

**Prevalence of Depression and Impact of Associated Risk Factors among  
University Students in Bangladesh**

By

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A thesis submitted to the School of Pharmacy in partial fulfillment of the requirements for  
the degree of  
Bachelor of Pharmacy (Hons)

School of Pharmacy  
Brac University  
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## **Declaration**

It is hereby declared that

1. The thesis submitted is my own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I/We have acknowledged all main sources of help.

**Student's Full Name & Signature:**

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## Approval

The thesis titled “Prevalence of Depression and Impact of Associated Risk Factors among University Students in Bangladesh” submitted by Umaira Abdul Khaleque (20146052), of Spring 2020, has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy on May 2, 2024.

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## **Ethics Statement**

All of the responders in this survey were given background information regarding the objectives of the study. Before the participants were allowed to fill out their responses, they were required to sign a consent form. Additionally, it was brought to their attention that none of their private information will be made public without first obtaining their permission.

## **Abstract**

Depression is a prevalent and significant medical condition that has a profound impact on our emotions, thoughts, and behaviors. It is a prominent global illness, classified as one of the top four major disorders and a leading cause of disability. The high incidence of depression among adults is a notable concern that adversely affects their daily activities. The diminished motivation and decreased proficiency in everyday tasks are often ascribed to both environmental and human influences. This study is conducted on the student population of Bangladesh, aiming to evaluate and determine the prevalence of depression. The data can be used to investigate various parameters such as socioeconomic circumstances, academic performance, familial challenge, chronic ailments, that might be influencing the incidence of depression. The results had shown the prevalence of 49.1% depression was seen among the students and various risk factors were seen to have a significant impact leading to depressive disorder.

**Keywords:** Depression; PHQ-9; Prevalence; Major depressive disorder; Students

## **Dedication**

*Dedicated to my parents and my mentor Professor Dr. Eva Rahman Kabir for their  
unwavering support and encouragement*

## **Acknowledgement**

First and foremost, I express my deepest gratitude to the Most Merciful Allah for granting me resilience throughout my life and helping me where I am today. I would extend my endless gratitude and sincere appreciation to my esteemed supervisor and Dean Professor Dr. Eva Rahman Kabir, for whom I am able to achieve this successful work. Her invaluable guidance and constant nurture have played a pivotal role throughout my pharmacy life and through my final year. I could not be thankful enough to get the opportunity to complete my thesis under her unwavering guidance. I am also grateful to my friends, who were there with me at each step of my undergraduate journey. Lastly, I extend my heartfelt gratitude to my parents who encouraged me to come this far in life. Without their support, I would not have the courage to pursue pharmacy as major. I shall forever be thankful to them and my Lord for their guidance.

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## **List of Acronyms**

5-HT: 5- Hydroxytryptamine

ADHD: Attention Deficit Hyperactivity Disorder

AIS-8: Athens Insomnia Scale-8

APA: American Psychological Association

BD-I: Bipolar I disorder

BD-II: Bipolar II disorder

BMI: Body Mass Index

CNS: Central Nervous System

GAD-7: Generalized Anxiety Disorder -7

MAO: Monoamine Oxidase

MDD: Major Depressive Disorder

PTSD: Post-Traumatic Stress Disorder

PHQ-9: Patient Health Questionnaire-9

SERT: Serotonin Reuptake Transporter

SPSS: Statistical Package for the Social Sciences

SSRI: Selective serotonin reuptake inhibitors

WHO: World Health Organization

# Chapter 1

## Introduction

According to the World Health Organization (WHO), mental health is a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn and work well, and contribute to their community (WHO, 2022). Mental health is a basic human right, crucial to personal, community, and socio-economic development. Yet mental health problems are the first cause of disability and a major public health issue worldwide due to disease progression, difficulties in therapeutic management, and increasing prevalence (Ramón-Arbués et al., 2020). Due to the rapid upsurge in disabilities related to mental health, it has become a concerning disease that needs to be researched in depth.

Mental health disorders involve a range of mental disorders, psychosocial disabilities, and other mental states that can cause substantial anxiety, impair functioning, or pose a risk of self-harm (Department of Health & Human Services, n.d.). In 2019, 1 in every 8 people, or 970 million people around the world, were living with a mental disorder, with anxiety and depressive disorders being the most common (WHO, 2022). In 2020, the number of people living with anxiety and depressive disorders rose significantly because of the COVID-19 pandemic. Anxiety and severe depressive disorders are suspected to have increased by 26% and 28% in the past year, respectively (WHO, 2022). According to various psychological studies conducted in both developed and developing nations, it was found that depression, stress and anxiety is more prevalent in students than general population (Mofatteh, 2021). University students are a distinct social group going through a critical stage in their journey to adulthood that may be extremely difficult and distressing (Alhemedi et al., 2023). College students go through many psychological changes, including learning to handle and endure the social and academic pressures that come with getting ready for professional life. The high academic standards have created an unhealthy atmosphere, making them more vulnerable to developing

mental health diseases. Various research suggests that this type of stress can lead to the development of depression (Alhemedi et al., 2023). Factors such as societal pressure, stress related to exams, and economic challenges contribute to the prevalence of depression (Shao et al., 2020). According to the American Psychological Association, many similarities are found between the signs of depression. The symptoms encompass insomnia, fatigue, muscle rigidity, and irritability or mood fluctuations (Ramón-Arbués et al., 2020). According to a journal article completed in 2021, average depression level obtained from Chinese university students is staggeringly high, ranging from 20% to 60% (Li et al., 2023). Students with depression have trouble with interpersonal communication and sleep patterns. They may also experience a loss of interest in both academic and personal lives, sometimes accompanied by suicidal thoughts (Li et al., 2023). Therefore, we must explore the fundamental key points and underlying cause of depression. Current research analyzes the prevalence of mental health problems (anxiety and depression) and sleep disorders (insomnia) within university going students in Bangladesh. This study mainly delves into the assessment of social and demographic factors that may contribute to major depressive disorder among students.

## **1.1 Types of Mental Health Disorder**

Psychological disorder is also known as mental disorder (MSEd, 2023). Psychiatric classification attempts to organize the diversity of mental symptoms, syndromes, and illnesses encountered in clinical practice (Gibbons et al., 2024). Some common mental disorders are

- a. Bipolar Disorder**
- b. Depression**
- c. Eating Disorder**
- d. Anxiety Disorder**
- e. Schizophrenia**
- f. Neurodevelopmental Disorder**

## **g. Post-Traumatic Stress Disorder**

### **1.1.1 Bipolar Disorder**

People with bipolar disorder experience alternating depressive episodes with periods of manic symptoms. During a depressive episode, people experience sadness, irritability, or emptiness, or a loss of pleasure or interest in activities for most of the day (Bipolar Disorder, n.d.). Manic symptoms may include euphoria or irritability, increased activity or energy, and other symptoms such as increased talkativeness, racing thoughts, increased self-esteem, decreased need for sleep, distractibility, and impulsive, reckless behaviour (Bipolar Disorder, n.d.). Bipolar disorders are chronic and recurrent conditions affecting over 1% of the global population. Bipolar and related disorders include bipolar I disorder (BD-I), bipolar II disorder (BD-II), and cyclothymic disorder (Fowler & Dooley, 2023). Bipolar disorders are substantial factors in the onset of disability among young individuals, as they can result in cognitive and functional decline and increased mortality rates, particularly from suicide and cardiovascular conditions (Fowler & Dooley, 2023).

### **1.1.2 Depression**

Depression, also known as major depressive disorder or clinical depression. It involves a depressed mood or loss of pleasure or interest in activities for long periods of time (WHO 2023). Depression is a condition that can affect anyone, regardless of their background or situation. People who suffer from harassment, significant losses, or other challenging circumstances have a greater tendency to suffer from depression (Depression and Suicide in Older Adults Resource Guide, 2023). Women have been found to possess a higher susceptibility to depression in comparison to men (Chand & Arif, 2023).



### **1.1.3 Eating disorders**

Eating disorders are severe biologically influenced health conditions characterized by disruptions in eating behaviors. Common eating disorders include anorexia nervosa, bulimia nervosa, binge-eating disorder, and avoidant-restrictive food intake disorder (World Health Organization: WHO, 2022).

### **1.1.4 Anxiety Disorders**

According to the American Psychiatric Association, anxiety disorder is characterized by extreme worry and fear, along with associated behavioral problems (Ramón-Arbués et al., 2020). People with anxiety disorders often try to avoid situations that can potentially trigger or exacerbate their symptoms. Job accomplishments, coursework, and personal relationships can be negatively impacted (WHO, 2022). Several anxiety disorders include generalized anxiety disorder, specific phobias, panic disorder with or without agoraphobia, social anxiety disorder, separation anxiety disorder, and selective mutism (*Anxiety Disorders*, n.d.).

### **1.1.5 Schizophrenia**

Schizophrenia is a severe brain or neurological disorder that causes people to interpret reality abnormally. When schizophrenia is active, patients may exhibit symptoms like delusions, hallucinations, incoherent speech, cognitive dysfunction, and a lack of motivation (World Health Organization: WHO, 2022).

### **1.1.6 Neurodevelopmental disorders**

Neurodevelopmental disorders are conditions defined by cognitive and behavioral impairments that manifest during the developmental stage and result in substantial challenges in acquiring and performing specific intellectual, language, motor, or interpersonal abilities. Neurodevelopmental disorders comprise conditions such as intellectual disability, autism spectrum disorder, and attention deficit hyperactivity disorder (ADHD), among others (World Health Organization: WHO, 2022).

### **1.1.7 Post-Traumatic Stress Disorder (PTSD)**

Post-traumatic stress disorder (PTSD) is a psychiatric disorder that may occur in people who have experienced or witnessed a traumatic event, series of events, or set of circumstances (Post-Traumatic Stress Disorder, n.d.). An individual may experience this as emotionally or physically harmful or life-threatening and may affect their mental, physical, social, and/or spiritual well-being (World Health Organization: WHO, 2022).

## **Chapter 2**

### **Literature Review**

Mental health disorders, such as depression, are among the most significant contributors to the burden associated with global health. According to the Injuries, and Risk Factors Study, Global Burden of Diseases 2019, mental diseases that are the most disruptive are anxiety and depressive disorders (Vos et al., 2020). In 2019, these diseases belonged to top 25 major problems of suffering worldwide (Santomauro et al., 2021). University students face a variety of stressors that greatly elevate their likelihood of developing depression compared to the general population. A thorough literature review was carried out before the analysis of the survey data to attain a comprehensive understanding of the subject matter. This literature review analyzed previous studies to provide insights into the high prevalence of depression among this specific demographic. It examined the myriad of potential dangers that might lead to its development and the broad impacts it could have. This paper researched the incidence and the features of depression among undergraduate university students by thoroughly analyzing and incorporating scholarly research articles obtained from reliable databases including PubMed, ScienceDirect, Frontiers, and Google Scholar. The articles considered for this study were published between January 1990 and February 2024. The searches utilized the keywords depression, consequences, symptoms of depression, major depressive disorders, prevalence, university students, and undergraduate students to yield an expanded list of published journals and papers.

### **2.1 Depression**

Major depressive disorder (MDD), commonly known as depression, is a prevalent and serious psychiatric condition worldwide. It is a psychological condition that is caused by both phenotypic and genetic disorders, with a lifetime prevalence of 15-20% (Bains & Abdijadid, 2023). It can frequently reoccur and is associated with various medical conditions, higher death

rates, and an elevated risk of suicide. Individuals diagnosed with depression have a heightened susceptibility to developing other forms of mental disorders (Perez-Lasierra et al., 2022). Depression is distinct from regular fluctuations in mood and emotions related to daily life. It has a potential impact on every aspect of life, causing significant disruptions to the professional and personal lives of individuals as well as their families and inflicting burdens on society (Daros et al., 2021).

Based on data obtained from the World Health Organization, around 3.8% of the global population suffers from depression. This comprises 5% of adults, with a breakdown of 4% among men and 6% among women. Additionally, 5.7% of individuals over the age of 60 experience depression. There are about 280 million individuals worldwide that suffer from depression (World Health Organization: WHO, 2023). Statistics issued by the WHO indicate that around 87% of annual deaths are attributed to suicide accidents associated with depression. Furthermore, bipolar disorder affects over 40 million people, and it is often accompanied by anxiety disorder and depressive symptoms (World Health Organization: WHO, 2023). Depression is defined by a group of symptoms, such as diminished interest in daily activities, substantial fluctuations in weight, disruptions in sleep patterns, decreased energy levels, impaired concentration, feelings of insignificance or remorse, and even recurring thoughts of mortality or self-harm (Bui & Fava, 2017). A comparative study was performed to examine the prevalence of depression among university students (N = 17,348) in 23 distinct countries (Koly et al., 2021). According to the data collected, it was found that 19% of male students and 22% of female students exhibited high levels of depressive symptoms. In addition, 4.9% of male students and 4.2% of female students exhibited results that surpassed the threshold for severe depression (Koly et al., 2021).

MDD is specified by the presence of a distinctive period of depression that lasts at least two weeks which comprises evident changes in mental state, hobbies, and happiness, as well as

changes in cognitive ability. This condition affects around 185 million people globally every year (Bains & Abdijadid, 2023). It occurs about twice as often in women than in men and affects about 6% of the adult population worldwide each year. MDD is a complex disorder that seems to be caused by a combined effect of genetic, environmental (such as poverty, recent negative life events, and childhood maltreatment), psychological (such as cognitive patterns), and biological (such as inflammatory and monoamine pathways) factors (Cui et al., 2024).

## **2.2 Symptoms**

Indication of depression range from moderate to extreme depression. Symptoms of depression is different from person to person. One can feel lonely and miserable.

- Feeling sad or having a depressed mood (Depression, n.d.).
- Loss of interest or pleasure in activities once enjoyed (Depression, n.d.).
- Changes in appetite — weight loss or gain unrelated to dieting (Bruce, 2023).
- Trouble sleeping or sleeping too much (Bruce, 2023).
- Loss of energy or increased fatigue (Depression, n.d.).
- Feeling worthless or guilty (Bruce, 2023).
- Difficulty thinking, concentrating or making decisions (Bruce, 2023).
- Thoughts of death or suicide (Depression, n.d.).
- Feeling irritable

The signs of major depressive disorder (MDD) are linked to structural and neurochemical deficiencies in the corticolimbic brain regions (Bruce, 2023). The wide range of behavioral symptoms associated with depression includes emotional, motivational, cognitive, and physiological aspects, such as anhedonia, abnormal perception of rewards, and changes in memory (Christensen et al., 2020).

## 2.3 Causes

Depression has a complex etiology that is influenced by multiple factors, including genetic predisposition, stress, and inflammatory processes, as well as environmental, and psychological factors (Li et al., 2021).

Various factors that can lead to depression include:

- **Biochemistry:** Differences in certain chemicals in the brain may contribute to symptoms of depression. Changes in emotional and rewarding experiences appear to be linked to dopamine dysregulation and deficits in neurotransmitters such as serotonin, dopamine, and norepinephrine, potentially leading to depression. Dopamine, serotonin, and norepinephrine are neurotransmitters that regulate emotions related to joy and happiness in the Central Nervous System (CNS) (Malhi & Mann, 2018).
- **Genetics:** Depression can run in families. For example, if one identical twin has depression, the other has a 70 percent chance of having the illness sometime in life (Kaltenboeck & Harmer, 2018). Genetic factors and mutations can influence how receptors respond to neurotransmitters or physiologically active substances, potentially impacting the brain's ability to maintain chemical equilibrium in the face of stressors. It is not completely understood which specific genes or areas of the nucleus, DNA, or which sorts of genetic alterations may function as the exact genetic indicators (Major Depression and Genetics, n.d.).
- **Environmental factors:** Continuous exposure to violence, neglect, abuse, or poverty may make some people more vulnerable to depression. Exposure to traumatic or frequent psychosocial and environmental triggers could enhance susceptibility to major depressive disorder (MDD) or induce depressive symptoms. MDD may occur spontaneously but is frequently triggered by a traumatic event or can manifest as a symptom of several disorders, particularly neurological (such as stroke, multiple

sclerosis, or Parkinson's disease) or endocrine (such as Cushing's syndrome and hypothyroidism) (Mizrachi et al., 2023). Abuse of drugs or pharmacological products can also induce MDD.

- Personality: People with low self-esteem, who are easily overwhelmed by stress, or who are generally pessimistic appear to be more likely to develop depression (Almeida et al., 2020).

Depression is connected to and impacted by physical health. Many of the variables that trigger depression (such as lack of physical activity or excessive drinking consumption) are also established risk factors for cancer, heart disease, diabetes, and respiratory diseases (WHO, 2022). People struggling with these diseases are also susceptible to depression as a consequence of the challenges involved in regulating their condition. Infectious disorders, such as hepatitis and sepsis, and autoimmune diseases, such as type 1 diabetes and rheumatoid arthritis, that are associated with elevated inflammation may increase the risk of depression (Borentain et al., 2020).

### **2.3.1 The Monoamine Hypothesis of Depression**

The notion that depression is caused by irregularities of chemicals in the brain, specifically serotonin has a prominent effect for several years and main theory behind the formulation of antidepressants (Moncrieff et al., 2022). Monoamines are neurotransmitters that control homeostasis and physiological processes by being released into the synapse to interact with receptors. Elevated levels of these monoamines have been proven to greatly influence depressive symptoms (Filatova et al., 2021). Serotonin regulates the functions of anxiety, memory, guilt, and mood, whereas dopamine determines anhedonia, motivation, reward, and enthusiasm. Norepinephrine plays an integral part in adjusting energy levels, vigilance, cognitive function, sleep, and pain perception (Filatova et al., 2021). The monoamine hypothesis investigates the activation and cycling routes of monoamines in order to determine

potential causes of reduced activity. The monoamine hypothesis is primarily concerned with the function of monoamine oxidase (MAO) (Cosci & Chouinard, 2019). The common characteristics of depression are considered to be associated with a deficiency of monoamines. Dopamine, serotonin, and norepinephrine are the main monoamines involved in the mechanism of MDD. pathophysiology of MDD correlates with various aspects of impaired functioning in the 5-HT neurotransmission in brain circuits that regulate emotions, regardless of whether these dysfunctions are primary or secondary (Wang et al., 2021). Low levels of dopamine have been linked to symptoms of depression. Anhedonia, a typical symptom of MDD, is linked to reduction in function of the dopamine, leading to a reduced capacity to experience pleasure or motivation (Boku et al., 2017).

Studies on mice have demonstrated that dopamine is linked to the expectation of rewards and influences levels of motivation. The results suggest that dopamine plays a significant role in causing depressive symptoms (Filatova et al., 2021).

An experiment conducted by Harmer et al. on healthy volunteers showed that antidepressants that raise serotonin levels cause emotions that are entirely different from those experienced by depressed people (Pastis et al., 2024). The results show serotonin's ability to act as an antidepressant. In another experiment with serotonin transporter protein (SERT) knockout mice, the SERT gene was either genetically removed or temporarily removed with drugs during early development. The mice had higher levels of serotonin activity and some small changes in brain development, which shows how important serotonin is as a strong growth factor in early life (Pastis et al., 2024). These mice also exhibit a behavioral phenotype in adulthood that is associated with depression and anxiety. This can be associated with humans. Individuals who possess the s allele of SERT, a genetic variant that decreases the expression of SERT, are more susceptible to the activation of the amygdala in response to stress (Pastis et al., 2024). They are also more likely to exhibit anxiety-like temperaments and have recurring episodes of



depression when faced with challenging environmental conditions (Pastis et al., 2024). Egami et al.'s experiment showed varying norepinephrine reuptake levels in healthy controls versus depressed persons, proposing norepinephrine pathways as prospective targets for therapy (Moretto & Palagini, 2019). This suggests a connection between norepinephrine and the disease, highlighting the potential for further investigation into these monoamines for new therapeutic approaches.

Currently, there is widespread agreement that depression is influenced by a range of hereditary, environmental, and neurological factors.

## Major Depressive Disorder: Causes

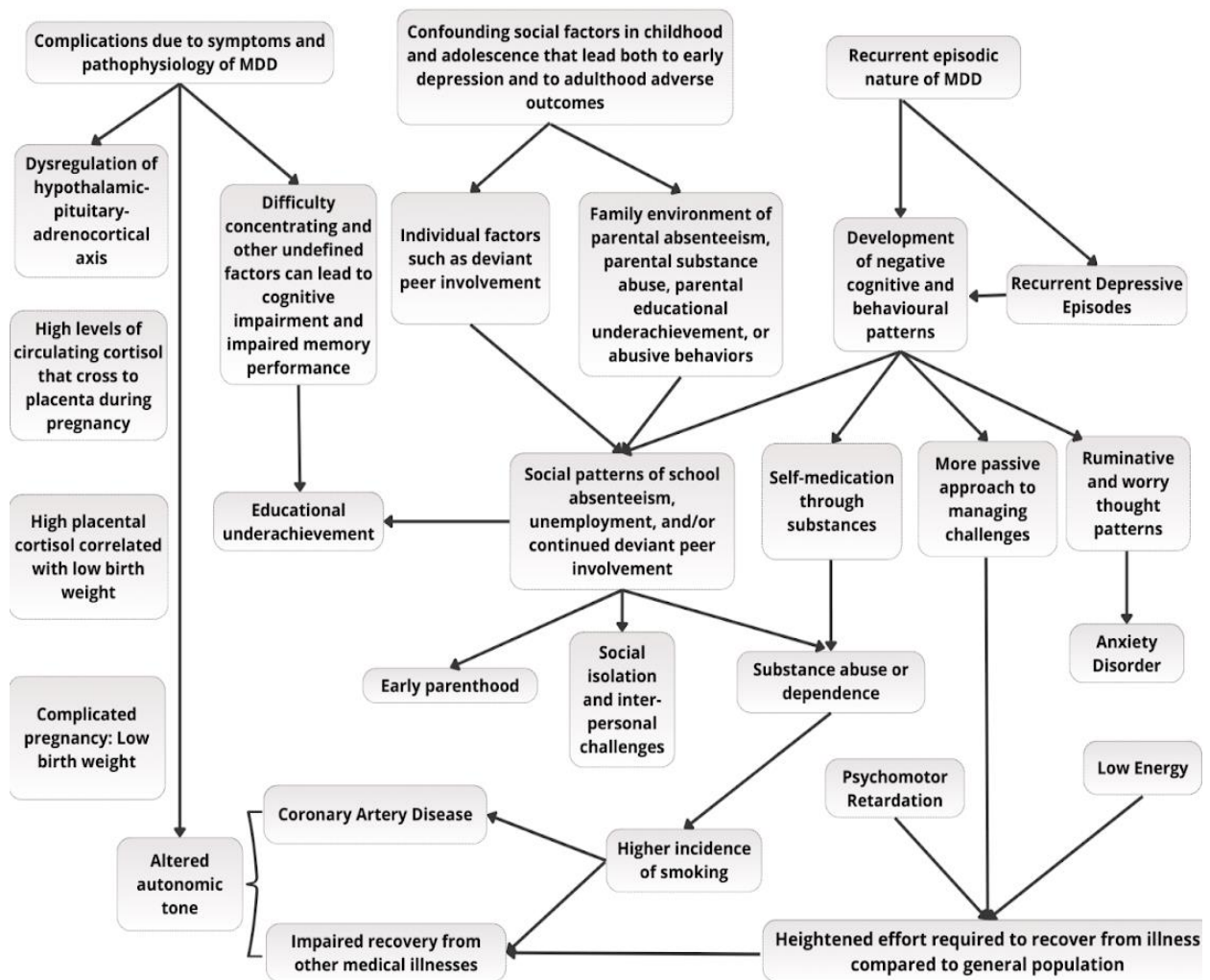


Figure 1: Major Depressive Disorder: Causes of Major Depressive Disorder

## **2.4 Depression Types**

Various kinds of depression, and they have been discussed below.

### **2.4.1 Depression along with signs of psychosis**

Psychotic depression, a highly intense type which is associated with the presence of delusions (disturbing, incorrect fixed beliefs) or hallucinations. People diagnosed with bipolar disorder, previously known as manic depression or manic-depressive illness, also suffer from depressive episodes, marked by feelings of sadness, apathy, or despair, accompanied by a significant decrease in activity (Harvard Health, 2020). However, individuals with bipolar illness also undergo manic (or less severe hypomanic) episodes, characterized by abnormally elevated moods, during which they may experience intense happiness, irritability, or a heightened sense of energy and activity (Harvard Health, 2020).

### **2.4.2 Persistent Depressive Disorder**

Persistent depressive disorder (also known as dysthymia) develops when an individual's state of mind is persistently deprived for more than 2 years in adults and at least one year in kids and adolescents. A person suffering from this disorder may have phases of MDD as well as periods of less severe symptoms in which they can operate daily (Marx et al., 2023).

### **2.4.3 Perinatal Depression**

Depression during pregnancy impacts women after they have a baby. It creates acute, persistent feelings of depression, anxiety, and weariness, making it difficult for women to care for themselves and their newborns while also carrying out regular tasks. Postpartum depression can develop anywhere from weeks to months after childbirth (Depression, n.d.).

## **2.5 Treatment**

Treatment for depression is constantly being improved as the disease gets more prevalent worldwide. There are three broad complementary treatment options which are effective for

depression, include psychotherapy, pharmacotherapy, and lifestyle interventions such as exercise (Stachowicz & Sowa-Kućma, 2022).

Approved medications for depression have varying effects on different neurotransmitters. Antidepressant medications can rectify the chemical imbalance in the brain until the natural equilibrium is reestablished (Karrouri et al., 2021). Numerous options have been demonstrated to be beneficial, and some are mentioned below.

1. N-methyl D-aspartate Antagonist
2. Selective Serotonin Reuptake Inhibitors
3. Tricyclic Antidepressants
4. Serotonin and Norepinephrine Reuptake Inhibitors
5. Atypical Antidepressants
6. Monoamine Oxidase Inhibitors

Selective serotonin reuptake inhibitors (SSRIs) function by enhancing the neurotransmission of serotonin in the brain. Antidepressants usually take 4 to 8 weeks of work, and fixes defect in appetite, sleeping patterns, and focus before mood changes (Karrouri et al., 2021).

Another form of treatment is psychological therapy. Engaging in scheduled conversations with a psychiatrist has been proven to alleviate symptoms of depression. The two most effective types of therapy are interpersonal therapy and cognitive-behavioral therapy. Exercise and other lifestyle modifications have an important function in the treatment of depression (Stachowicz & Sowa-Kućma, 2022). Engaging in regular exercise during free time, regardless of its intensity, has been demonstrated to enhance mental well-being and serve as a preventive measure against depression (Aguilar-Latorre et al., 2022). In addition to conventional depression therapies, including other lifestyle modifications such as maintaining a nutritious diet, obtaining sufficient sleep, and minimizing stress can also serve as valuable support (Stachowicz & Sowa-Kućma, 2022).

## **2.6 Depression in University Students in Bangladesh**

The higher education, or university phase of student life, is of utmost importance as it requires establishing significant life choices and preparing for future professional endeavors. A number of studies have shown that this formative period, along with other stresses and transitional situations, may be emotionally and psychologically detrimental to an individual's growth (Rasheduzzaman et al., 2021). An analysis conducted recently reveals that occurrence of depression within students in pre-university in Bangladesh stands at 44%, and this figure rises to 52% among university students (Rasheduzzaman et al., 2021). Numerous variables, affecting societal, environmental, cultural, and psychological aspects, can potentially contribute to depression and related anxiety among students, both in academic and non-academic contexts. These days, obtaining a degree in higher education entails a substantial financial burden. According to a cross-sectional study, financial difficulties make students particularly vulnerable to depression (Arusha & Biswas, 2020).

The primary aim of this investigation is to examine occurrence of depression, and the factors that have been associated with its occurrence. With the increasing worldwide occurrence of depressive disorders, especially in the wake of the pandemic, it is crucial to examine the factors that contribute to depression among young adults who face different kinds of academic and non-academic stressors.

## **2.7 Global Prevalence of Depression**

According to the World Health Organization (WHO), there are more than 280 million people worldwide who struggle with depression. As per the Centers for Disease Control and Prevention (CDC), the data from 2020 reveals that depression affects individuals of all ages (World Health Organization: WHO & World Health Organization: WHO, 2023). It has been estimated that about 1.9 million children between the ages of 3 and 17 are diagnosed with depression. Individuals aged 18 to 29 have the highest incidences of depression, with an

estimated prevalence of 21%. Individuals aged 45 to 64, as well as those aged 65 and up, have a prevalence rate of 18.4%. The prevalence rate for individuals between the ages of 30 and 44 was slightly lower at 16.8% (World Health Organization: WHO & World Health Organization: WHO, 2023). Research conducted worldwide on various undergraduate student populations has revealed a significant prevalence of depression and stress, ranging from moderate to high (Alhemedi et al., 2023). A study examining the determinants and prevalence of depression among university students in Jordan after the COVID-19 pandemic found that 10% of the respondents reported minimal or no depressive symptoms, 18.7% encountered mild depressive symptoms, 26.2% suffered from moderate depression, 19.3% grappled with severe depression, and 25.8% were diagnosed with severe depression (Ramón-Arbués et al., 2020). A separate investigation was carried out on a group of 1074 undergraduate students in Spanish colleges, with 71% of them being female and 29% male. The findings revealed a significant occurrence of depressive symptoms, with a prevalence rate of 18.4% (Heinze, 2023). The annual Healthy Minds Study collected data from 96,000 students across 133 institutions in the United States through online survey found that 44% of students experienced symptoms of depression, while 15% of them reported having seriously contemplated suicide within the last year. These numbers are the highest ever documented in the 15-year history of the institution (Liu et al., 2022). In Asia, a subsequent survey and study conducted over four consecutive years on 1401 Chinese undergraduates revealed that almost 35% of them exhibited elevated levels of depression compared to the general population (Anjum et al., 2019). A survey conducted online among 7915 first-year students at Hong Kong University in China revealed that 21% of participants exhibited moderate to severe levels of depression, surpassing the average prevalence in the overall population (Liu et al., 2022).

## **2.8 Prevalence of Depression in Bangladesh**

Bangladesh, situated in South Asia, is categorized as a lower-middle-income country. With a population of 169 million, this country is the eighth largest populated nation. Although Bangladesh has a significant population, the government's allocation for mental health in the overall health budget is only 0.44% (Rabby et al., 2023).

The deficiency of mental healthcare in Bangladesh can be attributed to various issues, such as the lack of public mental health facilities, an insufficient quantity of proficient mental health professionals, inadequate monetary resources, poorly administered mental health policies, and societal stigma (Islam et al., 2020). Approximately 7 million individuals in Bangladesh suffer from depressive disorders, with a claimed prevalence rate of up to 54.3%. These statistics strongly indicate that mental problems pose a major threat to public health in Bangladesh (Hasan et al., 2021). A study conducted among university students in Bangladesh, both at public and private universities, found a significant prevalence of depression (69.5%), which is even higher than the rates of other common mental disorders like anxiety (61%) (Koly et al., 2021). A separate survey performed in 2021 showed the incidence of depression was 47.3%, with a higher occurrence among female students in comparison to male students (50.7% vs. 43.6%) (Koly et al., 2021). The incidence of depression seems to be significantly greater at public universities (83.3%) in comparison to private ones (33.7%) (Rabby et al., 2023).

Although there have been few academic projects into the mental health issues of university students, most recent studies have indicated a significant prevalence of depression, anxiety, and stress among Bangladeshi undergraduate students. These significant and innovative discoveries could assist in the development of targeted mental health solutions for this specific category of individuals.

## **2.9 Impact of Sociodemographic factors on Depression**

Several sociodemographic factors, including age, gender, marital status, education, and income, have frequently demonstrated their significance in comprehending the variances in depression rates. Researchers have determined, employing data extracted from the National Comorbidity Survey, and the Canadian National Population Health Survey, that the prevalence of depression varies from 2.8% to 10.3%, depending on variables such as gender and age (Wang et al., 2022). In a 2016 mental health survey conducted by the World Health Organization (WHO) in 21 countries, it was discovered that 20.3% of college students encountered mental health challenges (Auerbach et al., 2016). Multiple studies have demonstrated a greater incidence of depression in women as compared to men. Prior research has demonstrated that the increased prevalence is associated with a range of socio-cultural factors, including gender norms, as well as biological and psychological factors. Previous studies indicate that married individuals have a lower likelihood of developing depression compared to those who are single (Shao et al., 2020). Using data collected in Japan and the US, a recent study looked at how often people experience depressive symptoms based on their marital status. The results indicated that unmarried individuals in both countries displayed elevated levels of depressive symptoms (Shao et al., 2020). A survey was conducted among university students from 23 nations, revealing that 22% of female students and 19% of male students exhibited symptoms indicative of depression (Chattu et al., 2020). Upon analyzing the data by gender, it was found that the occurrence of depression was more prevalent among female medical students (31.5%) in comparison to males (24.2%) (Chattu et al., 2020).

## **Chapter 3**

### **Methodology:**

#### **3.1 Research Objective**

The current research paper is a survey-based research paper. The main purpose of this survey was to investigate the occurrence of mental health disorders, including depression, anxiety, and insomnia, among university students in Bangladesh. Additionally, it aims to examine the association between multiple variables and mental health problems. Thus, the objective of the study is to determine the potential factors contributing to mental health disorders among university students.

#### **3.2 Research Design**

A comprehensive literature review was conducted to gather all relevant information related to mental health problems. A wide range of research papers from highly regarded journals such as PubMed, Elsevier, Oxford Journals, Nature, ScienceDirect, and Google Scholar were used for a better understanding of mental health disorders. Following an extensive discussion among the group members and mentors, a questionnaire was established.

#### **3.3 Research Approach**

The research approach is based on quantitative data.

The survey questionnaire was divided into two parts, following a structure similar to that of standard mental health related surveys. The first section of the survey consisted of demographic questions, comprising a total of 16 questions. The second section of the questionnaire consisted of 24 questions derived from commonly employed diagnostic tools in scientific research and self-assessment.

In the second section of the questionnaire, each question requires the participant to examine their symptoms for the last two weeks. The response options range from "included not at all



(0)", "several days (1)", "more than half the days (2)", and "nearly every day (3)" (Santomauro et al., 2021). These represented the different frequencies of occurrence, with 3 being the highest score. The diagnostic instruments employed to identify and evaluate the incidence of mental health diseases include (GAD 7) Generalized Anxiety Disorder Assessment, (PHQ 9) Patient Health Questionnaire to measure depressive symptoms, the Generalized Anxiety Disorder Assessment for determining the severity of generalized anxiety disorder (GAD), and the Athens Insomnia Scale (AIS-8) for measuring sleep difficulties. This paper employed the PHQ-9 scale to determine the severity, and prevalence of depression.

### **3.4 Research Participants**

The participants for this survey were chosen at random from various public and private universities across Bangladesh. Several universities include Dhaka University (DU), (CU) Chittagong University, (CUET) Chittagong University of Engineering and Technology, East West University, PrimeAsia University, and others. The participants were provided with a comprehensive explanation of the survey's primary concept and the significance of the study.

The participants were informed that the information collected would be kept anonymous and that confidentiality would be maintained. The participants are of ages between 18 and 27 years old. The individuals who participated were from both undergraduate and master's programs. The questionnaire was handed out at random to larger groups of students to avoid any biasness in the data. A few criteria were maintained. The ratio of male to female students' data was considered to 1:1. This was done to ensure that the data would represent the actual population. The ratio of data collected from rural and urban university students was set at 3:2 ratio. This was an important criterion that had to be maintained throughout the experiment.

A pilot test was conducted using 20 students from BRAC University before it was finalized. During the pilot test, participants were selected at random from the School of Pharmacy. Every participant was requested to complete the questionnaire. The data was subsequently compiled

and checked to identify any error and to validate the questions before the actual survey. The study was conducted in various districts of Bangladesh from October 2023 to January 2024. A total of 1037 data were collected from the university students.

**Inclusion criteria:** Students between the ages of 18 and 30 were chosen for this study, specifically those who are currently pursuing undergraduate and postgraduate degrees in universities in Bangladesh.

**Exclusion criteria:** Students who failed to provide adequate and comprehensive data, as well as data obtained from students in medical colleges, were eliminated. They were unable to provide information regarding their academic level, family income, age, and other relevant details.

After eliminating all the inaccurate data, a total of 952 data were determined for subsequent statistical analysis.

### 3.5 Instrument

The instrument used was Patient Health Questionnaire which is used to diagnose depression. It is a self-administered questionnaire and test can be taken online. The PHQ-9 is based on 9 DSM-IV which scores from 0 to 3. Here, 0 denotes not at all whereas 3 denotes nearly every day (Sun et al., 2020). Higher summation of scores indicates more severe depression. The actual scale has 5 category criteria but for this survey, it was scaled for 4 category criteria for depression. The score ranges from 0 to 27. The observation for depression (PHQ9) is done by following the table below:

*Table 1: Severity score of depression based on PHQ- 9 scale*

Score	Severity of Depression
0-9	None
10-15	Mild
16-21	Moderate
22-27	Severe

### **3.6 Ethical considerations**

This study was conducted on humans and various personal information was collected. Therefore, obtaining ethical permission was crucial to guarantee the participants' rights and safety. Strict confidentiality was ensured, and participants were required to sign a written agreement prior to responding to the questionnaire.

### **3.7 Data Analysis**

The data was analyzed by employing Statistical Packages for Social Sciences (IBM SPSS) V.25.0 and Microsoft Excel. Microsoft Excel was employed for the data processing, coding, and organizing. The statistical analysis was done using the SPSS tool. The information from Excel was imported into the IBM SPSS program. An analysis of the study participants' characteristics was carried out using descriptive statistics. An analysis was performed using a chi-square test to analyze the variations among the group statistics. The study employed logistic regression analysis to assess the risk ratios linked to the occurrence of mental health disorders. It specifically evaluated the demographic, social and lifestyle features of the students and their potential correlation with the prevalence of mental health disorders. Statistically significant results were obtained from Pearson correlation studies conducted at a significance level of  $p < 0.05$ . The statistical significance of the t-test (two-tailed) and the frequency were assessed.

## Chapter 4

### Results

#### 4.1 Demographic Characteristics

This study was conducted on 952 students from all over Bangladesh. Table 2 shows the socio-demographic features of the students. The mean age of students was 22.3 years (SD=2.03). The participants were grouped into two different age groups: 18-25 years (94.5%) and 26-30 (5.5%). Most of the participants were from the age 18 to 25 years. Females represented 49.9% (N = 475) and males represented 50.1% (N = 477) of our study sample. The majority of the participants were from the rural parts of Bangladesh, comprising 52.4% of the population sample. This result reflects to the population size of Bangladesh, with a majority of the population residing in rural areas (60%). The demographic characteristics of the participants showed that the majority of the students were undergraduates, 88.2% (N = 840), unmarried, 91.4% (N = 480) and not involved in any relationships, 64.8% (N = 617). 23.2% of the participants were obese with BMI above 25.5 and 15.5% (BMI below 18.5) of them were underweight and possibly malnourished. Regarding the living status, most participants lived with their family, 72.2% (N = 687) who belonged to nuclear family, 77.2% (N = 735) and had siblings, 87.4% (N = 832). Majority of students did not smoke (90.5%) and did not have any chronic disease (85.8%). Regarding the economic status, 59.7% (N = 568) of the participants belonged to lower class, 35.2% (N = 335) medium class, and 5.1% belonged to the higher class. The economic status is based on the monthly income of the family and were divided into three groups as low class with income below sixty-thousand-taka, medium class with sixty thousand takas to one hundred thousand taka, and high class with above one hundred thousand takas. These demographic characteristics are studied in detail to observe if they are associated with the prevalence of depression among the participants.

Table 2: Distribution of Participant Traits

Demographic variables		Total (N)	Frequency (%)
<b>Gender</b>	Female	475	49.9
	Male	477	50.1
<b>Age</b>	18 to 25	900	94.5
	26 to 30	52	5.5
<b>BMI</b>	Below 18.5	148	15.5
	18.5 – 25.5	583	61.2
	Above 25.5	221	23.2
<b>Marital status</b>	Married	82	8.6
	Unmarried	870	91.4
<b>Educational level</b>	Undergraduate	840	88.2
	Graduate or above	112	11.8
<b>Economic Impression</b>	Low	568	59.7
	Medium	335	35.2
	High	49	5.1
<b>Family Types</b>	Nuclear	735	77.2
	Joint	217	22.8
<b>Parent status</b>	Not Separated	915	96.1
	Separated	37	3.9
<b>Do you have any siblings?</b>	Yes	832	87.4
	No	120	12.6
<b>Involved in Relationship</b>	Yes	335	64.8
	No	617	35.2
<b>Living Status</b>	With Family	687	72.2
	Without Family	265	27.8
<b>Smoking Habit</b>	Non-smoker	862	90.5
	Smoker	90	9.5
<b>Chronic Disease</b>	Yes	135	14.2
	No	817	85.8
<b>Residence area</b>	Rural	499	52.4
	Urban	453	47.6

N=952

## **4.2 The prevalence of Depression based on demographic factors.**

Table 3 presents the incidence of depression on basis of various socio-demographic factors. The occurrence of depression was calculated using the (PHQ-9) scale. According to this study, it was found that 49.1% (N = 467) of the participants suffered from depressive disorder, and 50.9% (285) had no depression or a few symptoms of depression. Depression was seen to be higher in female participants than male participants. Out of 467 students with depression, 249 (53.31%,  $p < 0.05$ ) were females and 226 (48.39%) were males. Using the chi-square test, it was identified that depressive disorder was more prevalent in students within a BMI range below 18.5 and BMI range above 25.5 (124,  $p < 0.05$ ). It was further observed that participants from various economic backgrounds had a higher incidence of depression. It was seen that participants from the lower economic class (N = 260,  $p < 0.05$ ) suffered from depression more than those from the middle and higher classes. Individuals residing in urban areas (243) also had a substantially higher incidence of depression compared to those residing in rural areas (224). The occurrence of depressive disorder was more prominent in participants whose parents were unmarried (426), whose parents were separated (24), who had chronic disease, and who had smoking habits. A significant association between depression and a few of the demographic factors was identified at a p-value less than 0.05. The occurrence of depression was more prominent in participants who had smoking habits. It was found that there was no statistical significance of prevalence of depression with academic level, education level. Further it was observed that there was no association between the occurrence of depression and risk factors such as age, family type, living status, parents' status, marital status.

Table 3: Correlation between Demographic variables and Depression

Variables	Categories	Depression		p value
		Yes (467)	No (485)	
<b>Gender</b>	Female	249	259	<b>.038</b>
	Male	218	226	
<b>Age</b>	18-25	445	455	.380
	26-30	22	30	
<b>BMI</b>	Below 18.5	78	70	<b>.016</b>
	18.5 – 25.5	265	318	
	Above 25.5	124	97	
<b>Marital status</b>	Married	41	41	.858
	Unmarried	426	444	
<b>Educational level</b>	Undergraduate	412	428	.991
	Graduate or above	55	57	
<b>Economic Impression</b>	Low	260	308	<b>.018</b>
	Medium	176	159	
	High	31	18	
<b>Family Type</b>	Joint	95	363	.077
	Nuclear	372	275	
<b>Parents status</b>	Not Separated	443	472	.050
	Separated	24	13	
<b>Siblings</b>	Yes	402	430	.231
	No	65	55	
<b>Involved in Relationship</b>	Yes	167	168	.717
	No	300	317	
<b>Living status</b>	With family	340	347	.665
	Without family	127	138	
<b>Smoking Habit</b>	Non-smoker	414	448	<b>.050</b>
	Smoker	53	37	
<b>Residence Area</b>	Urban	243	210	<b>.007</b>
	Rural	224	275	
<b>Chronic Disease</b>	Yes	96	39	<b>&lt;.001*</b>
	No	371	446	

P-value<0.05

## Gender

Prevalence of depression varies with gender. In many previous studies, it was seen that women are more prone to depressive disorder than the men. As represented in the figure 2, it can be seen that among 467 participants, 53.31% are females with depression and 48.39% are males with depression. The Pearson chi square analysis had shown significant relationship between sex and prevalence (p value 0.038). This indicates that females are more vulnerable to depression.

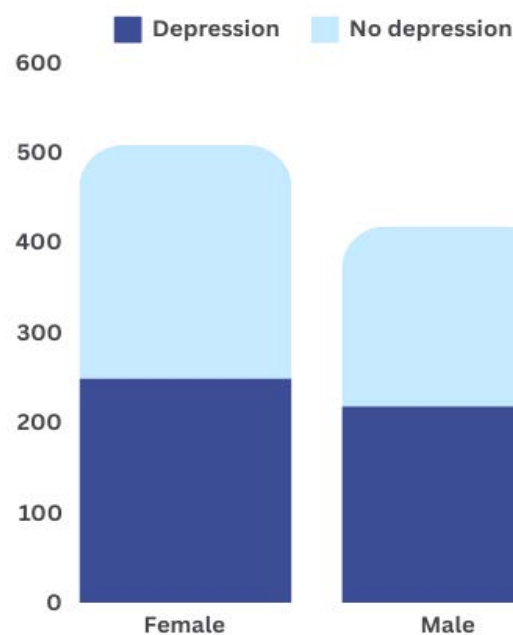


Figure 2: Prevalence of depression with gender

## BMI

In figure 3, it can be seen that Body mass index is a significant factor that could lead to depression among students. Participants with BMI below 18.5 are 56% more affected by depression than those with normal BMI. Students with BMI above 25.5 are also prone to depression than students with normal BMI.



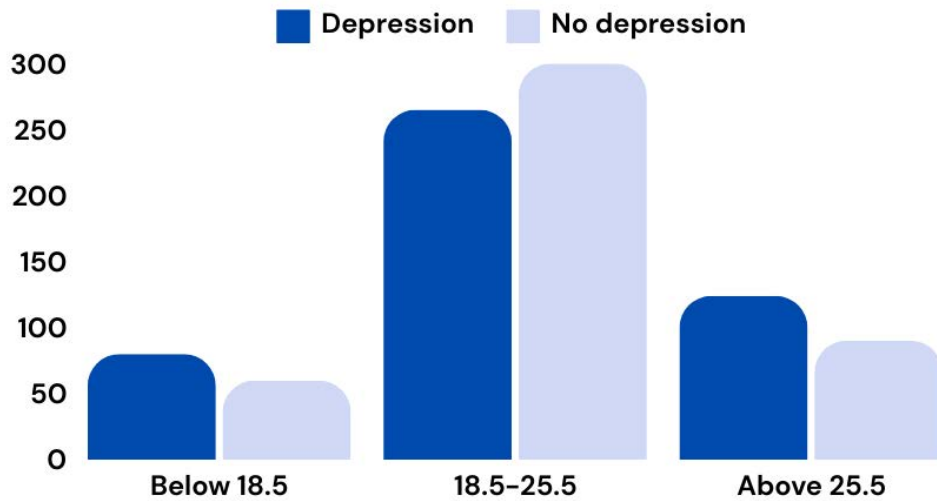


Figure 3: Presence of depression across various BMI range

### Chronic disease

People with chronic disease are more at risk of developing depressive disorder. In figure 4, it can be seen that participants with chronic disease have higher incidence of depression.

Among 135 students with chronic disease, 96 of them had depression. 71% of students with chronic disease have depression with significant p-value of less than 0.01.

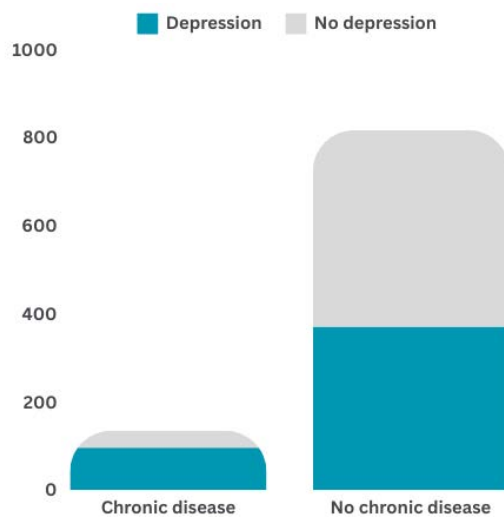


Figure 4: Chronic disease and prevalence of depression

## Residence Area

A major factor of the paper was to analysis incidence of depression among students from all over Bangladesh. Therefore, this study divided the participants into two residential groups and observed the pattern of prevalence among them. As shown in figure 5, the occurrence of depression is more in urban areas than rural. 53% of students living in urban areas suffer from depression.

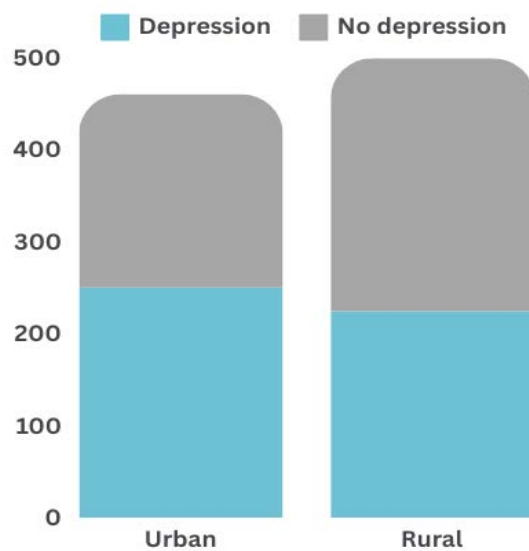


Figure 5: Prevalence of depression and area of residence

## 4.3 Severity of Depression

Figure 6 presents a pie chart display of the incidence of depression among the participants. 49% of the participants suffered from depressive disorder, and 50.9% had no depression or a few symptoms of depression. Figure 7 presents a graphic display of the proportion of depressed individuals classified by severity: 57% of the individuals had mild depression, 32% had a moderate level of depression, and 11% of the participants had a severe level of depression.

## Prevalence of Depression

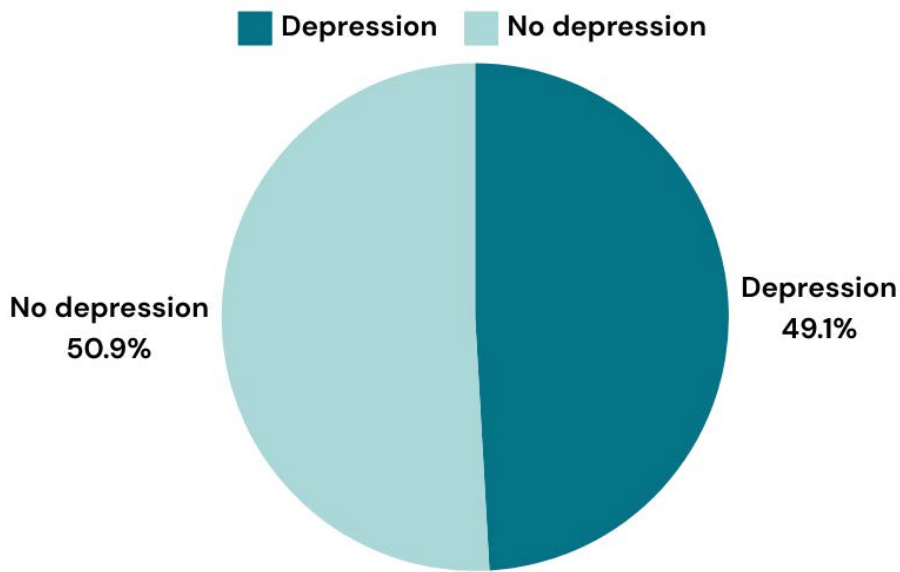


Figure 7: Pie chart representation of prevalence of depression

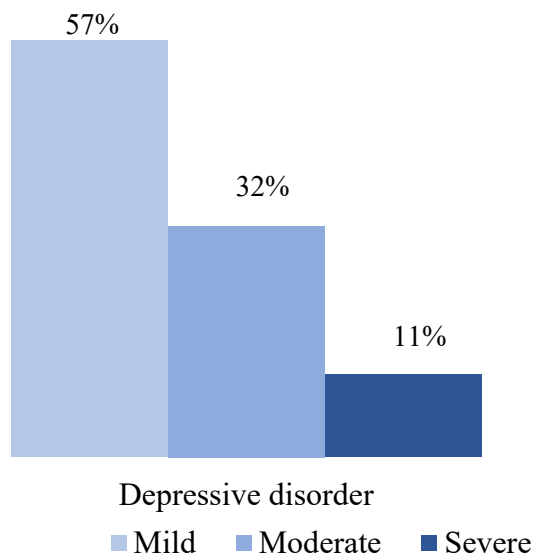


Figure 8: Bar chart presentation of levels of depression

### 4.4 Logistic Regression

A binary logistic regression, at 95% confidence interval was employed to identify the significant relationships between the independent factors and the nominal dependent factors. It can be observed that there is a significant relationship between gender and depression, presence of chronic disease and depression. For the other factors, the p-value was above 0.05.

Table 4: Binary Logistic Regression

Characteristics	B	Standard Error	Odds Ratio	95% Confidence Interval for Odds Ratio		p value
				Lower	Upper	
Age 26-30 18-25*	.424	.337	1.528	.789	2.961	.209
Sex: Male Female*	.277	.143	1.320	.997	1.746	<b>.050</b>
BMI Below 18.5 18.5 – 25.5* Above 25.5*						<b>.035</b>
	-.333	.193	.717	.491	1.046	.084
	.044	.226	1.045	.672	1.627	.844
Marital status Unmarried Married*						
	-.010	.253	.990	.603	1.627	.990
Educational level Undergraduate Graduate or above*						
	.031	.237	1.031	.648	1.640	.890
Economic Impression Low* High*						
	.469	.327	1.599	.843	3.033	.151
	-.130	.166	.878	.634	1.216	.435
Family Type Nuclear Joint*						
	-.260	.165	.771	.558	1.066	.116
Parent status Separated Not Separated*						
	-.581	.367	.559	.273	1.148	.113
Siblings No Yes*						
	.050	.325	1.051	.556	1.988	.878
Living status Without family With family*						
	.014	.154	1.466	.925	2.324	.927
Smoking Habit Smoker Non-smoker*						
	3.847	.258	.747	.450	1.240	.050
Chronic Disease Yes No*						
	-1.059	.209	.347	.230	.522	<b>&lt;.001</b>
Residence Area Rural* Urban						
	-.169	.170	.844	.605	1.179	.321

P<0.05

Reference group\*

## 4.5 Independent t-test and Pearson correlation

An independent t- test was conducted on the non-categorical data extracted from the survey questionnaire. It was found that, there was a significant difference in the non- categorical variables and depression. A significant difference was observed between depression and family monthly income ( $M = 53.76$ ,  $SD = 51.56$ ,  $p = 0.03$ ), and PHQ score ( $M = 1.62$ ,  $SD = 1.25$ ,  $p = 0.01$ ).

A Pearson correlation test was conducted to observe the positive or negative correlation between depression and various demographic factors. A strong positive correlation was observed between depression and family monthly income ( $r = 0.95$ ,  $p = 0.03$ ).

*Table 5: Independent t-test for comparison between participants with and without depression*

Demographic variables	Mean	Standard deviation	p- value p <0.05	95% Confidence Interval of the Difference	
				Lower	Upper
Age	22.40	1.98	.337	-.432	.199
	22.27	2.07			
BMI (kg/m <sup>2</sup> )	23.07	5.08	.295	-.29	1.40
	22.72	5.12			
Academic performance (CGPA)	3.33	.44	.626	-.091574	.078
	3.31	.49			
Family Income (KBDT)	53.76	51.56	.003	-.421	19.671
	45.13	38.68			
Number of siblings	2.16	1.50	.078	-.297	.201
	2.34	1.50			
PHQ Score	1.62	1.25	<0.01	9.614	10.998
	1.67	1.27			

*Table 6: Pearson correlation between categorical variables and depression*

<b>Demographic variables</b>	<b>r value</b>	<b>p-value</b>
<b>PHQ Vs Age</b>	.031	.338
<b>PHQ Vs BMI (kg/m2)</b>	.034	.295
<b>PHQ Vs Academic performance (CGPA)</b>	.016	.627
<b>PHQ Vs Family Income (KBDT)</b>	.095**	.003
<b>PHQ Vs Number of siblings</b>	-.057	.078
<b>PHQ Score</b>	.817**	<.001

## Chapter 5

### Discussion

This study was conducted to address the occurrence of depression within university-going students in Bangladesh. The population sample size was 952, and this was an in-person survey that was collected from both private and public universities. It was found that 49.1% (N = 267) of the participants had depressive disorder, and the severity of depression varied, with 57% of the individuals having mild depression, 32% having a moderate level of depression, and 11% having a severe level of depression. The current prevalence of depression is less than that of previous studies conducted in Bangladesh. In a study conducted in 2023, the prevalence estimates of mild, moderate, and severe were 10.4%, 15.9%, and 12.2%, respectively. The prevalence of depression observed in this study is similar to that of various studies that have examined depression among the student populations [23]. For example, the incidence rates for student depression have been reported to be 27.1% in Turkey, 37% in Malaysia, 43.7% in India, 40.9% in Pakistan, 43% in Saudi Arabia, 21.8% in Australia, 63.3% in Egypt, and 23% in the USA (Mamun et al., 2019).

This study further looks into factors that could be contributing to the prevalence of depression. The rapid physical changes that occur during puberty and the accompanying demands of meeting rigorous new social and academic standards, as well as increasing individual responsibility for one's health and happiness, likely contribute to the high rate of depression among university students. Various factors, including low family income, BMI range, family status, smoking habits, and marital relationships, have been cited as causes of depressive symptoms.

## **5.1 Demographic factors and Depression**

### **Age Range**

In this study, we divided the participants into two broad age groups, one from age 18 to 25 and the other from age 26 to 30. There was no significant difference observed between age groups. This could be due to the fact that only 52 students out of 952, belonged to age group 26- 30.

### **Gender**

The incidence of depression was found to be higher in females compared to males. The odd ratio in the present study was 1.32, indicating that the prevalence of depression was 1.32 times higher in females than in males.

### **BMI**

The BMI was categorized as follows: underweight or malnourished, with a BMI below 18.5; normal weight, with a BMI between 18.5 and 25.5; and overweight, with a BMI above 25.5. There was a statistically significant difference, suggesting that a person's body mass index (BMI) is a risk factor for depression. In comparison to the other two groups, participants whose BMI was below 18.5 were more likely to suffer from depression ( $p < 0.016$ ).

### **Economic Impression**

We divided the incomes into three groups to learn if there was a correlation between depression and the family's financial situation or monthly income. Low class was defined as a monthly income of less than 50,000 taka, the medium class as a monthly income of 50–100,000 taka, and the high class as a monthly income of 100,000 taka or more. According to this research, financial stress was the most significant determinant of depressive symptoms. A statistically significant difference of 0.018 was determined. The chi-square test, independent t-test, and Pearson correlation all yielded significant results. The Pearson correlation between income and depression revealed a high relationship, with an r-value of 0.095 and a p-value of 0.03. This research shows that students' family income was the most significant determinant of



depression. As a result of heightened an alarming factor that likely contributed to the increased occurrence was the cost of living, specifically the sharp increase in the cost of higher education.

### **Residence Area**

We gathered 499 records from rural areas and 453 from urban areas for this investigation. The rationale behind this move was to reflect the fact that 60% of Bangladeshis reside in rural areas. The study participants' dwelling area was found to have a significant correlation with depression ( $p < 0.07$ ). It was shown that students living in urban regions had a higher incidence of depression compared to those from rural areas.

### **Other factors**

There was a correlation between depression and other variables, such as chronic illness. A correlation was also found between smoking habits and a heightened prevalence of depression among students. Though it was believed to be a potential factor to student depression, there was no substantial association between academic achievement and depression. There was no statistically significant relationship between depression and variables such as parental status, family type, degree of education, or living situation.

## **5.2 Conclusion**

This study concludes that depression is an increasing issue among Bangladeshi university students and identifies different patterns of prevalence according to socioeconomic status. The results highlight the adverse consequences that are disproportionately experienced by people from low-income origins. This emphasizes the importance of creating programs and support systems that cater to the most disadvantaged groups. The notable disparity in the prevalence of depression between rural and urban areas highlights the necessity of developing mental health programs to effectively tackle the distinct challenges faced by students in various regions. Moreover, the study emphasizes complex characteristics of depression among undergraduate students by identifying various factors such as living arrangements, parental

status, chronic illnesses, and other health concerns. The increasing financial demands associated with living and studying, coupled with the mounting academic workload, contribute to a multifaceted confluence of stressors that exacerbate the probability of developing depression. To effectively tackle these factors, it is important to implement comprehensive measures for prevention and intervention. The significance of financial distress on mental health is underscored by the fact that economic status and family income play a crucial role in determining its impact. Addressing economic inequality and enhancing financial stability for students is of paramount importance, alongside the provision of mental health care, as monetary pressures have been shown to have a substantial impact on the development of depression.

This study tried to reflect on the global occurrence of depression among university students, with a specific focus on the situation in Bangladesh. The lack of recognition of depression within this specific demographic emphasizes the importance of destigmatizing discussions about mental health and implementing more comprehensive preventive measures.

### **5.3 Limitations**

This experiment was mostly focused on the age group of 18 to 25 and very few data was collected from the age range 26-30. The response rate from students completing their Masters was very low and thus it was difficult identify and generalize various factors that could lead to depression in that group. And finally, this survey was based on PHQ-9 scale and it only measures the depressive symptoms that appeared over the duration of 14 days. This experiment could have been reconducted on the same sample for a second time after an interval of time. However, as the participants were selected at random and anonymous nature of survey, conducting the survey again was not possible.

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## Appendix 1

### A study on the prevalence and associated risk factors for mental health problems among university students in Bangladesh

[বাংলাদেশি বিশ্ববিদ্যালয় পড়ুয়া ছাত্র-ছাত্রীদের উপর মানসিক স্বাস্থ্য এবং তার কারণ নিয়ে একটি গবেষণা]

The survey is designed to assess the mental health of university students in Bangladesh. This research work has received ethical approval from an Institutional Review Board (UAP/REC/2023/201-S). This is completely an anonymous survey where no one will identify you or compromise your privacy requested here. All information collected here only for explaining the various aspects of this study that will be kept confidential. Your consent to participate in this survey is very important. Thank you in advance for your cooperation in this noble initiative.

[এই গবেষণাটি বাংলাদেশের বিশ্ববিদ্যালয় পড়ুয়া ছাত্র-ছাত্রীদের মানসিক স্বাস্থ্য এবং তার কারণ মূল্যায়ন করার জন্য করা হয়েছে। এই গবেষণা কার্যক্রমটি একটি ইনস্টিটিউশনাল রিভিউ বোর্ড (UAP/REC/2023/201-S) থেকে নৈতিক অনুমোদন পেয়েছে। এটি সম্পূর্ণরূপে একটি অজ্ঞাতনামা/নামবিহীন জরিপ যেখানে আপনাকে সনাক্ত করা যাবে না কিংবা আপনার প্রদানকৃত সকল তথ্য শতভাগ গোপন ও সুরক্ষিত থাকবে। আপনার দেওয়া সকল তথ্য শুধুমাত্র গবেষণা কাজে এবং একাডেমিক উদ্দেশ্যে গোপনীয়তা বজায় রেখে ব্যবহার করা হবে। এই গবেষণায় অংশগ্রহণের জন্য সম্মতি খুব গুরুত্বপূর্ণ। এই মহৎ উদ্যোগে আপনার সহযোগিতার জন্য অগ্রিম ধন্যবাদ।]

Express your consent to participate in the research and processing of anonymous data for scientific purposes [এই নামবিহীন/অজ্ঞাতনামা বৈজ্ঞানিক সমীক্ষায় অংশগ্রহণের জন্য সম্মতি প্রকাশ করুন]

\*I am a Bangladeshi university student and have no objection to the privacy policy of this survey and the information collected. I voluntarily agree to take part in this study. [আমি একজন বাংলাদেশী বিশ্ববিদ্যালয়ের ছাত্র/ছাত্রী এবং এই সমীক্ষার গোপনীয়তা নীতি এবং সংগৃহীত তথ্য নিয়ে আমার কোন আপত্তি নেই। আমি স্বেচ্ছায় এই গবেষণায় অংশ নিতে সম্মত।]

- I do agree (আমি একমত)
- I do not agree (আমি একমত নই)

Please tick one box for each statement [প্রতিটি উক্তির জন্য যে উত্তরটি আপনার মতামতকে সবচেয়ে ভালোভাবে বর্ণনা করে তা চিহ্নিত করুন]

#### Section 01: General Questions (সাধারণ প্রশ্ন)

1. Age in years [বয়স (বছর)]

- .....

2. Sex [লিঙ্গ পরিচিতি]
  - Male (পুরুষ)
  - Female (মহিলা)
  - Others (অন্যান্য)
3. Height (Feet and Inch) [উচ্চতা (ফুট এবং ইঞ্চিতে)]
  - .....
4. Weight (kg) [ওজন (কেজি)]
  - .....
5. Marital status [বৈবাহিক অবস্থা]
  - Unmarried (অবিবাহিত)
  - Married (বিবাহিত)
  - Divorced (ডিভোর্সড)
6. Education level [শিক্ষাগত যোগ্যতা]
  - Undergraduate level (Year:.....) [স্নাতক (বর্ষ)]
  - Graduate/above level (স্নাতকোত্তর)
7. Academic performance [লেখাপড়ায় ফলাফল]
  - CGPA:..... (সিজিপিএ)
8. Family income monthly (KBDT) [পারিবারিক মাসিক আয় (হাজারে)]
  - .....
9. Family type [পরিবারের ধরণ]
  - Nuclear family (একক পরিবার)
  - Joint family (যৌথ পরিবার)
10. Parents status [পিতামাতার বর্তমান সম্পর্ক]
  - Not separated (অবিচ্ছিন্ন)
  - Separated (বিচ্ছিন্ন)
11. Do you have any sibling (s) [আপনার কি ভাইবোন আছে?]
  - Yes (number.....& your rank.....) [হ্যাঁ (সংখ্যা এবং আপনার ক্রম)]
  - No (না)
12. Are you involved in a relationship? [আপনি কি কোন সম্পর্কে জড়িত আছেন?]
  - Yes (হ্যাঁ)
  - No (না)
13. Living status [বসবাসের অবস্থা]
  - With family (পরিবারের সাথে)
  - Without family (পরিবার ছাড়া)
14. Smoking habit [ধূমপানের অভ্যাস]
  - Non-smoker (অধূমপায়ী)
  - Current smoker (ধূমপায়ী)
  - Ex-smoker (আগে ধূমপায়ী ছিলেন)
15. Do you have any chronic diseases? [আপনি কি কোন দীর্ঘস্থায়ী রোগে আক্রান্ত?]
  - .....

- Yes (হ্যাঁ)
- No (না)

16. Residence area [বসবাসের এলাকা]

- Urban (শহর)
- Rural (গ্রাম)

**Section 2: Mental Health Related Questions (মানসিক স্বাস্থ্য সম্পর্কিত প্রশ্ন)**

1. Over the last 2 weeks, how often have you been bothered by little interest or pleasure in doing things? [বিগত দুই সপ্তাহে আপনি কতোবার স্বাভাবিক কাজকর্ম করতে আনন্দ বা আগ্রহের অভাব অনুভব করেছেন?]
  - Not at all (0) (একবারেই না)
  - Several days (1) (মাঝে মাঝে)
  - More than half the days (2) (বেশিরভাগ দিন)
  - Nearly every day (3) (প্রায়ই)
2. Over the last 2 weeks, how often have you been bothered by feeling down, depressed, or hopeless? [বিগত দুই সপ্তাহে কতোবার আপনি মন খারাপ, হতাশা অথবা নিরাশ অনুভব করেছেন?]
  - Not at all (0) (একবারেই না)
  - Several days (1) (মাঝে মাঝে)
  - More than half the days (2) (বেশিরভাগ দিন)
  - Nearly every day (3) (প্রায়ই)
3. Over the last 2 weeks, how often have you been bothered by trouble falling or staying asleep, or sleeping too much? [বিগত দুই সপ্তাহে, ঘুমের অসুবিধা অথবা অনেক বেশি ঘুম, এমনটি কতোবার ঘটেছে আপনার সাথে?]
  - Not at all (0) (একবারেই না)
  - Several days (1) (মাঝে মাঝে)
  - More than half the days (2) (বেশিরভাগ দিন)
  - Nearly every day (3) (প্রায়ই)
4. Over the last 2 weeks, how often have you been bothered by feeling tired or having little energy? [প্রায়ই ক্লান্ত অনুভব বা কাজকর্মে শক্তি পাচ্ছেন না এমনটি কতোবার ঘটেছে আপনার সাথে বিগত দুই সপ্তাহে?]
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5. Over the last 2 weeks, how often have you been bothered by poor appetite or overeating? [বিগত দুই সপ্তাহে, কতোবার আপনার সাথে এমন হয়েছে যে, অনেক ক্ষুধা পাচ্ছে অথবা একদমই খেতে ইচ্ছে করছে না?]
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  - More than half the days (2) (বেশিরভাগ দিন)
  - Nearly every day (3) (প্রায়ই)

6. Over the last 2 weeks, how often have you been bothered by feeling bad about yourself or that you are a failure or have let yourself or your family down? [বিগত দুই সপ্তাহ ধরে, আপনার কি এমন মনে হয় যে, আপনি ব্যর্থ এবং আপনি নিজেকে এবং আপনার পরিবারকে নিরাশ করছেন?]
- Not at all (0) (একবারেই না)
  - Several days (1) (মাঝে মাঝে)
  - More than half the days (2) (বেশিরভাগ দিন)
  - Nearly every day (3) (প্রায়ই)
7. Over the last 2 weeks, how often have you been bothered by trouble concentrating on things, such as reading the newspaper or watching television? [বিগত দুই সপ্তাহ ধরে, আপনার কি এমন মনে হয় যে, আপনি স্বাভাবিক কোনো কাজকর্মে মনোযোগ দিতে পারছেন না?]
- Not at all (0) (একবারেই না)
  - Several days (1) (মাঝে মাঝে)
  - More than half the days (2) (বেশিরভাগ দিন)
  - Nearly every day (3) (প্রায়ই)
8. Over the last 2 weeks, how often have you been bothered by moving or speaking so slowly that other people could have noticed? Or the opposite, being so fidgety or restless that, you have been moving around a lot more than usual? [বিগত দুই সপ্তাহে, আপনি আপনার কাজকর্মে এবং কথাবার্তায় অনেক বেশি ধীরগতি অথবা অধৈর্য এবং অস্থিরতা অনুভব করেছেন কিনা?]
- Not at all (0) (একবারেই না)
  - Several days (1) (মাঝে মাঝে)
  - More than half the days (2) (বেশিরভাগ দিন)
  - Nearly every day (3) (প্রায়ই)
9. Over the last 2 weeks, how often have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way? [বিগত দুই সপ্তাহে, আপনার কি মনে হয়েছে যে বেঁচে থাকার চেয়ে মরে যাওয়া ভালো বা এমন কোনো চেষ্টা করেছেন কিনা?]
- Not at all (0) (একবারেই না)
  - Several days (1) (মাঝে মাঝে)
  - More than half the days (2) (বেশিরভাগ দিন)
  - Nearly every day (3) (প্রায়ই)

Any comments [আপনার মতামত]

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Thank you for completing this survey [আপনার সহযোগিতার জন্যে অসংখ্য ধন্যবাদ।]

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Chapter 1 Introduction According to [the World Health Organization \(WHO\), mental health is a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn and work well, and contribute to their community](#). [1]. [Mental health is a basic human right, crucial to personal, community, and socio-economic development. Yet mental health problems are the first cause of disability and a major public health issue worldwide due to disease progression, difficulties in therapeutic management, and increasing prevalence](#) [2]. Due to the rapid upsurge in disabilities related to mental health, it has become a concerning disease that needs to be researched in depth. Mental health disorders involve a [range of mental disorders, psychosocial disabilities, and other mental states that can cause substantial anxiety, impair functioning, or pose a risk of self-harm](#) [3]. [In 2019, 1 in every 8 people, or 970 million people around the world, were living with a mental disorder, with anxiety and depressive disorders being the most common](#) [1]. [In 2020, the number of people living with anxiety and depressive disorders rose significantly because of the COVID-19 pandemic. Anxiety and severe depressive disorders are suspected to have increased by 26% and 28% in the past year, respectively](#) [1]. According to various psychological studies conducted in both developed and developing nations, it was found that depression, stress and anxiety is more prevalent in students than general population [4]. University students are a distinct social group going through a critical stage in their journey to adulthood that may be extremely difficult and distressing. College students go through many psychological changes, including learning to handle and endure the social and academic pressures that come with getting ready for professional life. The high academic standards have created an unhealthy atmosphere, making them more vulnerable to developing mental health diseases. Various research suggests that this type of stress can lead to the development of depression [5]. Factors such as societal pressure, stress related to exams, and economic challenges contribute to the prevalence of depression [6]. According to the American Psychological Association, many similarities are found between the signs of depression. The symptoms encompass insomnia, fatigue, muscle rigidity, and irritability or mood fluctuations. [2]. According to a journal article completed in 2021, average depression level obtained from Chinese university students is staggeringly high, ranging from 20% to 60%. Students with depression have trouble with interpersonal communication and sleep patterns. They may also experience a loss of interest in both academic and personal lives, sometimes accompanied by suicidal thoughts [7]. Therefore, we must explore the fundamental key points and underlying cause of depression. Current research analyzes the prevalence of [mental health problems \(anxiety and depression\)](#) and [sleep disorders \(insomnia\)](#) within university going students in Bangladesh. This study mainly delves into the assessment of social and demographic factors that may contribute to major depressive disorder among students. 1.1 Types of Mental Health Disorder Psychological disorder is also known as mental disorder [8]. Some common mental disorders are bipolar disorder, depression, eating disorder, anxiety disorder, schizophrenia, neurodevelopmental disorder, and post-traumatic stress disorder. 1.1.1 Anxiety Disorders [According to the American Psychiatric Association, anxiety disorder is characterized by extreme worry and fear, along with associated behavioral problems. People with anxiety disorders often try to avoid situations that can potentially trigger or exacerbate their symptoms. Job accomplishments, coursework, and personal relationships can be negatively impacted. Several anxiety disorders include generalized anxiety disorder, specific phobias, panic disorder with or without agoraphobia, social anxiety disorder, separation anxiety disorder, and selective mutism](#) [1]. 1.1.2 Depression [Depression, also known as major depressive disorder or clinical depression. It involves a depressed mood or loss of pleasure or interest in activities for long periods of time. Depression is a condition that can affect anyone, regardless of their background or situation. People who suffer from harassment, significant losses, or other challenging circumstances have a greater tendency to suffer from depression. Women have been found to possess a higher susceptibility to depression in comparison to men](#) [10]. 1.1.3 Bipolar Disorder [People with bipolar disorder experience alternating depressive episodes with periods of manic symptoms. During a depressive episode, people experience sadness, irritability, or emptiness, or a loss of pleasure or interest in activities for most of the day. Manic symptoms may include euphoria or irritability, increased activity or energy, and other symptoms such as increased talkativeness, racing thoughts, increased self-esteem, decreased need for sleep, distractibility, and impulsive, reckless behaviour. Bipolar disorders are chronic and recurrent conditions affecting over 1% of the global population. Bipolar and related disorders include bipolar I disorder \(BD-I\), bipolar II disorder \(BD-II\), and cyclothymic disorder. Bipolar disorders are substantial factors in the onset of disability among young individuals, as they can result in cognitive and functional decline and increased mortality rates, particularly from suicide and cardiovascular conditions](#) [11]. 1.1.4 Post-Traumatic Stress Disorder (PTSD) [Post-traumatic stress disorder \(PTSD\) is a psychiatric disorder that may occur in people who have experienced or witnessed a traumatic event, series of events, or set of circumstances. An individual may experience this as emotionally or physically harmful or life-threatening and may affect their mental, physical, social, and/or spiritual well-being](#) [10]. 1.1.5 Schizophrenia Schizophrenia is a severe brain or neurological disorder that causes people to interpret reality abnormally. When schizophrenia is active, patients may exhibit symptoms like delusions, hallucinations, incoherent speech, cognitive dysfunction, and a lack of motivation. However, through effective treatments, [most symptoms of schizophrenia greatly improve, and the likelihood of a recurrence is found to be diminished](#) [1]. 1.1.6 Eating disorders Eating disorders are severe biologically influenced health conditions characterized by disruptions in eating behaviors. [Common eating disorders include anorexia nervosa, bulimia nervosa, binge-eating disorder, and avoidant-restrictive food intake disorder](#) [1]. 1.1.7 Neurodevelopmental disorders Neurodevelopmental disorders are conditions defined by cognitive and behavioral impairments that manifest during the developmental stage and result in substantial challenges [in acquiring and performing specific intellectual, language, motor, or interpersonal abilities. Neurodevelopmental disorders comprise conditions such as intellectual disability, autism spectrum disorder, and attention deficit hyperactivity disorder \(ADHD\), among others](#) [1]. Chapter 2 Literature Review Mental health disorders, such as depression, are among the most significant contributors to the burden associated with global health. According to the Injuries, and Risk Factors Study, Global Burden of Diseases 2019, mental diseases that are the most disruptive are anxiety and depressive disorders. In 2019, these diseases belonged to top 25 major problems of suffering worldwide. University students face a variety of stressors that greatly elevate their likelihood of developing depression compared to the general population. A thorough literature review was carried out before the [analysis of the survey data](#) to attain a comprehensive understanding of the subject matter. This literature review analyzed previous studies to provide insights into the high prevalence of depression among this specific demographic. It examines the myriad of potential dangers that might lead to its development and the broad impacts it could have. This paper researches the incidence and the features of depression among undergraduate university students by thoroughly analyzing and incorporating scholarly research articles obtained from reliable databases including PubMed, ScienceDirect, Frontiers, and Google Scholar. The articles considered for this study were published between January 1990 and February 2024. The searches utilized the keywords depression, consequences, symptoms of depression, major depressive disorders, prevalence, university students, and undergraduate students to yield an expanded list of published journals and papers. 2.1 [Depression Major depressive disorder \(MDD\), commonly known as depression, is a prevalent and serious psychiatric condition worldwide. It is a psychological condition that is caused by both phenotypic and genetic disorders, with](#)

a lifetime prevalence of 15-20%. It can frequently reoccur and is associated with various medical conditions, higher death rates, and an elevated risk of suicide. Individuals diagnosed with depression have a heightened susceptibility to developing other forms of mental disorders [13]. Depression is distinct from regular fluctuations in mood and emotions related to daily life. It has a potential impact on every aspect of life, causing significant disruptions to the professional [and personal lives of](#) individuals [as well as](#) their families [and](#) inflicting burdens on [society](#). According to the World Health Organization, depression disturbs [an estimated 3.8% of people globally, including 5% of adults \(4% of males and 6% of females\) and 5.7% of those over the age of 60](#). On a worldwide scale, over 280 million people suffer from depression. Statistics issued by the WHO indicate that around 87% of annual deaths are attributed to suicide accidents associated with depression. Furthermore, bipolar disorder affects over 40 million people, and it is often accompanied by anxiety disorder and depressive symptoms [1]. Depression is defined by a group of [symptoms, such as](#) diminished [interest in](#) daily [activities, substantial](#) fluctuations in [weight](#), disruptions in sleep patterns, decreased energy levels, impaired [concentration, feelings of](#) insignificance [or](#) remorse, [and even](#) recurring [thoughts of](#) mortality [or](#) self-harm. A comparative study was performed to examine [the prevalence of depression among university students](#) (N = 17,348) [in](#) 23 distinct countries [14]. According to the data collected, it was found that 19% of male students and 22% of female students exhibited high levels of depressive symptoms. In addition, 4.9% of male students and 4.2% of female students exhibited results that surpassed the threshold for severe depression [15]. MDD is specified by the presence of a distinctive period of depression that lasts at least two weeks which comprises evident changes in mental state, hobbies, and happiness, as well as 6 changes in cognitive ability. This condition affects around 185 million people globally every year [1]. It [occurs about twice as often in women than in men and affects about 6% of the adult population worldwide each year](#). [MDD is a complex disorder that seems to be caused by a combined effect of genetic, environmental \(such as poverty, recent negative life events, and childhood maltreatment\), psychological \(such as cognitive patterns\), and biological \(such as inflammatory and monoamine pathways\) factors](#) [14]. 2.2 Symptoms Indication of depression range from moderate to extreme depression. Symptoms of depression is different from person to person. One can feel lonely and miserable. Depression can also lead to changes in sleeping patterns, food habits, having no energy, losing focus, feeling suicidal and lose interest in daily activities. The signs of major depressive disorder (MDD) are linked to structural and neurochemical deficiencies in the corticolimbic brain regions. The wide range of behavioral symptoms associated with depression includes emotional, motivational, cognitive, and physiological aspects, such as anhedonia, abnormal perception of rewards, and changes in memory [15]. 2.3 Causes Depression has a complex etiology that is influenced by multiple factors, including genetic predisposition, stress, and inflammatory processes, as well as environmental, and psychological factors. Various factors that can lead to [depression include:](#)

- [Biochemistry: Differences in certain chemicals in the brain may contribute to symptoms of depression](#). Changes in emotional and rewarding experiences appear to be linked to dopamine dysregulation and deficits [in neurotransmitters such as serotonin, dopamine, and norepinephrine](#), potentially leading [to depression](#). Dopamine, serotonin, and norepinephrine are neurotransmitters that regulate emotions related to joy and happiness in the Central Nervous System (CNS) [16].
- [Genetics: Depression can run in families. For example, if one identical twin has depression, the other has a 70 percent chance of having the illness sometime in life](#). Genetic factors and mutations can influence how receptors respond to neurotransmitters or physiologically active substances, potentially impacting the brain's ability to maintain chemical equilibrium in the face of stressors. It is not completely understood which specific genes or areas of the nucleus, DNA, or which sorts of genetic alterations may function as the exact genetic indicators [16].
- [Environmental factors: Continuous exposure to violence, neglect, abuse, or poverty may make some people more vulnerable to depression](#). Exposure to [traumatic](#) or frequent psychosocial and environmental triggers could enhance susceptibility to major depressive disorder (MDD) or induce depressive symptoms. MDD may occur spontaneously but is frequently triggered by a traumatic event or can manifest as a symptom of several disorders, particularly neurological (such as [stroke, multiple sclerosis, or Parkinson's disease](#)) [or endocrine](#) (such as [Cushing's syndrome and hypothyroidism](#)) [16].
- [Abuse of drugs or pharmacological products can also induce MDD.](#)
- [Personality: People with low self-esteem, who are easily overwhelmed by stress, or who are generally pessimistic appear to be more likely to](#) develop [depression](#) [16].

[Depression is](#) connected [to and](#) impacted [by physical health](#). Many of the variables [that](#) trigger [depression \(such as](#) lack of [physical](#) activity [or](#) excessive drinking consumption) are also established risk factors for cancer, heart disease, [diabetes, and respiratory diseases](#). People struggling [with these diseases](#) are [also](#) susceptible to [depression](#) as a consequence of the challenges involved in regulating their condition. Infectious disorders, such as hepatitis and 8 sepsis, and [autoimmune diseases, such as type 1 diabetes and rheumatoid arthritis](#), that are [associated with](#) elevated inflammation may increase the risk of depression.

2.3.1 The Monoamine Hypothesis of Depression The notion that depression is caused by irregularities of chemicals in the brain, specifically serotonin has a prominent effect for several years and main theory behind the formulation of antidepressants. Monoamines are neurotransmitters that control homeostasis and physiological processes by being released into the synapse to interact with receptors. Elevated levels of these monoamines have been proven to greatly influence depressive symptoms [17]. Serotonin regulates the functions of anxiety, memory, guilt, and mood, whereas dopamine determines anhedonia, motivation, reward, and enthusiasm. Norepinephrine plays an integral part in adjusting energy levels, vigilance, cognitive function, sleep, and pain perception. The monoamine hypothesis investigates the activation and cycling routes of monoamines in order to determine potential causes of reduced activity. The monoamine hypothesis is primarily concerned with the function of monoamine oxidase (MAO). The common characteristics of depression are considered to be associated with a deficiency of monoamines. Dopamine, serotonin, and norepinephrine are the main monoamines involved in the mechanism of MDD. pathophysiology of MDD correlates with various aspects of impaired functioning in the 5-HT neurotransmission in brain circuits that regulate emotions, regardless of whether these dysfunctions are primary or secondary. Low levels of dopamine have been linked to symptoms of depression. Anhedonia, a typical symptom of MDD, is linked to reduction in function of the dopamine, leading to a reduced capacity to experience pleasure or motivation [18]. Studies on mice have demonstrated that dopamine is linked to the expectation of rewards and influences levels of motivation. The results suggest that dopamine plays a significant role in causing depressive symptoms. An experiment conducted by Harmer et al. on healthy volunteers showed that antidepressants that raise serotonin levels cause emotions that are entirely different from those experienced by depressed people [17]. The results show serotonin's ability to act as an antidepressant. In another experiment with serotonin transporter protein (SERT) knockout in mice, the SERT gene was either genetically removed or temporarily removed with drugs during early development. The mice had higher levels of serotonin activity and some small changes in brain development, which shows how important serotonin is as a strong growth factor in early life. These mice also exhibit a behavioral phenotype in adulthood that is associated with depression and anxiety. This can be associated with humans. Individuals who possess [the s allele of SERT, a genetic variant that decreases the expression of SERT](#), are [more susceptible to the activation of the amygdala in response to stress](#). They are also more likely to exhibit anxiety-like temperaments and have recurring episodes of depression when faced with challenging environmental conditions. Egami et al.'s experiment showed varying norepinephrine reuptake levels in healthy controls versus depressed persons, proposing norepinephrine pathways as prospective targets for therapy [18]. This suggests a connection between norepinephrine and the disease, highlighting the potential for further investigation into these monoamines for new therapeutic approaches. Currently, there is widespread agreement [that depression is](#) influenced [by a range of](#) hereditary, [environmental, and neurological factors](#).

2.4 Depression Types Various kinds of depression, and they have been discussed below.

2.4.1 Depression along with signs of psychosis Psychotic depression, a highly intense type which is associated with the presence of delusions (disturbing, incorrect fixed beliefs) or hallucinations. People [diagnosed with bipolar disorder, 10 previously known as manic depression or manic-depressive illness](#), also suffer from depressive episodes, marked by feelings of sadness, apathy, or despair, accompanied by a significant decrease in activity. However, individuals [with bipolar illness also](#) undergo [manic \(or less severe hypomanic\) episodes](#), characterized by abnormally [elevated moods](#), during [which they](#) may experience intense happiness, irritability, or a heightened sense of energy and activity.

2.4.2 Persistent Depressive Disorder [Persistent depressive disorder \(also known as dysthymia\)](#) develops when an individual's state of mind is persistently deprived

for more than 2 [years in adults and at least one year in](#) kids [and](#) adolescents. A person suffering from this disorder may have phases of MDD as well as periods of less severe symptoms in which they can operate daily. 2.4.3 Perinatal Depression Depression during pregnancy impacts women after they have a child. It creates acute, persistent feelings of depression, anxiety, and weariness, making it difficult for women to care for themselves and their newborns while also carrying out regular tasks. Postpartum depression can develop anywhere from weeks to months after childbirth. 2.5 Treatment Treatment for depression is constantly being improved as the disease gets more prevalent worldwide. There are three [broad complementary treatment options](#) which [are effective for](#) depression, include [psychotherapy, pharmacotherapy, and lifestyle interventions such as exercise](#). Approved medications for depression have varying effects on different neurotransmitters. [Antidepressant medications can rectify the chemical imbalance in the brain until the natural equilibrium is](#) reestablished. Numerous options have been demonstrated to be beneficial, and some are mentioned below. 1.1. N-methyl D-aspartate Antagonist [2. Selective Serotonin Reuptake Inhibitors](#) [3. Tricyclic Antidepressants](#) [4. Serotonin and Norepinephrine Reuptake Inhibitors](#) [5. Atypical Antidepressants](#) [6. Monoamine Oxidase Inhibitors Selective serotonin reuptake inhibitors \(SSRIs\)](#) function by enhancing [the](#) neurotransmission of serotonin in the brain. Antidepressants usually take 4 to 8 weeks of work, and fixes defect in appetite, sleeping patterns, and focus before mood changes [32]. Another form of treatment is psychological therapy. Engaging in scheduled conversations with a psychiatrist has been proven to alleviate symptoms of depression. The two most effective types of therapy are interpersonal therapy and cognitive-behavioral therapy. Exercise and other lifestyle modifications have an important function in the treatment of depression [33]. Engaging in regular exercise during free time, regardless of its intensity, has been demonstrated to enhance mental well-being and serve as a preventive measure against depression [26]. In addition to conventional depression therapies, including other lifestyle modifications such as maintaining a nutritious diet, obtaining sufficient sleep, and minimizing stress can also serve as valuable support. 2.6 Depression in University Students in Bangladesh The higher education, or university phase of student life, is of utmost importance as it requires establishing significant life choices and preparing for future professional endeavors. A number of studies have shown that this formative period, along with other stresses and transitional situations, may be emotionally and psychologically detrimental to an individual's growth. An analysis conducted recently reveals that occurrence of depression within students in pre- university in Bangladesh stands at 44%, and this figure rises to 52% among university students [31]. Numerous variables, affecting societal, environmental, cultural, and psychological aspects, can potentially contribute to depression and related anxiety among students, both in academic and non-academic contexts. These days, obtaining a degree in higher education entails a substantial financial burden. According to a cross-sectional study, financial difficulties make students particularly vulnerable to depression. The primary aim of this investigation is to examine occurrence of depression, and the factors that have been associated with its occurrence. With the increasing worldwide occurrence of depressive disorders, especially in the wake of the pandemic, it is crucial to examine the factors that contribute to depression among young adults who face different kinds of academic and non-academic stressors. 2.7 Global Prevalence of Depression [According to the World Health Organization \(WHO\), there are](#) more than 280 [million people worldwide](#) who struggle with depression. As per [the Centers for Disease Control and Prevention \(CDC\), the data from](#) 2020 reveals that depression affects individuals of all ages [1]. [It has been](#) estimated [that](#) about [1.9 million children between the ages of 3 and 17](#) are [diagnosed with depression](#). Individuals aged 18 to 29 have the highest incidences of depression, with an estimated prevalence of 21%. Individuals aged 45 to 64, as well as those aged 65 and up, have a prevalence rate of 18.4% [2]. The prevalence rate for individuals between the ages of 30 and 44 was slightly lower at 16.8% [30]. Research conducted worldwide on various undergraduate student populations has revealed a significant [prevalence of depression](#) and stress, [ranging from](#) moderate to high. A study examining the determinants and prevalence of [depression among university students in Jordan after the COVID-19 pandemic](#) found that 10% of the respondents reported [minimal or no](#) depressive symptoms, [18.7%](#) encountered [mild](#) depressive symptoms, [26.2%](#) suffered from [moderate depression](#), [19.3%](#) grappled with [severe](#) depression, and [25.8%](#) were diagnosed with [severe depression](#) [5]. A separate investigation was carried out on a group of 1074 undergraduate students in Spanish colleges, with 71% of them being female and 29% male. The findings revealed a significant occurrence of depressive symptoms, with a prevalence rate of 18.4% [28]. The annual Healthy Minds Study collected data from 96,000 students across 133 institutions in the United States through online survey found that 44% of students experienced symptoms of depression, while 15% of them reported having seriously contemplated suicide within the last year [19]. These numbers are the highest ever documented in the 15-year history of the institution. In Asia, a subsequent survey and study conducted over four consecutive years on 1401 Chinese undergraduates revealed that almost 35% of them exhibited elevated levels of depression compared to the general population. A survey conducted online among [7915 first-year students at Hong Kong University in China](#) revealed that [21% of participants](#) exhibited [moderate](#) to severe [levels of depression](#), surpassing the average prevalence in the overall population [4]. 2.8 Prevalence of Depression in Bangladesh Bangladesh, situated in South Asia, [is categorized as a](#) lower-middle-income country. With a population of 169 million, this country is the eighth largest populated nation. Although Bangladesh has a significant population, the government's allocation for mental health in the overall health budget is only 0.44% [20]. The deficiency of mental healthcare in Bangladesh can be attributed to various issues, such as the lack of public mental health facilities, an insufficient quantity of proficient mental health professionals, inadequate monetary resources, poorly administered mental health policies, and societal stigma [27]. Approximately 7 million individuals in Bangladesh suffer from depressive disorders, with a claimed prevalence rate of up to 54.3%. These statistics strongly indicate that mental problems pose a major threat to public health in Bangladesh [20]. A study [conducted among university students](#) in Bangladesh, [both at public and private universities](#), found a 14 significant prevalence of depression (69.5%), which is even higher than the rates of [other common mental disorders](#) like [anxiety \(61%\)](#). The incidence of [depression](#) seems [to be](#) significantly greater [at public universities \(83.3%\)](#) in comparison [to private ones \(33.7%\)](#) [21]. Although there have been few academic projects into [the mental health](#) issues of university [students](#), most recent [studies](#) [have](#) indicated a significant [prevalence of](#) depression, [anxiety, and](#) stress among Bangladeshi undergraduate students. These significant and innovative discoveries could assist in the development of targeted mental health solutions for this specific category of individuals. 2.9 Impact of Sociodemographic factors on Depression Several [sociodemographic factors, including age, gender, marital status, education, and income](#), have frequently demonstrated their significance in comprehending the variances in depression rates. Researchers have determined, employing data extracted from [the National Comorbidity Survey](#), and [the Canadian National Population Health Survey](#), that [the](#) prevalence of depression varies from 2.8% to 10.3%, depending on variables such as gender and age [26]. In a 2016 [mental health survey conducted by the World Health Organization \(WHO\) in 21 countries](#), it was discovered that 20.3% of college students encountered mental health challenges [1]. Multiple studies have demonstrated a greater incidence of depression in women as compared to men. Prior research has demonstrated that the increased prevalence is associated with a range of socio-cultural factors, including gender norms, as well as biological and psychological factors. Previous studies indicate that married individuals have a lower likelihood of developing depression compared to those who are single [4]. Using data collected in Japan and the US, a recent study looked at how often people experience depressive symptoms based on their marital status. The results indicated that unmarried individuals in both countries displayed elevated levels of depressive symptoms. A survey was conducted among university students from 23 nations, revealing that 22% of female students and 19% of 15 male students exhibited symptoms indicative of depression [25]. Upon analyzing the data by gender, it was found that the occurrence of depression was more prevalent among female medical students (31.5%) in comparison to males (24.2%) [29]. [Chapter 3 Methodology: 3.1 Research Objective](#) The current [research](#) paper is a survey-based research paper. [The main purpose of this survey was to investigate the occurrence of](#) mental health disorders, [including](#) depression, anxiety, and insomnia, among university students in Bangladesh. Additionally, it aims to examine the association between multiple variables and mental health problems. Thus, [the objective of the study is to determine the](#) potential factors contributing to mental health disorders among university students. 3.2 Research Design A comprehensive literature review was conducted to gather all relevant information related to mental health problems. A wide range of research papers from highly regarded journals such as PubMed, Elsevier, Oxford

Journals, Nature, ScienceDirect, and Google Scholar were used for a better understanding of mental health disorders. Following an extensive discussion among the group members and mentors, a questionnaire was established. 3.3 Research Approach The research approach is based on quantitative data. The survey questionnaire was divided into two parts, following a structure similar to that of standard mental health related surveys. The first section of the survey consisted of demographic questions, comprising a total of 16 questions. The second section of the questionnaire consisted of 24 questions derived from commonly employed diagnostic tools in scientific research and self-assessment. In the second section of the questionnaire, each question requires the participant to examine their symptoms for the last [two weeks](#). The [response options range from](#) "included not at all (0)", "several days (1)", "more than half the days (2)", [and](#) "nearly every day (3)" [24]. These represented [the](#) different frequencies [of](#) occurrence, with 3 being the highest score. The diagnostic instruments employed to identify and evaluate the incidence of mental health diseases include ([GAD 7](#)) [Generalized Anxiety Disorder Assessment](#), ([PHQ 9](#)) [Patient Health Questionnaire](#) to measure depressive symptoms, [the](#) Generalized Anxiety Disorder Assessment for determining the severity of generalized anxiety disorder (GAD), and the Athens Insomnia Scale (AIS-8) for measuring sleep difficulties. This paper employed the PHQ-9 scale to determine the severity, and prevalence of depression.

3.4 Research Participants The participants for this survey were chosen at random from various public and private universities across Bangladesh. Several universities include Dhaka University (DU), (CU) Chittagong University, (CUET) Chittagong University of Engineering and Technology, East West University, PrimeAsia University, and others. The participants were provided with a comprehensive explanation of the survey's primary concept and the significance of the study. The participants were informed that the information collected would be kept anonymous and that confidentiality would be maintained. The participants are of ages between 18 and 27 years old. The individuals who participated were from both undergraduate and master's programs. The questionnaire was handed out at random to larger groups of students to avoid any biasness in the data. A few criteria were maintained. The ratio of male to female students' data was considered to 1:1. This was done to ensure that the data would represent the actual population. The ratio of data collected from rural and urban university students was set at 3:2 ratio. This was an important criterion that had to be maintained throughout the experiment. 18 A pilot test was conducted using 20 students from BRAC University before it was finalized. During the pilot test, participants were selected at random from the School of Pharmacy. Every participant was requested to complete the questionnaire. The data was subsequently compiled and checked to identify any error and to validate the questions before the actual survey. The study was conducted in various districts of Bangladesh from October 2023 to January 2024. A total of 1037 data were collected from the university students. Inclusion criteria: Students between the ages of 18 and 30 were chosen for this study, specifically those who are currently pursuing undergraduate and postgraduate degrees in universities in Bangladesh. Exclusion criteria: Students who failed to provide adequate and comprehensive data, as well as data obtained from students in medical colleges, were eliminated. They were unable to provide information regarding their academic level, family income, age, and other relevant details. After eliminating any inaccurate data, a total of 952 data were determined for subsequent statistical analysis.

3.5 Instrument The instrument used was Patient Health Questionnaire which is used to diagnose depression [24]. It is a self-administered questionnaire and test can be taken online. The PHQ-9 is based on 9 DSM-IV which scores from 0 to 3. Here, 0 denotes not at all whereas 3 denotes nearly everyday [24]. Higher summation of scores indicates more severe depression. The actual scale has 5 category criteria but for this survey, it was scaled for 4 category criteria for depression. The score ranges from 0 to 27. The observation for depression (PHQ9) is done by following the table below: Score Severity of [Depression 0-9](#) None [10-15](#) Mild [16-21](#) Moderate [22-27](#) Severe

3.6 Ethical considerations This study covers both human and data collection from various personnel. Therefore, obtaining ethical permission was crucial to guarantee the participants' rights and safety. Strict confidentiality was ensured, and participants were required to sign a written agreement prior to responding to the questionnaire. 3.7 Data Analysis The data was analyzed by employing [Statistical Packages for Social Sciences \(IBM SPSS\) V.25.0](#) and [Microsoft Excel](#). Microsoft Excel was employed for the data processing, coding, and organizing. The statistical analysis was done using the SPSS tool. The information from Excel was imported into the IBM SPSS program. An analysis of the study participants' characteristics was carried out using descriptive statistics. An analysis was performed using a chi-square test to analyze the variations among the group statistics. The study employed logistic regression analysis to assess the risk ratios linked to the occurrence of mental health disorders. It specifically evaluated the demographic, social and lifestyle features of the students and their potential correlation with the prevalence of mental health disorders. Statistically significant results were obtained from Pearson correlation studies conducted at [a significance level of p<0.05](#). [The](#) statistical significance of the t-test (two-tailed) and the frequency were assessed. [Chapter 4](#)..... [Results 4.1 Demographic Characteristics](#) This [study](#) was conducted on 952 students from all over Bangladesh. Table 4.1 shows the socio- demographic features of the students. The [mean age of students was 22.3](#) years ([SD=2.03](#)). [The](#) participants were grouped into two different age groups: 18-25 years (94.5%) and 26-30 (5.5%). Most of the participants were from the age 18 to 25 years. Females represented 49.9% (N = 475) and males represented 50.1% (N = 477) of our study sample. The majority of the participants were from the rural parts of Bangladesh, comprising 52.4% of the population sample. This result reflects to the population size of Bangladesh, with a majority of the population residing in rural areas (60%). The demographic characteristics of the participants showed that the majority of the students were undergraduates, 88.2% (N = 840), unmarried, 91.4% (N = 480) and not involved in any relationships, 64.8% (N = 617). 23.2% of the participants were obese with BMI above 25.5 and 15.5% (BMI below 18.5) of them were underweight and possibly malnourished. Regarding the living status, most participants lived with their family, 72.2% (N = 687) who belonged to nuclear family, 77.2% (N = 735) and had siblings, 87.4% (N = 832). Majority of students did not smoke (90.5%) and did not have any chronic disease (85.8%). Regarding the economic status, 59.7% (N = 568) of the participants belonged to lower class, 35.2% (N = 335) medium class, and 5.1% belonged to the higher class. The economic status is based on the monthly income of the family and were divided into three groups as low class with income below sixty-thousand-taka, medium class with sixty thousand takas to one hundred thousand taka, and high class with above one hundred thousand takas. These demographic characteristics are studied in detail to observe if they are associated with the prevalence of depression among the participants. 21 Table 4.1 Distribution of Participant Traits Demographic variables Total (N) Frequency (%) Gender Female Male Age 18 to 25 26 to 30 475 477 900 52 49.9 50.1 94.5 5.5 BMI Below 18.5 18.5 – 25.5 Above 25.5 Marital status Married Unmarried Educational level Undergraduate Graduate or above Economic Impression Low Medium High Family Types Nuclear Joint Parent status Not Separated Separated Do you have any Yes siblings? No Involved in Yes Relationship No Living Status With Family Without Family Smoking Habit Non-smoker Smoker Chronic Disease Yes No Rural 148 583 221 82 870 840 112 568 335 49 735 217 915 37 832 120 335 617 687 265 862 90 135 817 499 15.5 61.2 23.2 8.6 91.4 88.2 11.8 59.7 35.2 5.1 77.2 22.8 96.1 3.9 87.4 12.6 64.8 35.2 72.2 27.8 90.5 9.5 14.2 85.8 52.4

Findence area Urban 453 47.6 N=952 4.2 The prevalence of Depression based on demographic factors. Table 4.2 presents the incidence of depression on basis of various socio-demographic factors. The occurrence of depression was calculated using the (PHQ-9) scale. According to this study, it was found that 49.1% (N = 467) of the participants suffered from depressive disorder, and 50.9% (285) had no depression or a few symptoms of depression. Depression was seen to be higher in female participants than male participants. Out of 467 students with depression, 249 (53.31%, p<0.05) were females and 226 (48.39%) were males. Using the chi-square test, it was identified that depressive disorder was more prevalent in students within a BMI range of 18.5– 25.5 (265, p<0.05). It was further observed that participants from various economic backgrounds had a higher incidence of depression. It was seen that participants from the lower economic class (N = 260, p<0.05) suffered from depression more than those from the middle and higher classes. Individuals residing in urban areas (243) also had a substantially higher incidence of depression compared to those residing in rural areas (224). The occurrence of depressive disorder was more prominent in participants whose parents were unmarried (426), whose parents were separated (24), who had chronic disease, and who had smoking habits. A significant association between depression and a few of the demographic factors was identified at a p-value less than 0.05. The occurrence of depression was more prominent in participants who had smoking habits. It was found that there was no statistical significance of prevalence of depression

with academic level, education level. Further it was observed that there was no association between the occurrence of depression and risk factors such as age, family type, living status, parents' status, marital status. Table 4.2 Correlation between Demographic variables and Depression Variables Categories Depression p value Yes (467) No (485) [Gender Female Male Age 18-25 26-30](#) BMI Below 18.5 18.5 – 25.5 Above 25.5 Marital status Married Unmarried Educational level Undergraduate Graduate or above Economic Impression Low Medium High Family Type Joint Nuclear Parents status Not Separated Separated Siblings Yes No Involved in Relationship Living status Yes No With family Without family Smoking Habit Non-smoker Smoker Residence Area Urban Rural Chronic Disease Yes No 218 249 445 22 259 226 455 30 265 124 78 41 426 318 97 70 41 444 412 55 428 57 260 176 31 308 159 18 95 372 443 24 402 65 167 300 340 127 363 275 472 13 430 55 168 317 347 138 414 53 448 37 243 224 210 275 96 371 39 446 .038 .380 .016 .858 .991 .018 .077 .050 .231 .717 .665 .050 .007 <.001\* P-value>0.05 Gender Prevalence of depression varies with gender. In many previous studies, it was seen that women are more prone to depressive disorder than the men. As represented in the figure 02, it can be seen that among 467 participants, 53.31% are females with depression. The Pearson chi square analysis had shown significant relationship between sex and prevalence (p value 0.038). BMI In figure 2.1, it can be seen that Body mass index is a significant factor that could lead to depression among students. Participants with BMI below 18.5 are 56% more affected by depression than those with normal BMI. Chronic disease People with chronic disease are more at risk of developing depressive disorder. In figure 2.2, it can be seen that participants with chronic disease have higher incidence of depression. Among 135 students with chronic disease, 96 of them had depression. 71% of students with chronic disease have depression with significant p-value of less than 0.0. Residence Area A major factor of the paper was to analysis incidence of depression among students from all over Bangladesh. Therefore, this study divided the participants into two residential groups and observed the pattern of prevalence among them. As shown in figure 2.3, the occurrence of depression is more in urban areas than rural. 53% of students living in urban areas suffer from depression. 4.3 Severity of Depression Figure 3 presents a pie chart display of the incidence of depression among the participants. 49% of the participants suffered from depressive disorder, and 50.9% had no depression or a few symptoms of depression. Figure 3.1 presents a graphic display of the proportion of depressed individuals classified by severity: 57% of the individuals had mild depression, 32% had [a moderate level of depression](#), and 11% of the participants had [a severe level of depression](#). 4.4 [Logistic Regression](#) A [binary logistic regression](#), at [95% confidence interval](#) was employed to identify [the](#) significant relationships between the independent factors and the nominal dependent factors. It can be observed that there is a significant relationship between gender and depression, presence of chronic disease and depression. For the other factors, the p-value was above 0.05. Table 4.3 Binary Logistic Regression Characteristics B [Standard Error Odds Ratio 95% Confidence Interval for Odds Ratio Lower Upper p value](#) Age 26-30 18-25\* .424 .337 1.528 .789 2.961 .209 Sex: Male Female\* .277 .143 1.320 .997 1.746 .051 BMI Below 18.5 .035 18.5 – 25.5\* -.333 .193 .717 .491 1.046 .084 Above 25.5\* .044 .226 1.045 .672 1.627 .844 Marital status Unmarried Married\* -.010 .253 .990 .603 1.627 .990 Educational level Undergraduate Graduate or above\* .031 .237 1.031 .648 1.640 .890 Economic Impression Low\* .469 .327 1.599 .843 3.033 .151 High\* -.130 .166 .878 .634 1.216 .435 Family Type Nuclear Joint\* -.260 .165 .771 .558 1.066 .116 Parent status Separated Not Separated\* -.581 .367 .559 .273 1.148 .113 Siblings No Yes\* .050 .325 1.051 .556 1.988 .878 Living status Without family With family\* .014 .154 1.466 .925 2.324 .927 Smoking Habit Smoker Non-smoker\* 3.847 .258 .747 .450 1.240 .050 Chronic Disease Yes No\* -1.059 .209 .347 .230 .522 <.001 Residence Area Rural\* Urban -.169 .170 .844 .605 1.179 .321 4.5 Independent t-test and [Pearson correlation](#) An [independent t-test](#) was conducted on [the](#) non-categorical data extracted from the survey questionnaire. It was found that, there was a significant difference in the non-categorical variables and depression. A significant difference was observed between depression and family monthly income ( M = 53.76, SD = 51.56, p = 0.03), and PHQ score ( M = 1.62, SD = 1.25, p = 0.01). A Pearson correlation test was conducted to observe the positive or negative correlation between depression and various demographic factors. A strong positive correlation was observed between depression and family monthly income ( r = 0.95, p = 0.03). Table 4.4 Independent t-test for comparison between participants with and without depression Demographic variables Mean Standard deviation p- value p > [0.05 95% Confidence Interval of the Difference Lower Upper](#) Age 22.40 22.27 1.98 2.07 337 -.432 .199 BMI (kg/m<sup>2</sup>) 23.07 22.72 5.08 5.12 .295 -.29 1.40 Academic performance (CGPA) 3.33 3.31 .44 .49 .626 -.091574 .078 Family Income (KBDT) 53.76 45.13 51.56 38.68 .003 -.421 19.671 Number of siblings 2.16 2.34 1.50 1.50 .078 -.297 .201 PHQ Score 1.62 1.67 1.25 1.27 <0.01 9.614 10.998 Table 4.4.1 Pearson correlation between categorical variables and depression Demographic variables r value p-value PHQ Vs Age .031 .338 PHQ Vs BMI (kg/m<sup>2</sup>) .034 .295 PHQ Vs Academic performance (CGPA) .016 .627 PHQ Vs Family Income (KBDT) .095\*\* .003 PHQ Vs Number of siblings -.057 .078 PHQ Score .817\*\* <.001 Chapter 5 Discussion [This study was conducted to](#) address [the occurrence of](#) depression within university-going students in Bangladesh. The population sample size was 952, and this was an in-person survey that was collected from both private and public universities. It was found that 49.1% ( N = 267) of the participants had depressive disorder, and the severity of depression varied, with 57% of the individuals having mild depression, 32% having a moderate level of depression, and 11% having a severe level of depression. The current prevalence of depression is less than that of previous studies conducted in Bangladesh. In a study conducted in 2023, the prevalence estimates of mild, moderate, and severe were 10.4%, 15.9%, and 12.2%, respectively. [The prevalence of depression](#) observed in this study is similar to that of [various studies that have examined depression among the student populations](#) [23]. For example, [the incidence rates for student depression have been reported to be](#) 27.1% in Turkey, 37% in Malaysia, 43.7% in India, 40.9% in Pakistan, 43% in Saudi Arabia, 21.8% in Australia, 63.3% in Egypt, and 23% in the USA [23]. This study further looks into factors that could be contributing to the prevalence of depression. The rapid physical changes that occur during puberty and the accompanying demands of meeting rigorous new social and academic standards, as well as increasing individual responsibility for one's health and happiness, likely contribute to the high rate of depression among university students. Various factors, including low family income, BMI range, family status, smoking habits, and marital relationships, have been cited as causes of depressive symptoms. 5.1 Demographic factors and Depression Age Range In this study, we divided the participants into two broad age groups, one from age 18 to 25 and the other from age 26 to 30. There was no significant difference observed between age groups. This could be due to the fact that only 52 students out of 952, belonged to age group 26- 30. Gender The incidence [of depression was found to be higher](#) in [females](#) compared to males. The odd ratio in the present study was 1.32, indicating [that the prevalence of depression was 1.32 times higher in females than in males](#). BMI The BMI was categorized as follows: underweight or malnourished, with a BMI below [18.5; normal weight](#), with a [BMI between 18.5 and 25.5](#); and [overweight](#), with a BMI above [25.5](#). There was a statistically significant difference, suggesting that a person's [body mass index \(BMI\) is a risk factor for](#) depression. In comparison to the other two groups, participants whose BMI was below 18.5 were more likely to suffer from depression (p<0.016). Economic Impression We divided the incomes into three groups to learn if there was a correlation between depression and the family's financial situation or monthly income. Low class was defined as a monthly income of less than 50,000 taka, the medium class as a monthly income of 50–100,000 taka, and the high class as a monthly income of 100,000 taka or more. According to this research, financial stress was the most significant determinant of depressive symptoms. A statistically significant difference of 0.018 was determined. The [chi-square test](#), [independent t-test](#), and [Pearson correlation](#) all yielded significant results. The Pearson correlation between income and 31 depression revealed a high relationship, with an [r-value of 0.095 and a p-value of 0.03](#). This research shows that students' family income was the most significant determinant of depression. As a result of heightened an alarming factor that likely contributed to the increased occurrence was the cost of living, specifically the sharp increase in the cost of higher education. Residence Area We gathered 499 records from rural areas and 453 from urban areas for this investigation. The rationale behind this move was to reflect the fact that 60% of Bangladeshis reside in rural areas. The study participants' dwelling area was found to have a significant correlation with depression (p<0.07). It was shown that students living in urban regions had a higher incidence of depression compared to those from rural areas. Other factors There was a correlation between depression and other variables, such as chronic illness. A correlation was also found between smoking habits and a heightened prevalence of depression among students. Though it was believed to be a potential factor to student depression,

there was no substantial association between academic achievement and depression. There was no statistically significant relationship between depression and variables such as parental status, family type, degree of education, or living situation.

5.2 Conclusion This study concludes that depression is an increasing issue among Bangladeshi university students and identifies different patterns of prevalence according to socioeconomic status. The results highlight the adverse consequences that are disproportionately experienced by people from low-income origins. This emphasizes the importance of creating programs and support systems that cater to the most disadvantaged groups. The notable disparity in the prevalence of depression between rural and urban areas highlights the necessity of developing mental health programs to effectively tackle the distinct challenges faced by students in various regions. Moreover, the study emphasizes complex characteristics of depression among undergraduate students by identifying various factors such as living arrangements, parental status, chronic illnesses, and other health concerns. The increasing financial demands associated with living and studying, coupled with the mounting academic workload, contribute to a multifaceted confluence of stressors that exacerbate the probability of developing depression. To effectively tackle these factors, it is important to implement comprehensive measures for prevention and intervention. The significance of financial distress on mental health is underscored by the fact that economic status and family income play a crucial role in determining its impact. Addressing economic inequality and enhancing financial stability for students is of paramount importance, alongside the provision of mental health care, as monetary pressures have been shown to have a substantial impact on the development of depression. This study tried to reflect on [the global occurrence of depression among university students](#), with a specific focus on the situation in Bangladesh. The lack of recognition of depression within this specific demographic emphasizes the importance of destigmatizing discussions about mental health and implementing more comprehensive preventive measures.

5.3 Limitations This experiment was mostly focused on the age group of 18 to 25 and very few data was collected from the age range 26-30. The response rate from students completing their Masters was very low and thus it was difficult to identify and generalize various factors that could lead to depression in that group. And finally, this survey was based on PHQ-9 scale and it only measures the depressive symptoms that appeared over the duration of 14 days. This experiment could have been reconducted on the same sample for a second time after an interval of time.

33 However, as the participants were selected at random and anonymous nature of survey, conducting the survey again was not possible.