was reviewed on how an addiction develops and how it can be cured and the first step towards healing was determined to be taking an assessment. From the research, it was identified that most of the addicts who participated in the survey came to realise about their addictions through the police a few through friends and family and some when they hit rock bottom. Only a few realised it on their own. Through documentary analysis it was discovered that symptoms appear in stages. At the stage which the addiction starts developing, the symptoms resemble those of having a hobby hence becoming difficult to identify. The different assessment tools currently in use were reviewed to help identify one that could be used in the development of the scheme. Existing applications similar to the proposed solution were analysed to identify their strength and weakness. The researcher decided to use both MAST and DAST as the assessment tools and development done on an Android phone and a web application for the backend. The scheme would enable anyone with an Android mobile phone do an assessment helping them realise before it is too late and take precautions.

### **7.3. Recommendations**

The study showed that most drugs and alcohol related deaths could have been avoided if treatment was done early. The first form of treatment as identified by the study was an assessment. An addiction is a disease that affects the user psychologically having the same effects as hunger or thirst as seen from the research. The research saw the best way to avoid an addiction is never to try drugs or alcohol but if one has already started using them it is good to take an assessment to avoid the addiction from spreading. As the research showed, most addicts and ex-addicts would have liked to know of their addictions early in advance.



The research recommends the application to be used by anybody taking drugs and alcohol and not just people who are abusing them. This is because one can never know if they are addicted or how close they are to getting addicted.

#### **7.4. Future Work**

The application only created awareness but never provided a means of interacting with a physician. The research also identified other types of addictions that people are having other than drug related addictions. These are addictions like gambling, sex, that consist of behavioural addictions that also cause psychological dependency. The research also noted that most addicts never knew where to get help. The respondents identified the best help was through support groups or counselling. Further studies could focus on providing a back end where results can be sent to clinicians who can then provide help and monitor addicts. The studies could also focus on behavioural addictions, and on directing addicts on where to get help. Lastly the application could be extended to other platforms like Windows and IOS to cover more people.

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## APPENDICES

### Appendix A: Envisioning Survey

Dear Respondent,

I am a Masters student in the Faculty of Information Technology, Strathmore University conducting a research entitled, A Mobile-Based Drugs and Alcohol Addiction Self-Assessment and Management Scheme.

You have been selected to form part of this study. I kindly request you to complete the questionnaire below. The information requested is needed for academic purposes only and will be treated in strict confidence.

Kind Regards,

Lewis M. Mwangi.

\* Required Fields

#### **SECTION A: BACKGROUND INFORMATION**

1. What is your gender? \* Mark only one oval.

- Male  
 Female

2. What is your age group? \* Mark only one oval.

- 13-17  
 18-24  
 25-34  
 35-54  
 55+

3. What is your relationship status? \*  
Mark only one oval.

- Married
- Single
- Dating

4. What is your occupation? \* Mark only one oval.

- Employed
- Student
- None

**SECTION B: ADDICTION INFORMATION**

5. What is your type of addiction? \* Mark only one oval.

- Process/Behavioural
- Substance and drug addiction

6. If process/behavioural, what addiction is it? Mark only one oval.

- Internet
- Eating
- Work
- Video games
- Gambling
- Sex
- ..... Other:

7. If substance and drug addiction, what addiction is it?  
Mark only one oval.

- Alcohol
  - Tobacco/Cigarette
  - Marijuana/Weed/Bhang/Hashish/Joints/Blunts
  - Khat/Miraa
  - Prescription drugs
  - Cocaine
  - .....
- Other:

8. How did the addiction start? \* Check all that apply.

- As an hobby
  - Due to stress
  - Peer pressure
  - Family traditions e.g. family drink a lot
  - .....
- Other:

**SECTION C: ADDICTION SYMPTOMS DETECTION**

9. How did you know you are an addict? \* Check all that apply.

- Self-realisation
- Friends and families
- Guidance and counselling
- Hitting rock bottom
- Police/Law enforcement
- Other:

10 What was your lowest point/biggest side effect from the addiction? \* Check all that apply.

- Fired from work
- Marital and relationship issues
- Admitted to the hospital
- Extreme dependency
- ..... Other:

**SECTION D: ADDICTION SELF-ASSESSMENT APPLICATION INFORMATION**

11. Do you own a smartphone? If yes select your platform. Mark only one oval.

- Android
- IOS
- Symbian
- Blackberry
- Windows

12. Would you have liked to know earlier of your addiction before it became serious? \*  
Mark only one oval.

- Yes
- No

13. In what ways do you think people could have helped you in advance? \* Check all that apply.

- Paying attention to you
- Calling the cops on you/ forcing you out of the addiction
- Controlling your money or/and time spent on the addiction
- Taking you to guidance and counselling
- ..... Other:

14. Do you think that a mobile application that helped you measure your level of addiction could have helped? \* Mark only one oval.

- Yes
- No



15 If yes, what features would like in the application? (You can select all and add others)

Check all that apply.

- Addiction test
- Addiction score and the level of your addiction
- Records of your progress and history
- Specific advice based on gender, age and occupation
- Treatment tips and tricks
- ..... Other:

**SECTION E: ADDICTION TREATMENT INFORMATION**

16. Would you have liked to know where to seek treatment? \* Mark only one oval.

- Yes
- No

17. Have you ever gone for treatment? Tick where you have been for treatment. \*  
Check all that apply.

- Psychiatrist
- Rehab
- Support group
- ..... Other:

18. If yes, how much did they help you? (rate them on a scale of 1 to 5) Mark only one oval.

	1	2	3	4	5	
Not much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very much

## Appendix B: Database Schema

Table B.3: Activity Logs Table

COLUMN NAME	DATA TYPE	INDEX
id	int(10) unsigned	Primary Key
user_id	int(11)	
text	varchar(255)	
ip_address	varchar(64)	
created_at	timestamp	
updated_at	timestamp	

Table B.2: Assessment Details Table

COLUMN NAME	DATA TYPE	INDEX
id	int(11)	Primary key
pr_id	int(11)	Foreign key
asstyp_id	int(11)	Foreign key
assdtls_start_time	timestamp	
assdtls_finish_time	timestamp	
assdtls_followup_date	date	
assdtls_score	int(11)	
created_at	timestamp	
updated_at	timestamp	

Table B.3: Person Table

COLUMN NAME	DATA TYPE	INDEX
id	int(11)	Primary key
pr_username	varchar(45)	
pr_fname	varchar(45)	
pr_sname	varchar(45)	
pr_gender	varchar(45)	
pr_email	varchar(255)	
pr_tel	varchar(45)	
pr_dob	date	
pr_latitude	varchar(255)	
pr_longitude	varchar(255)	
created_at	timestamp	
updated_at	timestamp	

Table B.4: Questions Answers Table

<b>COLUMN NAME</b>	<b>DATA TYPE</b>	<b>INDEX</b>
id	int(11)	Primary key
assque_id	int(11)	Foreign key
assdtls_id	int(11)	Foreign key
qans_answer	varchar(50)	
qans_score	int(11)	
qans_additional_operation	varchar(10)	
qans_additional_operation_value	int(11)	
created_at	timestamp	
updated_at	timestamp	

Table B.5: User Type Table

<b>COLUMN NAME</b>	<b>DATA TYPE</b>	<b>INDEX</b>
id	int(11)	Primary key
urt_name	varchar(45)	
urt_description	varchar(45)	
created_at	timestamp	
updated_at	timestamp	

Table B.6: Users Table

<b>COLUMN NAME</b>	<b>DATA TYPE</b>	<b>INDEX</b>
id	int(11)	Primary key
pr_id	int(11)	Foreign key
urt_id	int(11)	Foreign key
usr_active	int(11)	
password	varchar(255)	
created_at	timestamp	
updated_at	timestamp	

Table B.7: Person Table

<b>COLUMN NAME</b>	<b>DATA TYPE</b>	<b>INDEX</b>
userid	int(11)	
username	varchar(45)	
urtid	int(11)	
urt_name	varchar(45)	
urt_description	varchar(45)	
usr_active	int(11)	

pr_fname	varchar(45)	
pr_sname	varchar(45)	
pr_gender	varchar(45)	
pr_email	varchar(255)	
pr_tel	varchar(45)	
pr_dob	date	
pr_latitude	varchar(255)	
pr_longitude	varchar(255)	
password	varchar(255)	

Appendix C: Wireframes



Figure C.1: Welcome Wireframe

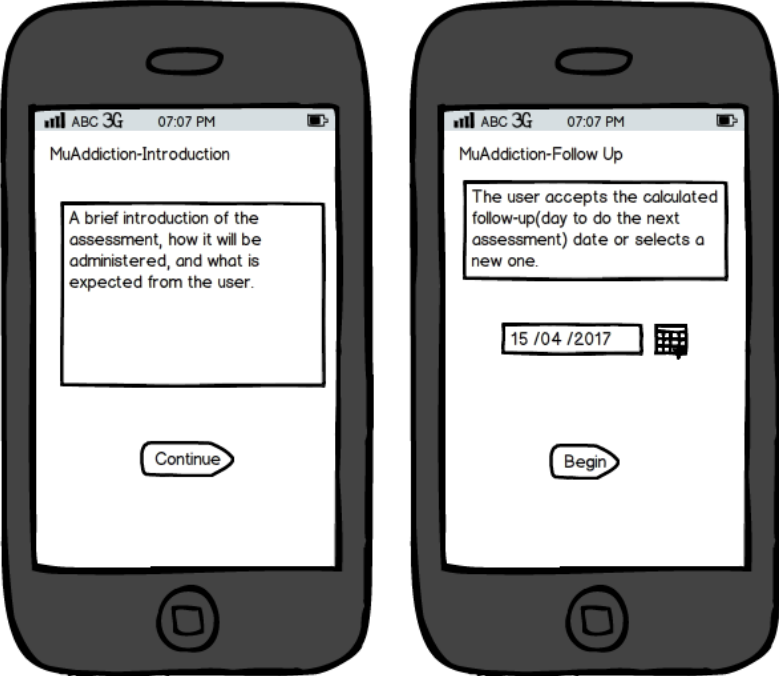


Figure C.2: Introduction and Follow-Up Wireframes

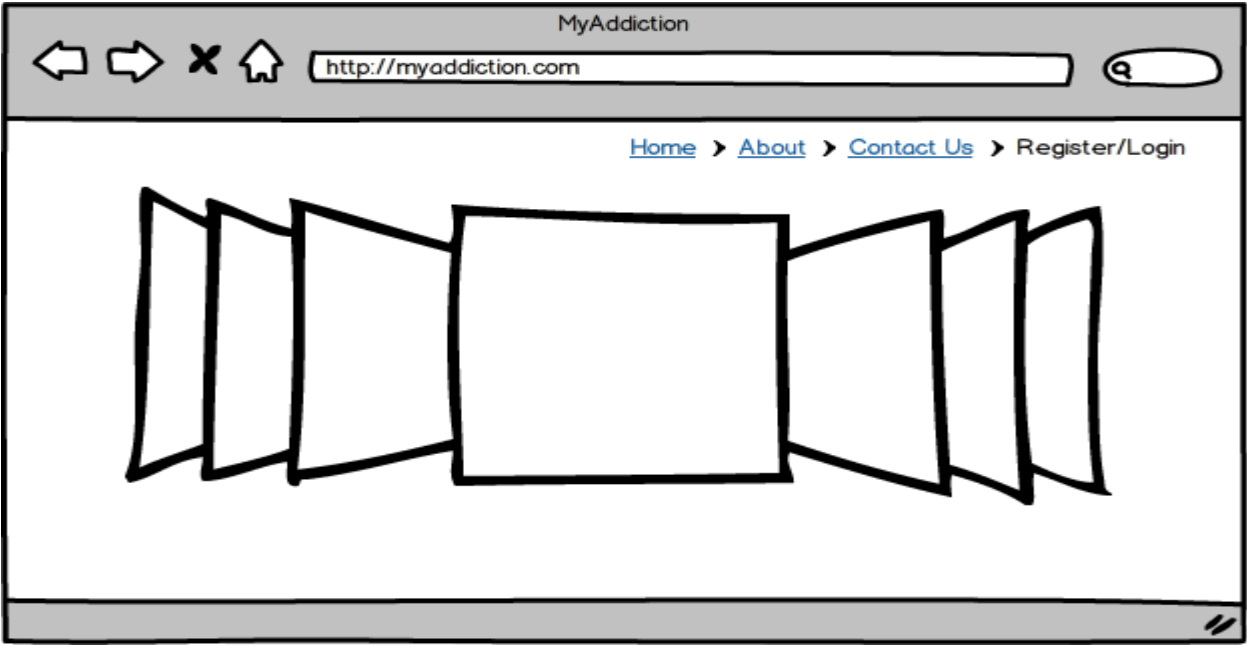


Figure C.3: Website Home Page Wireframe

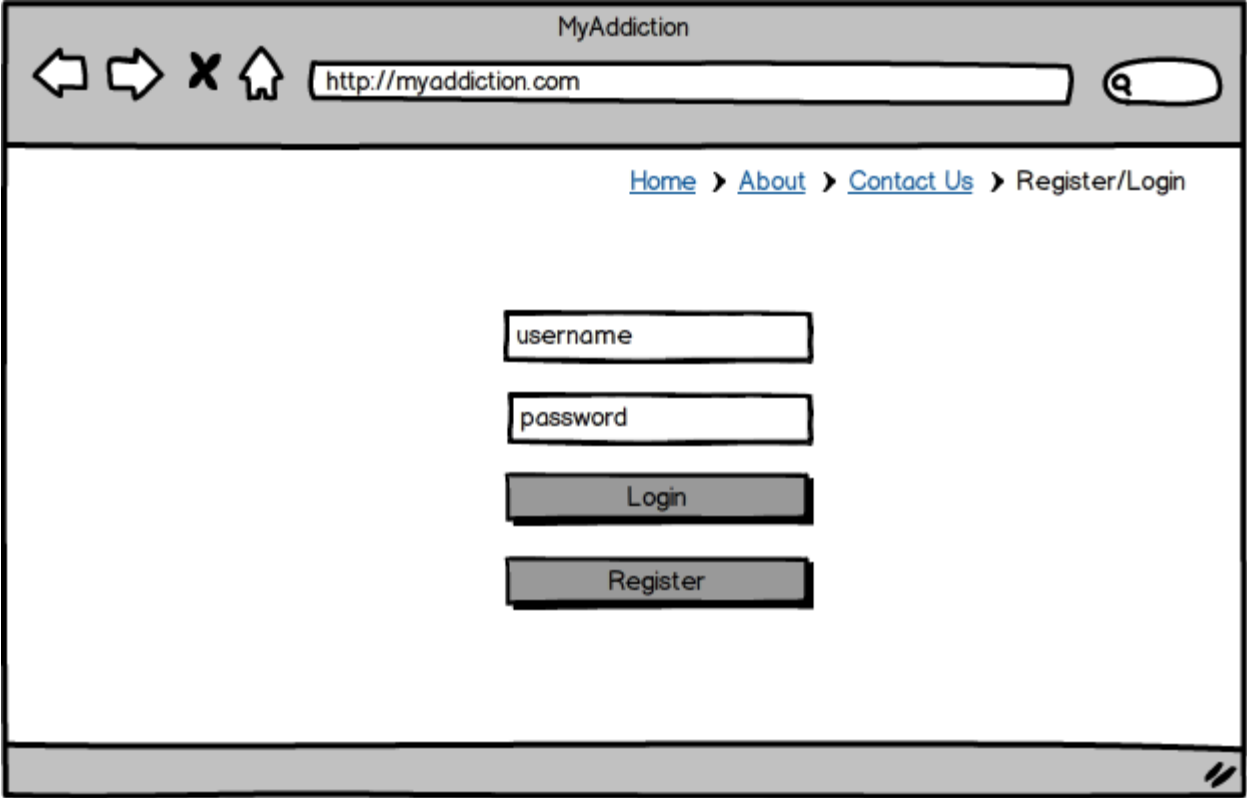


Figure C.4: Website Backend Login Wireframe

## Appendix D: Screenshots

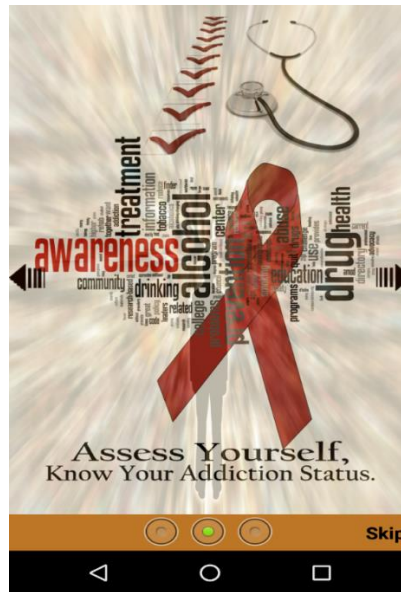


Figure D.1: Splash Screen Screenshot

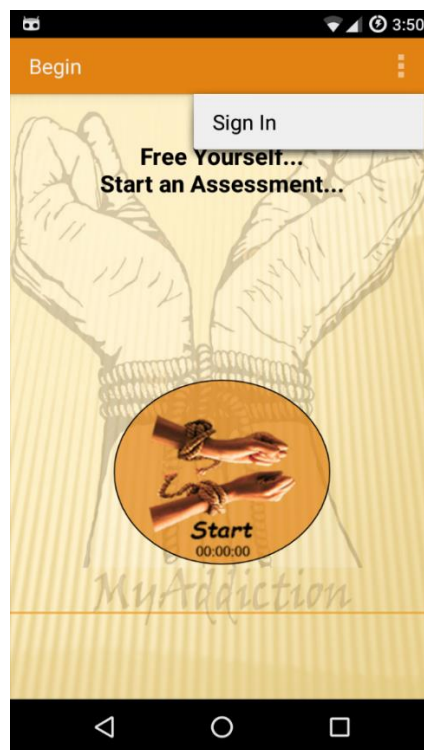


Figure D.2: Welcome Screen Screenshot



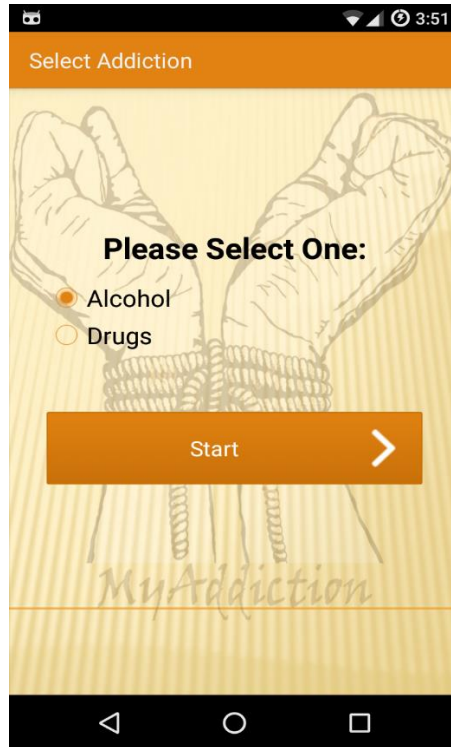


Figure D.3: Selecting an Addiction Screenshot

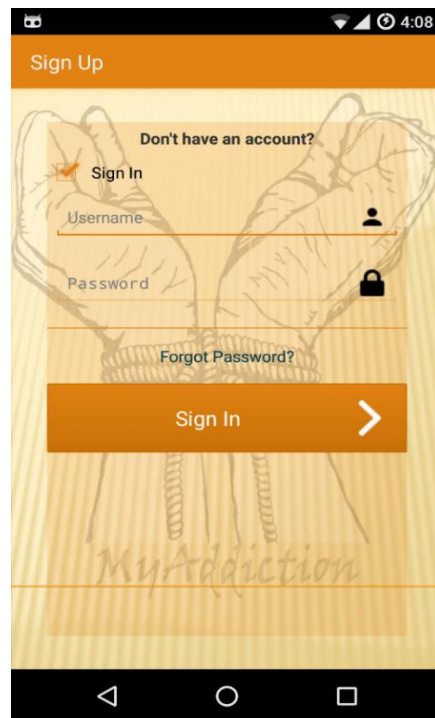


Figure D.4: Sign-In Screenshot

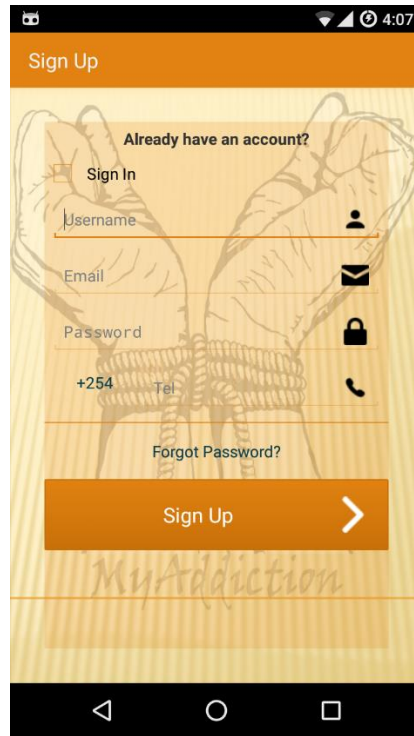


Figure D.5: Sign-Up Screenshot

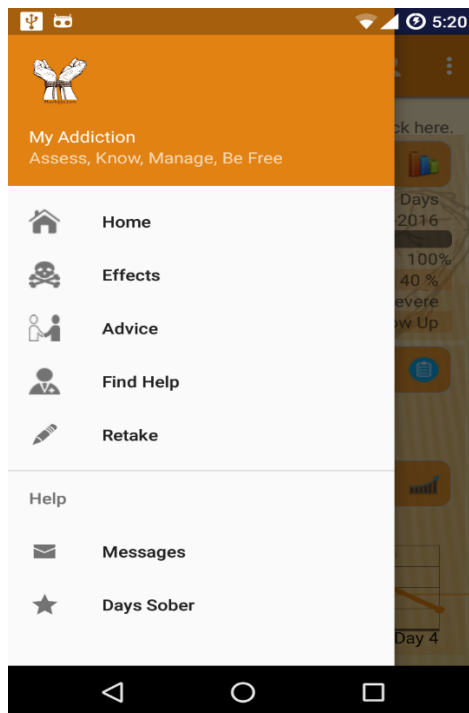


Figure D.6: Home Functionalities Screenshot



Figure D.7: Finding Help Screenshot

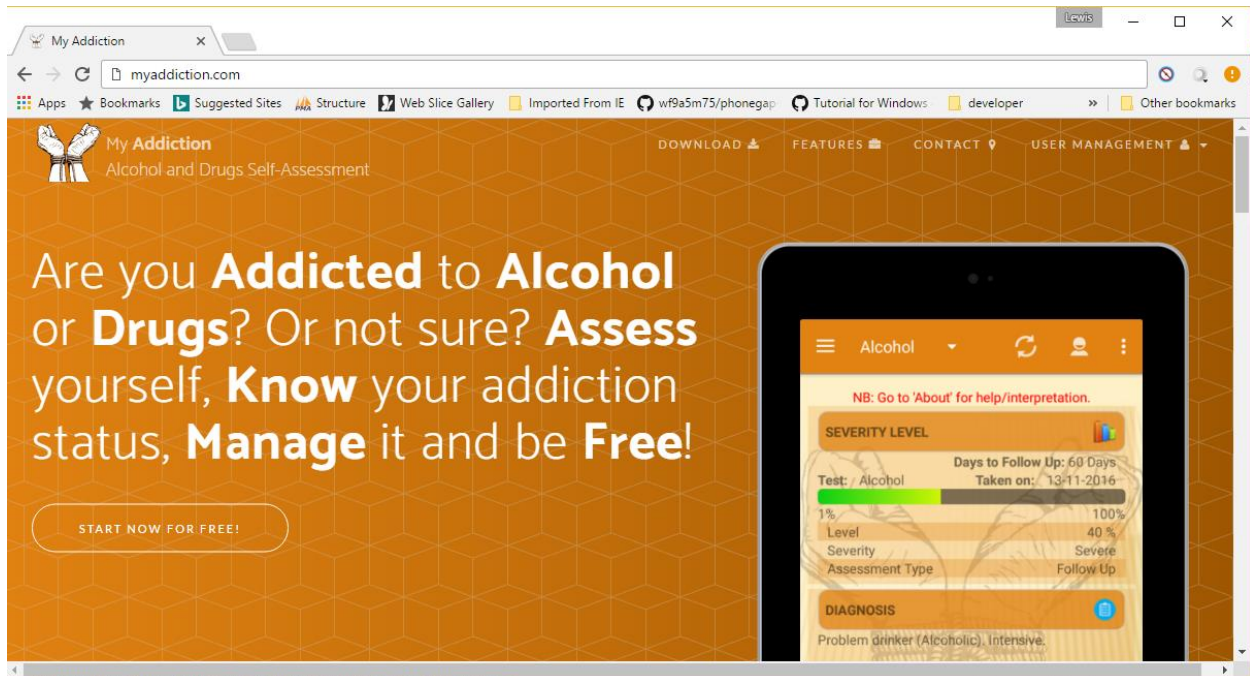


Figure D.8: Website Landing Page Screenshot

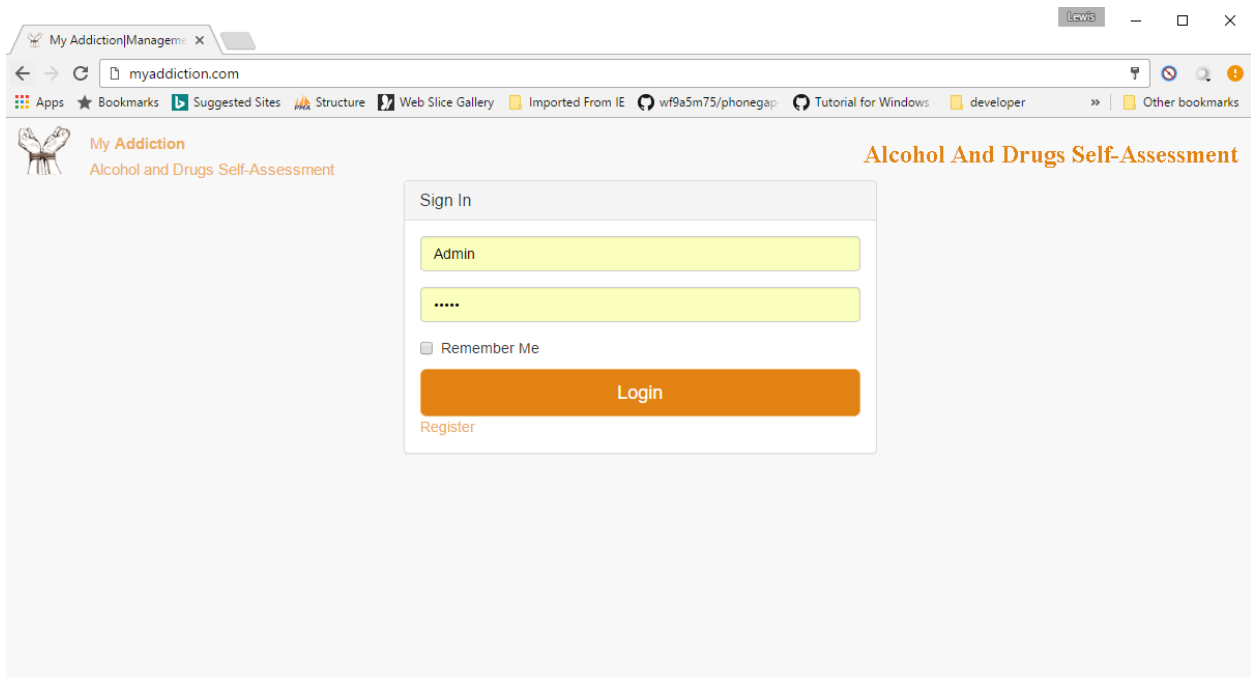


Figure D.9: Website Login Screenshot

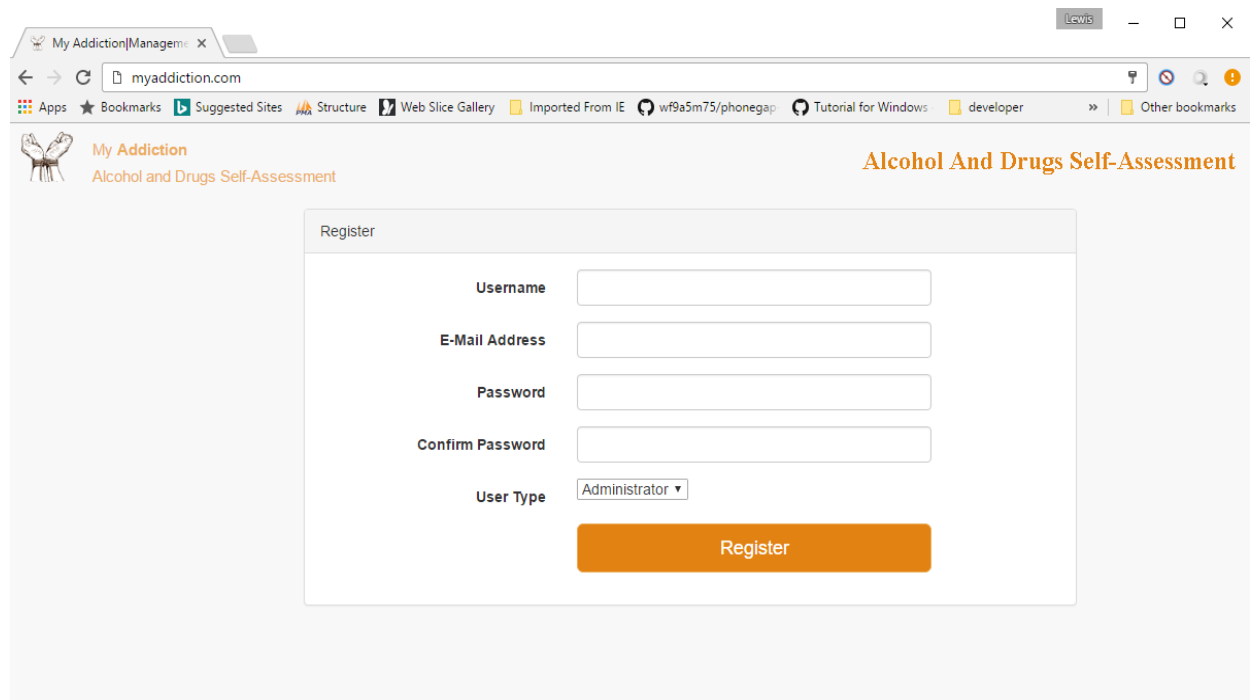


Figure D.10: Website Register Screenshot

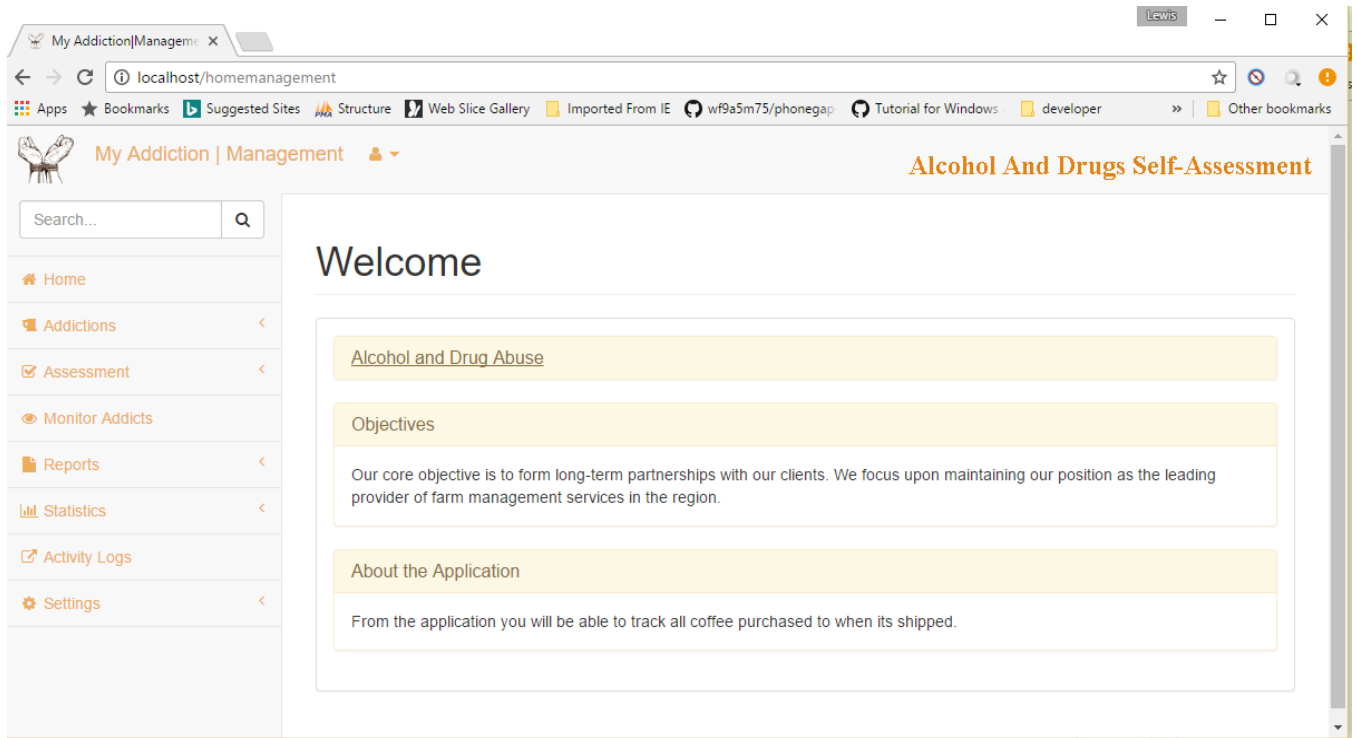


Figure D.11: Website Backend Home Screenshot

## Appendix E: Feedback Survey

Dear Respondent,

I am a Masters student in the Faculty of Information Technology, Strathmore University conducting a research entitled, A Mobile-Based Drugs and Alcohol Addiction Self-Assessment and Management Scheme.

You have been selected to form part of this study because you have downloaded and installed "MyFreedom". I kindly request you to complete the feedback questionnaire below to help us improve your experience in using the application. The information provided will be treated in strict confidence.

Kind Regards,

Lewis M. Mwangi.

### **SECTION A: BACKGROUND INFORMATION**

1. What is your gender? \* Mark only one oval.

- Male  
 Female

2. What is your age group? \* Mark only one oval.

- 13-17  
 18-24  
 25-34  
 35-54  
 55+

**SECTION B: FEEDBACK INFORMATION**

3. How helpful is MyFreedom in drugs and alcohol assessment? Mark only one oval.

- Very Helpful
- Helpful
- Moderately Helpful
- Not Helpful

4. Would you recommend MyFreedom to a friend? Mark only one oval.

- Yes
- No

5. If you were to review MyFreedom what score would you give it out of 5? Mark only one oval.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. What do you find most frustrating about MyFreedom?

.....

7. Overall, how easy to use do you find MyFreedom? Mark only one oval.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. How can we improve MyFreedom? Send us your ideas and suggestions.

.....

.....

.....

.....

.....

# Appendix F: Turnitin Report

Figure F.1 shows the originality report from the Turnitin online application.

The screenshot displays the Turnitin interface. The top navigation bar includes the URL, 'feedback studio' logo, the user name 'Lewis Mutua', and the document title 'MTI Dissertation'. The main content area shows the title of the dissertation, the author's name and ID, and the institution details. A match overview panel on the right shows a total match rate of 21% and a list of 10 sources with their respective match percentages.

Source	Match Percentage
1 Submitted to EDMC Student Paper	2%
2 www.nida.nih.gov Internet Source	2%
3 Submitted to Strathmor... Student Paper	1%
4 Submitted to Grand Can... Student Paper	1%
5 www.arcr.niaaa.nih.gov Internet Source	1%
6 www.ncbi.nlm.nih.gov Internet Source	1%
7 ndarc.med.unsw.edu.au Internet Source	1%
8 Submitted to Colorado ... Student Paper	<1%
9 www.freedomfrommed... Internet Source	<1%
10 www.c4tbh.org	<1%

Figure F.1: Turnitin Report