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Prevalence of Internet Addiction and Associated Factors Among Undergraduate Students of College of Medicine and Health Sciences, Bahir Dar Ethiopia2022

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BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

PREVALENCE OF INTERNET ADDICTION AND ASSOCIATED FACTORS AMONG UNDERGRADUATE STUDENTS OF COLLEGE OF MEDICINE AND HEALTH SCIENCES, BAHIR DAR ETHIOPIA2022.

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ABSTRACT

Background: Internet addiction is one of the fast-growing addictive behaviors and is a significant public health problem affecting a large number of people worldwide. Excessive use of the internet among university students increases their risk of internet addiction and related negative consequences. However, there is limited evidence on the status of IA and its consequences among college students in Ethiopia. This study aimed to determine the prevalence and factors associated with internet addiction among medical and health sciences students of College of Medicine and Health Science.

Objective; the aim of this study was to assess the prevalence of internet addiction and associated factors among undergraduate students in the college of medicine and health sciences of Bahir Dar University.

Method; A cross-sectional study was conducted among Bahir Dar University College of Medicine and Health Science students from August to September 2021. A total of 449 students were selected systematically and interviewed using a structured questionnaire. Bivariate logistic regression was first used and then variables with p-values <.2 were entered to multi variable analysis and finally variables with p-values <.05 used for final analysis.

Result; the response rate was 97.3% & the prevalence of internet addiction in this study was 44.1 %(n=198) (95% CI 39.2_48.8). The factors significantly associated with internet addiction were using of smart phones p=0.015 (AOR=8.142, 95% CI; 1.511, 43.8), being permanently online day and night p<.001 (AOR=7.4, 95% CI; 2-3.6), playing mobile games p=.016 (AOR=2.795% CI; 1.2-6.075) and students who had psychological depression p=0.015(AOR=9.726; 95% CI; 1.566-60.4).

Conclusion: Internet addiction is growing health problem among students of medicine and health science. The overall prevalence of internet addiction in college of medicine health science, Bahirdar University is in the ranges of global prevalence. The factors with significant association with internet addiction were having smart phones, being online permanently day and night, playing mobile games and psychological depression. In this study the harmful consequences of

excessive internet use in this population was due to excessive use of smart phones for games, using the internet permanently day and night and psychological depression

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LIST OF ACRONYMES

BDU----------Bahir Dar University

CMHS----------College of Medicine and Health Sciences

COVID-19--------Corona Virus Infection Diseases 2019

EBR ----------Ethiopian Birr

ADHD ----------Attention deficit hyperactivity disorder

IA----------Internet Addiction

IAT----------Internet Addiction Test

IGD----------Internet Gaming Disorder

KPDS10--------Kessler Psychological Distress Scale

OR----------Odds Ratio

PI----------Principal Investigator

PIU----------Problematic Internet Use

PLEs----------Psychotic like Experience

PSQI----------Pittsburgh Sleep Quality Index

SD----------Standard Deviation

SOHS---------School of Health Sciences

SOM----------School of Medicine

SOPH--------School of Public Health

YIAT--------Young's Internet Addiction Test

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1.INTRODUCTION

1.1. Back ground:

The internet has become an essential means for communication, academic research, information and entertainment(1, 2) . However, over users of the internet lead to less self-reliance in social skills and the predisposition to be isolated(3)

Internet addiction is one of the increasing addictive behavior and is an important public health problem, that affects a large number of people globally(4).It is defined as any Internet -related, compulsive behavior which interferes with normal living and causes severe negative impacts on family, friends, loved ones, and one's work environment (5). Internet addiction is a repeated behavior leading to significant harm or distress, which is not reduced by the person and persists over a significant period of time (e.g. at least 12 months), making functional impairment (6).By any name, it is a compulsive behavior that completely dominates the addict's life, make the Internet a prior to family, friends, organizing principle of addicts' lives and work(7).

This may be due to the fact that now a days there has been dramatic decrease in the internet costs due to launch of cheap internet plans making it affordable to people of lower, socioeconomic status accessibility of Wi-Fi(8). The prominent influences the use of the Internet has on undergraduate students are: they spend study time surfing the Internet for non-academic purposes, reply to chats or surf the Internet while attending a lecture and also emerged that many of the students try to spend less time on the Internet and fail(9).

In Islamabad, Pakistan University students in relation to intensity of Facebook use, significant mean difference in salience, tolerance, mode modification, relapse, withdrawal and significant mean difference in conflict were found(10). The main purposes of internet use is for social networks ,for games, for news or information, to work or study, for sexual content with internet use patterns of normal use, mild dependence pattern, moderate to severe dependence which results in depression and/or anxiety disorders (11). College students are sexually active, liable to alcohol and tobacco and other substance use that lead to internet addiction(12).

In Davangere, Karnataka Medical students, IA was 30% mild and 10% had moderate addiction due to social networking, Facebook (72.7%) and WhatsApp (64%) for entertainment

(62.7%),and keeping in touch with friends and family (61.3%) (22). Psychiatric morbidity has been associated with internet addiction which includes mood disorders, anxiety disorders, substance use disorders, psychotic disorders, impulse control disorders and distress and also association between social media use and poor academic performance in medical students(23)

In screening positive for depression/anxiety and content accessed (games, sexual content) continued risk factors for internet addiction, while work/study associated access remained as protective factor against internet addiction(13).

The implications of internet addiction (IA) as well as its association with sleep, mood disorders and self-esteem can hinder their studies, impact their long- term career goals and have wide and detrimental consequences for society as a whole(14). Internet addiction could be a major concern in university medical and Health Science students. The objective of this study is to assess the prevalence of IA and associated factors among CMHS.

1.2.Statement of the Problem

Internet has become an essential part of our life, however internet addiction is a growing public health problem affecting many scopes of our lives(15). Internet addiction is caused by highuse of the Internet to the extent of 'addiction' being the focus of much global concern(15, 16). The problem of internet addiction varies across the World, high in Asia, low in Europe and not constant in Australasia and North America (17). College Students in Hanoi, Vietnam who had depression, anxiety, and stress were suffering with internet addiction (18).Similarly in Brazil, individuals screened positive for depressive or anxiety disordersaccess contents such as gaming and sexual content were also internet addicted (19).

Technological advancement resulted in increasingthe possibility of internet addiction in medical students and more in males than to females especially in India(20) . Now a days, there has been increasing global acknowledgement that excessive online video gaming lead to noticeable functional impairment and psychological distress for a significant minority of users and the magnitude of the problem of Gaming Disorder(GD) estimated to be 10%–15% in Asian countries and 1%–10% in western countries(21).

High levels of internet use, and websites with self-harm or suicide content behavior were mostly connected with internet addiction(22).

Entertainment (watching movies, listening songs, social networking websites), caused IA and negatively affected academic performance of male Indian Medical College students(23). Collecting evidence on IA has demonstrated several consistent findings, such as the high rate of psychiatric comorbidity(24).

In Korean schools, male and female students were almost equally affected by moderate and severe internet addiction (25). The relations between IU-PIU and anxiety, social anxiety, depression and general psychological distress have been examined mainly as predictors, and less as potential consequences of IU-PIU, across mainly Asian populations (Korean, Singaporean) and over different periods of time (26). Age, gender, depression, and stress were the potential key factors affecting IA(27).

In Bangladesh,spending more time on social media websites was the most common online activity among the participants which results in internet addiction(28).Poor academic performance, a negative relationship between teachers and student, academic pressure and having classmates with problematic Internet use contributed to the risk of IA(29).

Egyptian Medical students, Facebook results in physical problems such as eye irritation, post ponding /forgetting meal, headache disturbance of sleep pattern, holding urine or defecation, feeling lethargic, back pain, change in body weight, change in physical exercise and change in meal size (40).Severely internet addicted Egyptian Non-medical and medical students lost sleep at night(30). Attention deficit hyperactivity disorder (ADHD) and mainly major depression are also the most common comorbid conditions to IA (31).

Similarly, using internet both at the hostel/ home and college, using internet for a long time(5 h or more per day) and using internet for social networking were the reasons for IA inUndergraduate Tanzanian Medical students (2).

This non substance use Global public health problem is affecting Addis Ababa University main Campus students in rangesof moderate to severeinternet addiction(11). Magnitude of the

problem inWollo University is too high, 85% of under graduate students internet addicted, mild, moderate, and severe Internet Addiction Mainly caused by psychoactive substance use(32).

This study assessed the factors including environmental influences (university settings) and relationship between IA and anxiety, depression, and psychoactive substance use(33).

1.3. Significance of the study

There were studies that recommended to study the association between IA and psychoactive substance use, university setting and mental health related factors. The findings of this study will help in understanding the Internet Addiction among undergraduate Medical and Health Science students of College of Medicine and Health Science (CMHS). This can provide valuable learning, training and practical strategies to teachers, administrators and experts of training issues.

The research findings also will be helpful for future researches on Internet Addiction. This study also will explore the different levels of internet addiction of Medical and Health Science students of Bahir Dar University College of Medicine and Health Sciences.

2.LIRATURE REVIEW

A worldwide review carried on behalf of the German health ministry reports that international prevalence rates for IA range from 1.5%- 8.2%(34). A cross-sectional survey in high school students of 11 European countries revealed an overall prevalence rate of 4.4%.C(35). Asian cultures have had the most significant problems with IA varying from 2.4%_ 13.5% in Chinese schools and from 1.6% to 20.3% in South Korean adolescents(36). In the United States, prevalence rates vary from 0.7%- 26.3% in adolescents and college students(37). In Europe, rates have a similarly broad range between 1% and 18.3% in random surveys(38). Studies of IA rates in other countries also fluctuate between 0.7% in Indian college students to 17.3% in Qatari adolescents and young(39).

2.1. Global Magnitude of Internet Addiction in College Students

Today, internet and computer use are deep-seated in modern society but, we still know relatively little about the effects of internet addiction on our psychological functioning, mental health, and

general well-being(7). According to internet addiction review in 2017, prevalence of IA in Turkey 5%, US 8.1%, Norway 1%, China 4.6%, Hungary 4.3%, South Korea 1.6%, Taiwan 10.8, Italy 5% are addicted(40).

On self-awareness of the uncontrollability of an impulse, prevalence rate of IA among Japanese college students is 26.1% (24). In college students of Nagpur, Maharashtra a study revealed that according to IAT score, (61.47%) were average users, (34.83%) were possible addicts and (3.68%) were addicts of the internet(41).In among female students at Jouf University, Saudi Arabia, according to the YIAT scale of Internet addiction, 48.6% of the students scored normal Internet users and 49.5% and 1.9% of the students had moderate and severe addictions, respectively(42).

Among undergraduate students in Nepal, overall, 35.4%, 35.4% and 21.2% of students had poor sleep quality, internet addiction and depression respectively(14).Similarly in Taiwan female College students, Internet addiction was significantly associated with subjective sleep quality, sleep latency, sleep duration, insomnia, sleep disturbance, use of sleep medication, and daytime dysfunction(43).

The prevalence of IA in students from an educational institution in Brazil was 50.8% and the rate was higher among individuals who had screened positive for depressive or anxiety disorders than among those who had not(44).In another study in Taiwan during COVID-19, there were higher neuroticism, higher impulsivity, higher depression, lower self-esteem, lower subjective well-being, lower actual social support, higher virtual social support, and lower family function(45). Internet addiction in Malaysia among medical students is 45% male and 32% of female(46). Anxiety, depression, stress Insomnia are also the major problems related to internet addiction in University Students (47).

2.2.Magnitude of Internet Addiction in African

In Tanzania, the general prevalence of internet addiction among 500 undergraduate medical students was 31%(48). Facebook is the most frequently used social media by Egyptian Medical students (93%) which results in physical problems such as eye irritation, post ponding /forgetting meal, headache disturbance of sleep pattern, holding urine or defecation feeling lethargic back

pain due to Facebook use , change in body weight, change in physical exercise and change in meal size (49).

2.3.Magnitude of Internet Addiction in Ethiopia

In Addis Ababa University Main Campus Students (71.7%) of students are “normal” internet users, 24.3 % and 3.9% of students described “moderate” and “severe” level of internet addiction respectively(50). Another study in Wollo University on internet addiction was 466 (85%) of the 305(55.6%), 153(27.9%), 8(1.5%) mild, moderate, and severe Internet Addiction respectively

(32). In another study in BDU, the prevalence of sever PIU is 1.8% and mild PIU 33.4% respectively(33).In Dilla University magnitude of internet addiction was 19.4% with male predominated(51).

2.4. Factors Associated With Internet Addiction

According to a study medical students in Nagpur, Maharashtra, being male is more risky for internet addiction (36.36%) as compared to females (32.87%)(20).In Saudi Arabia University students, communication (47.3%), utilization of mobile phones for Internet access (79.5%), and other devices such as laptop, tablets, and desktop were used by 15.4%, 4.3%, and 3.2% of the students, respectively(42).

The duration of internet usage is more than 5 hours per day (69%) and spending on the monthly internet pack more than Rs. 400 (64%) among the internet addicts students of a medical college in Karnataka (52). The other factors is that more students spent more time in Internet use during COVID-19, and the consequences of lockdown(27).

Among Taiwanese College students sleep duration was related with three symptom patterns of internet addiction, specifically, salience, excessive use, and lack of control(43). Smartphone ownership was very high in both populations, 95% and 97.5% in Japanese and Thai students respectively with same trend of social media use whereby 97.7% of Japanese students and 99.6% of Thai students had earlier used social media(53).

Proportion of undergraduate students in Nepal using tobacco was 9.1% and that who consumed alcohol was 19.1% and 20.9% of the students were sexually active which are associated factors of internet addiction(12). Kurdish university students who use Snapchat excessively were more

under risk to become addicted to the internet rather than to Facebook, Instagram and YouTube applications(54). In Japanese college students, 39.4% of male respondents answered ‘Internet gaming,’ whereas 75.1% of female students used it for social networking services(24).

Among medical and allied health sciences students in Northern Tanzania, the factors associated with internet addiction are duration of using the internet per day, primary purpose for internet use, commonplace for internet use and long time, internet use 5 h or more per day(48).

A study in Wollo University showed that spending more time on the internet and mode of internet access were related to Internet Addiction which means those who used mobile internet were 45% lower risks of having Internet Addiction than those who used data card(55). The most reasons for internet use were social networking (75.5%), entertaining (watching videos, sports, music, and news) (73.6%), academic works (72.5%), and online gaming (61%)(2). In Ethiopian university students the use of internet for social networking is the strongest predictor of PIU(33). There are no any studies conducted in Ethiopia in medical and health science College students.

3. CONCEPTUAL FRAMEWORK

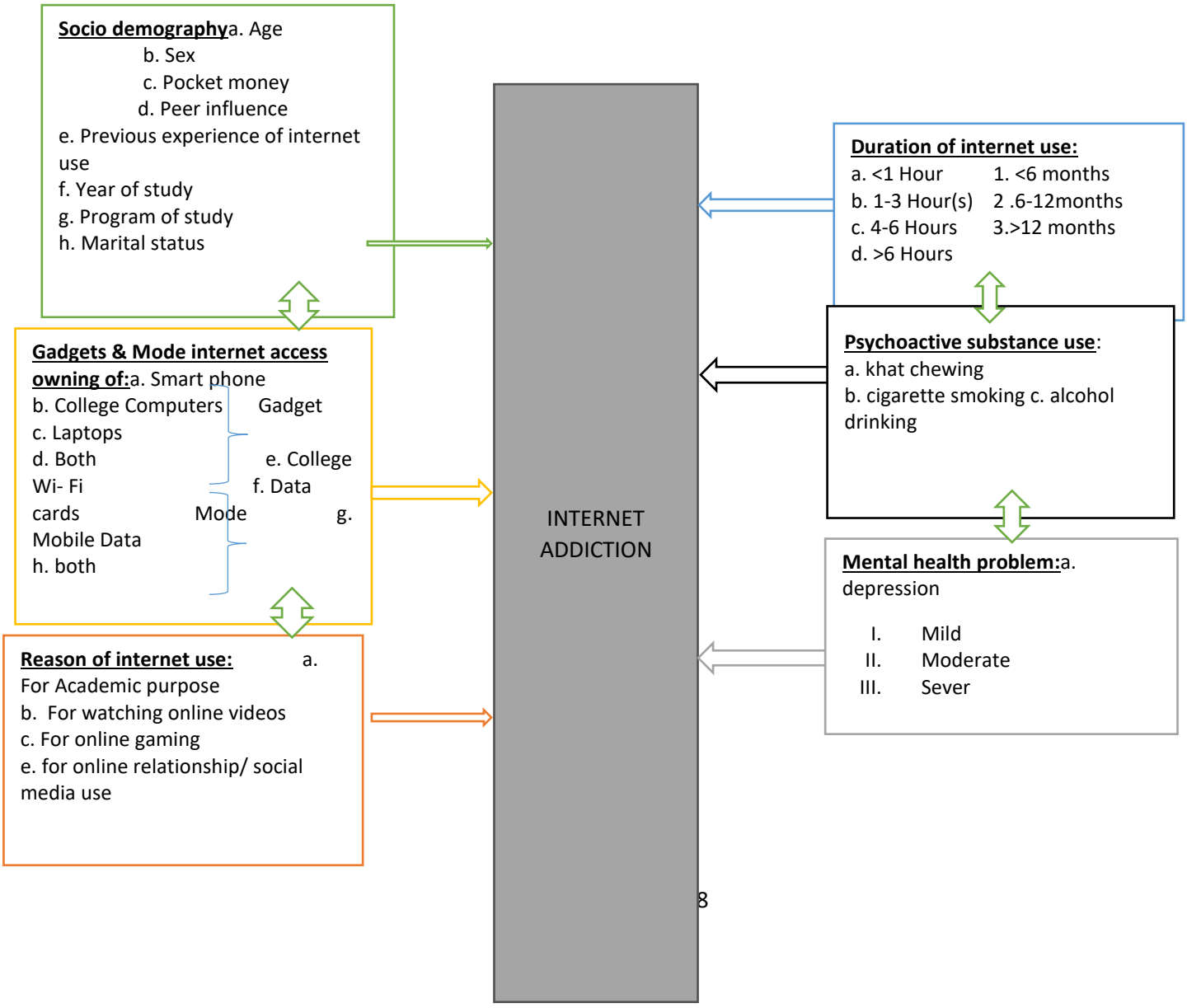

Figure 1Conceptual framework

4. OBJECTIVES

4.1. General Objective

- To measure the prevalence of Internet Addiction (IA) and associated factors among undergraduate students of CMHS 2021.

4.2. Specific Objectives

- To determine the magnitude of internet use addition among undergraduate students in CMHS, Bahir Dar University, Ethiopia 2021.
- To identify factors associated with internet use addiction.

5. METHODOLOGY

5.1. Study design, Area and Period

A Cross-sectional study was carried out to assess the prevalence and associated factors of Internet Addiction among undergraduate students of College of Medicine and Health Sciences (CMHS). This study was conducted at College of Medicine and Health Sciences from August 2021 to September 2021. Bahir Dar University College of medicine and health Science is one of the five colleges in Bahir Dar University and has 3 schools (the School of Medicine (SOM), the School of Public Health (SOPH) and the School of Health Sciences (SOHS).Bahir Dar University College of Medicine and Health Sciences has total number of 1410, 885 male and 525 female undergraduate regular Students.

The study was conducted at College of Medicine and Health Sciences from August to September 30 2021. The sample size was determined using EpiData taking 85% prevalence of Internet Addiction taken from Wollo University and factors which were significant used for calculation with the following assumption: 80% power, AOR, 95% CI, 5% margin of error, 10% non-response.

5.3. Source Population

- All students of College of Medicine and Health Sciences.

5.4.StudyPopulation

- All Undergraduate Students ofCollegeofMedicineand health Sciences.

5.5. Study Units

- Students who are randomly selected.

5.6. Sample size determination techniques

5.7. Sampling Size Calculation

The sample size was determined using EpiData taking 85% prevalence of Internet Addiction taken from Wollo University and factors which were significant used for calculation with the following assumption: 80% power, AOR, 95% CI, 5% margin of error, 10% non-response.

Sample Size for objective One; Single population formula was first used as an objective one from previous study, p =85%(32). Considering the following assumptions; 85% prevalence, 95% confidence and 5% margin of error 10% nonresponse rate.

n= (Zα/2)2 X p (1-p)/d2

Where n=minimum sample size

p= the proportion of internet addiction 0.85

Z α/2=the critical value at 95% confidence level of certainty which is 1.96

d = the margin of error between the sample and the population which is 4%

n= (1.96)2 x 0.850(1-0.850)/ (0.04)2 = 306=>

306+306×0.1=337.

- Sample size for objective two

  Using Epi-Info version 7, the sample size was calculated by 80% power, 95% CI, 10% Non-response rate and AOR as follows; then the final sample size is 462.

Table 1Sample size Calculation.

S.no	Factors identified	Categories	AOR (95% CI.)	% outcome in expose	% outcome in un exposed	Sample size using	Non-response rate =a*10%	Total Sample size = a+b	Re

				d group	group	(Epi info7) (a)	(b)	(c)	e
1	Current Khat chewer	yes(Ref, No)	3.34	96.2	82.4	240	24	264	Y f
2	Playing mobile games	yes(Ref, No)	2.4	91.4	79.9	348	34.8	383	Z be al
3	**Current alcohol Drunker**	**yes(Ref, No**	**2.32**	**92.8**	**82.4**	**420**	**42**	**462**	2(
4	Mental distress	yes(Ref, No	2.69	95.3	82.6	327	32.7	360	

Therefore the final sample size was 462.

5.7.Sampling Procedure

Systematic random sampling was used after listing the 1410 students. The sampling frame for the study was the Lists of all 1410 (885 male and 525 female) undergraduate regular students. The ideal size of the sample from the entire population to choose to be a part of the sample was 462. Then assigning the interval ("K") by dividing the total population("N") by the sample size ("n") which is K= N/n =1410/462 ≈3.A random number from 1-3 for the first sample selected and then adding 3, which was the standard distance between the elements of the sample, until the sample size (462) reached.

5.8. Data Collection Tool

A Structured Self-administered, English version questionnaire was disseminated to individual sampled students. The questionnaires had 6 parts. Part one is socio-demographic characteristics; age, sex, marital status, year of study, program of study a structured questionnaire was used to assess sociodemographic characteristics.

Parttwo wastime-associated factors; structured questionnaire prepared from different kinds of literature to assess time-associated factors (such asInternet use per day in hours start of internet use how often to login and off per day.

Part three reasons for internet use; for entertainment,(for online relationship with social media , downloading music/video, for watching pornographic, for watching online gaming for academic or scientific purpose.

Part four was psychoactive substance use-associated factors;alcohol drinking, cigarette smoking use of Khat, Cigarette.

Part five consists of Young's Internet Addiction Test (YIAT); a structured, self-administered questionnaire used to assess InternetAddiction (18, 51). It includes 20 questions with a scoring of 1–5 for each question and a total maximum score of 100. Based on scoring subjects were classified into normal users (0–30), mild (31–49), moderate (50–79), and severe (80–100). Internet Addiction groups. Mild Internet addiction, moderate Internet addiction, and severe Internet Addiction were considered as having an Internet Addiction and those who scored less than 30 points out of 100 were normal internet users(56)

Part six was mental health problem-associated factors and assessed by Kessler10 (K10). The K10 scale is a simple measure of mental distress. The K10-item scale was validated and used to measure mental distress (depressive, anxiety, and psychotic symptoms).The Scores will range from 10 to 50 and a score under 20 was likely to be well, a score of 20–24 was likely to have mild mental distress, a score of 25–29 was likely to have moderate mental distress and a score of 30 and above were likely to have severe mental distress.

5.8. Incursion and Exclusion Criteria

5.8.1. Inclusion Criteria

- All registered regular undergraduate medical and health sciences students at CMHS who were in class during the data collection period.

5.8.2 Exclusion Criteria

- The students who were severely ill.

5.8.3 .Study Variables

5.8.4.Dependent Variables

- The dependent variable in this study was Internet use Addiction (1=yes,0=no)

5.8.5.Independent Variables

The independent variables included;

- Socio-demographical characteristics, particularly age in years, year of study, sex and marital status program of study.
- Internet use practices included gadgets for internet use (college computers, personal/ own device or a combination of these two), method of internet access (College Wi-Fi, mobile data, data cards or both),
- Time in hours spent using internet per day,
- Primary purpose using the internet (academic/ online relationship for social networking and surfing, down loading videos, online gaming, pornographic content).
- The other independent variable was mental distress (depression).
- Psychoactive substance use like Khat, Alcohol drinking and cigarette smoking were also the other independent variable**.**

5.9. Operational definition & Terms

Young's internet addiction test was calculated and the IAT score by adding the scores obtained for all 20 items, with a total ranging from 0 to 100. After computing scores for each question, it was categorized internet addiction into a binary variable whereby those with a score of 30 and above were considered addicted to the internet and not addicted if less than 30(2).

Problematic internet use (PIU); is addictive behavior and include excessive or poorly controlled Preoccupations, urges, or behaviors regarding computer use and internet access that lead to impairment(9, 57).

Internet Addiction (IA); Any online-related, compulsive behavior which interferes with normal living and causes severe stress on family, friends, loved ones, and one's work environment(33). **Internet Use (IU);** Whether it's surfing the Web, sending emails, online games, various

downloads, or using network gaming consoles, any activity on the Internet generates usage of internet.

5.10. Data management and Analysis

Data was cleaned, coded, and entered Epi-data Version 3.1 and exported to SPSS version 25 for analysis. Descriptive statistics were used to describestudy variables using percentage mean deviation andthe results of the study presented by tables and figure.Bivariate and multivariable logistic regression were used to assess the association between dependent and explanatory variables. Those variables with p value ≤ 0.2 bivariate analyses were fitted to the Multivariablelogistic regression analysis.Finally, variables with P value < 0.05 in the final model had been taken as significant association with the outcome variable.

5.11.Data Quality Assurance

Training was given to the data collectors and supervisors on the data collection tool. Supervision was held regularly during the data collection period by the researcher, to check on a daily basis for completeness and consistency. Every day filled questionnaires were checked for completeness by all data collectors and supervisor before they returned from data collection.

5.12 Ethical Clearance

Ethical clearance was obtained from the Ethical Clearance Committee of, CMHS Bahir Dar University research and academic director.Supporting letter was taken fromChief Academic and research director.Informed consent was taken from the study participants before administration of the questionnaire. Participation was voluntary based and confidentiality was kept.

6.RESULT

This study was carried out among 449 students withresponse rate of 97.2%. From 449 participants, 267(59.5%) were male with age range from 20 to 45 year and mean age being 25.3 years with SD of 3.14612.The age categories of the students was 20-24 years 43.9.%, 25-29 years 46.8%, and >30 years 9.4%.

Proportions of students according to their program of study were doctorof medicine 114(35.4%), nursing127(28.3%),) medical laboratory science49(10.9%,physiotherapy11(2.4%),pharmacy83(18.5%), anesthesia21(4.1%) and midwifery students44(9.8%. Year of study of the participant were 75(16.7%) 2nd, 189(42.1%) 3rd,104(23.2%) 4th, 42(9.4%) 5^{th,} 24(5.3%) 6th and 15(3.3%) 7thyear Table -2).

Table 2Socio-demographic characteristics CMHS, BDU 2021

Variables	Response	Frequency	IA		Percent of IA
			yes	No	
Age ranges	20-24	197	97	100	21.6
	25-29	210	80	130	17.8
	>30	42	21	21	4.8
Sex	Male	267	131	136	29.2
	Female	182	67	115	14.9
Marital status	Married	104	47	57	10.5
	Single	345	151	194	33.6
Year of study	2^{nd} -4^{th}	386	163	205	36.3
	5^{th}-7^{th}	81	35	46	7.8
Program of study					
	Doctor of medicine	114	58	56	12.9
	Nursing	127	46	81	10.2
	Medical Laboratory	49	28	21	6.2
	Physiotherapy	11	2	9	0.4
	Pharmacy	83	33	50	7.3
	Anesthesia	21	9	12	2
	Midwifery	44	22	22	4.9

6.2 Prevalence of Internet Addiction

The prevalence of internet addiction among CHMHS students was 44.1% (95% CI, 39.2-48.8)(n=198).

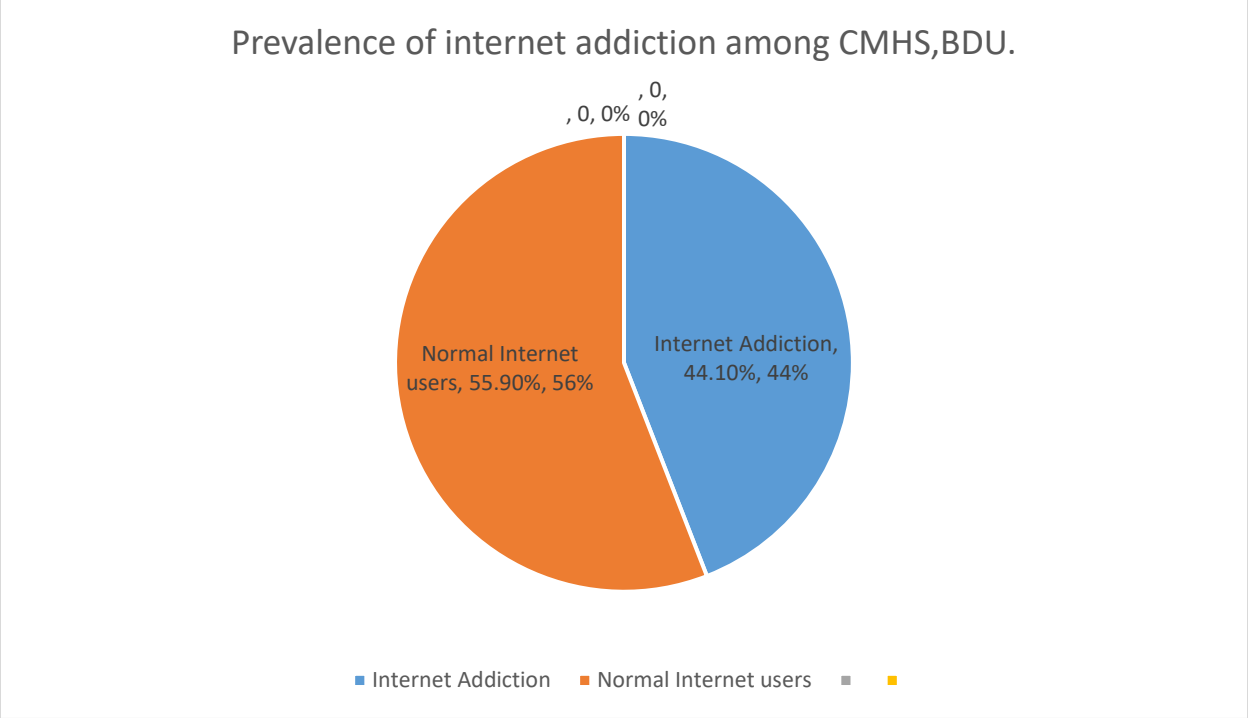

Figure 2 Prevalence of Internet addiction among CMHS students, BDU 2022.

6.3 Types of apparatus mode of internet access, Purpose and Duration of Internet userelated variables of under graduate students in CMHS-BDU

Most of the students were smart phone users for internet use 244(54.3%), 161 (35.9%) students used mixed (smart phones laptops and college computers) for internet use. The most common mode of internet access for the students were college Wi-Fi 258(57.5%), mobile data 183(40.8) and data card 7(21.6%).

Majority of CMHS –BDU studentsused internet for entertainment like getting into relationship for social media 268(59.7%), playing mobile games 199(44.5%), downloading music 310(69.5%), watching videos online 288(64.1%),for pornographic videos 132(29.4%) which were risk factors

of internet addiction. The other reason for internet use was for academic purpose such as to get reading materials or for scientific purpose 387(86.2%), to forget daily problems encountered 238(53%),due to shortage of enough books in the library 189(42.1%) and preference to read soft copies than hard copies 254(254(56.6%).

Duration of start of internet use in years was one factor for IA. Duration of start of internet use among the students was more than 12 months 418(93.1%) and less than 12 months 31 (6.9%). Internet use in a day among students were less than an hour54(12.2%),1-3hours 188 (64%),4-6 hours 73 (10.2%) and >6 hours 33(7.1%). The mean hours of internet use per day was 2.6 with SD of 2.45898 and the maximum was 16 hours.

Table 3 Frequency vs internet addiction among CMHS, BDU

Variables	Response	Frequency	IA		% IA
			YES	NO	
Duration of internet use in hours	<1hr	54	28	26	6.2
	>1hour	294	179	198	39.8
Starting time of internet use	<12months	31	16	15	3.6
	>12months	418	183	235	40.8
Frequency of internet use	Login and off during the day	383	156	27	34.7
	Permanently online day and night	66	42	24	9.4
Gadgets (tools) for internet use	College computers	15	6	9	1.3
	Mobile phone	244	106	138	23.6
	mixed	190	86	104	19.2
Mode of internet access	College wi-fi	258	177	141	39.4
	Mobile data	183	77	106	17.1
	Data cards	8	4	4	0.9
Reasons of internet use					
	Getting into	268	126	142	31.6

	relationship with social media				
	For Playing mobile games	268	199	250	44.3
	To download music	310	158	139	35.2
	To watch videos online	288	152	161	33.9
	To watch pornographic videos	132	75	317	16.7
	To download reading materials	388	174	62	37.8
	No enough books in the library	189	168	93	20.7
	Preference of soft copies	254	125	195	27.8
	Peer influence to read soft copies	185	84	114	18.7
Psychoactive substance use	Current khat use	39	28	410	6.2
	Smoking status	13	12	424	2.7
	Drinking of alcohol	67	46	382	14.9

6.4 Mental Health Problem Related Factors and Psychoactive substance use

Psychoactive substance use related factors of participants were 39(8.7%) use khat, 13 (2.9%) were current smokers and 67(14.9%) were alcohol drinkers. In bivarite analysis current kchat use (p=.001), cigarette smoking (p=.001), Alcohol consumption (p=0.07) were factors for internet addiction.

From 62 participants who had mild psychological depression, 41.9% and 12.9% were mild and moderate internet addicted respectively. On the other hand from 34 students who had moderate

psychological depression 32.4%) were mild internet addicted and 15 (41.1%) were moderate internet addicted. All the 3 sever internet addicted were also had severe psychological depression. Table 5 shows the detail association of Internet addiction and Psychological Depression

Table 4 Psychological depressive scale Internet addiction score scale cross tabulation (based on severity of IA)*

Psychological depressive scale* Internet addiction score scale cross tabulation							
			INTERNET ADDICTION SCORE SCALE				
			Normal internet users	Mild IA	Moderate IA	Sever IA	Total
Psychological depressive scale	No depression	Count	211	70	7	0	288
		% within psychological depressive scale	73.3%	24.3%	2.4%	0.0%	100.0%
	Mild depression	Count	28	26	8	0	62
		% within psychological depressive scale	45.2%	41.9%	12.9%	0.0%	100.0%
	Moderate depression	Count	8	11	15	0	34
		% within psychological depressive scale	23.5%	32.4%	41.1%	0.0%	100.0%
	Severely depressed	Count	4	21	37	3	65
		% within psychological depressive scale	6.2%	32.3%	56.9%	4.6%	100.0%
Total		Count	251	128	67	3	449
		% within psychological depressive scale	55.9%	28.5%	14.9%	0.7%	100.0%

6.5. Factors associated with Internet Addiction

In the final model,playing mobile games, using internet for more than 3 hours, using internet more than one year, using smart phone for internet use and having mental destress were factors significantly associated with internet addiction.

In the final model, students who play mobile games p=0.011, (AOR=3.223, 95% CI; 1.302-7.980) were 3.223 times more likely to internet addiction as compared to those who does not play mobile games. Students using the internet for more than 3 hours, p=0.003(AOR=7.753,95% CI;2.6-9.664) were 7.753 times more likely to be addicted to internet as compared with students who used the internet less than one hour. Regarding their starting of using internet, students who started internet use more than one year p=0.007(AOR=7.658, 95% CI;1.753-3.345) were 7.658 times more likely to internet addiction as compared to those who started internet use less than one year. Student using smart phones for internet p=0.008(AOR=12.319 95% CI; 1.909-7.951) were more likely to internet addiction as compared with students using collage computers for internet use. Students who login and off occasionally more likely to internet addiction as compared with those who were perm

In association with mental health, students suffering with psychological depression were2.946times more likelyto internet addiction (AOR=2.946, 95% CI 1.595-5.441) as compared to those who had no depression. Students who had moderate psychological depression were6.574, timesmore likely to internet addiction (AOR=6.574, 95% CI 2.617-16.517) as compared to students who had no depression.

Table 5 Factors associated with IA among students of CMHS BDU

Variables	Response	IA		COR (95%; CI)	AOR (95%CI)	p-value
		Yes	No			
Sex	Male	267(59.5%)	131(29.2%)	1.653(1.125-2.430)	.705(.267-1.862)	0.480
	Female	182(40.5%)	67(14.9%)	1		
Gadget(tools) for internet use	College computer	6(1.3%)	9(2%)	1		
	Mobile phone	106(23.6%)	138(30.7%)	16.98(15.759-50.101)	12.319(1.909-79.315)	<0.008*
	Mixed	86(19.2%)	104(43.2%)	1.244(.432-3.659)	1.016(.229-4.517)	.0691
Frequency of login	Permanently day and night	156(34.7%)	227(50.6%)	2.546(1.482-4.376	2.546(1.482-	0.001*

					4.376	
	Login & of occasionally	42(9.3%)	24(5.3%)	1		
Duration of internet use in months	<12 months	15(3.4%)	16(3.6%)	1		
	>1year	183(40.8%)	235(52.3%)	1.027(.272-3.880)	7.658(1.753-33.458)	0.007*
Duration of internet use in a day	<1 hour	28(6.2%)	137(30.5%)	1		
	>1 hour	170(37.8%)	114(25.3%)	4.521(2.73-7.469)	7.753(2.026-9.664)	0.003*
Reasons of internet use	Playing mobile games	112(25%)	87(19.4%)	2.455(1.674-3.63	3.233(1.302-7.980)	0,011*
	Watching online videos	152(33.9%)	136(30.3%)	2.794(1.849-4.222)	1.090(.391-3.038)	.869
	Downloading reading materials	174(38.8%)	213(47.4%)	1		
	Psychoactive substances related factors					
	Cigarette smoking	13(2.9%)		17.074(2.2-132.5)	12.346(.475-3.26)	0,130
	non cigarette smokers		12(2.7%)	1		
	Alcohol drunkard	67(15%)		3.315(1.902-5.766)	1.540(.465 5.096	0.480
	Not alcohol drinkers		46(10.2%)	1		
Depression	No depression	288(64.1%)	211(47%)	1		
	Mild depression	62(13.8%)	28(6.2%)	2.946(1.595-5.441	2.946(1.595-5.441)	.001*

	Moderate depression	34(7.6%)	8(1.7%)	6.574(2.617-16.517)	6.574(2.617-16.517)	<0.001*
	Severe depression	65(14.5%)	4(0.9%)	21.089(7.158-62.134)	21.089(7.158-62.134)	<.001*

1 Reference

7. DISCUSSION

This research tried to determine the prevalence of internet addiction among students of CMHS in Bahirdar University. Besides, the study also looked for the association between internet addiction and different sociodemographic and internet-usage-related variables. In this study the overall prevalence of IA among Bahir Dar University CMHS was 44.1% with 95% CI, 39.2-48.8.The rest of the students (55.9%) were normal internet users which implies that these group of students have greater control over the use of the internet.

The prevalence of internet addiction in Bahirdar University College of Medicine and Health Sciences undergraduate students was half of that of a cross sectional study conducted in Wollo University which was 85%(55). The magnitude of internet addiction among undergraduate students of CMHS BDU is more than that of Dilla University (19.4%) and Addis Ababa (28.2%) university which had difference among universities of Ethiopia(50, 58).

This may also due to the fact that in recent years there has been intense decrease in the internet costs due to launch of cheap internet strategies making it reasonably priced to people of lower socioeconomic status.

The factors significantly associated with internet addiction in this study were psychological depression as in Dilla University,playing mobile games in line with Wollo university undergraduate students (51, 55).The likely implication of this may be that, persons suffering from depression can have the tendency to have an Internet addiction; depressed mood can weaken the coping with stress, and may let subjects escape the undesirable involvement through entering into internet. Consequently, students who have depressive symptoms usually seek

internet for socializing with distant friends and short term relief which makes them addicted to internet.Prevalence of internet addiction was among those who used internet for a long time, i.e

1h or more per day as in Tanzanian medical and health science students(59).This implies that students of CMHS,BDU spent most of their time online and are at risk of IA. Vast majority of the students preferred to access the internet at college in contrast to a study in King Abdulaziz University, who used the internet at home(97.5%)(60).This may be due tobetter internet access at the CMHS, in BDU than any other places and most students were at college dormitories.

Factorssignificantly associated with internet addiction in this study were playing mobile games, as another study in wollo University(55). The prevalence of internet addiction in this study was10% higher than a cross sectional study in Tanzania University Medical and other health science students(2).Males were more prone to internet addiction (29 %) than female (14.9), which corresponds with previous studies literatures.This may be due to lack of recreational places for the students. The study revealed that the overall prevalence of IA is 44.5%,(95% CI; 39.2-48.8) which was close to a study previously conducted among the students of a university in Sarawak, Malaysia(61).

The majority of the students 244(54.3%) utilized mobile phones for Internet access while other devices such as college computers, laptop and mixed were used by 15 (3.3%), 29(6.5%), and 161(35.2%) of the students, respectively as in a cross sectional study among female students at Jouf University, Saudi Arabia(42).The most common mode of internet access for the CMHS students were college Wi-Fi 258(57.5%), followed by mobile data 183(40.8).A similar cross sectional study among students of a medical college in Davangere , Karnataka, Mobile internet services (88.7%) and Wi-Fi (16%) were the commonly used modes to access internet which was to the contrary to this CMHS BDU students(62).This implies that costs of mobile data may higher in Ethiopia so that students use wi-fi for internet access.

Participants who were more depressed were also addicted to the internet, as a similar cross sectional studies conducted among Senior Medical Students in King Abdul-Aziz University, Jeddah, Saudi Arabia and the United States of America, the burden of internet addiction and

COVID-19 pandemic respectively(63, 64).This had the implication of depression as a risk factor for IA.

Significantly more subjects who did not have IA accessed study related content on the internet than those who did. These findings point to a possible factor of protection against IA in subjects who access academic type of content. One possible explanation is that people who access these contents do it because they have commitments to their studies, leaving less time to overuse of the internet for social media.

8. STRENGTH AND LIMITTATIONS

8.1.Strength

8.2.Limitations:

The cross-sectional nature of this study limits causal interpretation of the findings. There may be recall bias for duration of internet use among participants. Because the questionnaire is self-administered, over or under reporting the real magnitude of the problem expected.There was no follow up, no in-depth interview except supervision as the study is quantitative cross sectional study.Another limitation is being a cross-sectional study which revealed the relation between Internet addiction and some risk factors without being able to determine a cause-effect relationship.

9.CONCLUSION

Internet addiction is growing hidden problem, which has psychological and social impact on medical students and requires preventive strategies and therapeutic interventions. The overall prevalence of internet addiction in college of medicine health science, Bahirdar University is in the ranges of global prevalence. The factors with significant association with internet addiction were having smart phones, being online permanently day and night, playing mobile games and psychological depression. In this study the harmful consequences of excessive internet use in this population was due to excessive use of smart phones for games, using the internet permanently day and night and psychological depression. Overall, the present study integrated various factors concerning the usage of internet use the factors which may lead to pathological internet use (internet addiction).This had negative impacts to the students that will result in poor health care services at the end.

10. RECOMMENDATION

Bahir Dar University College of medicine and health science should let every departments of schools to give assignments and group work to students to spend most of their time in studying or using internet for scientific purpose.

Researcher should do further studies on magnitude of IA in the general population especially the young.

Given the results of this study, students should havestrategies to combat internet addiction and its psychological impact and setting boundaries between studying and internet use. Spending some time with friends, establishing a healthy routine, being conscious of and regulating technology use, reducing the duration and frequency of internet consumption, having pre-scheduled technology-free periods are recommended to students.

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12. Appendix

12.1. Information sheet

Study on Prevalence of Internet Addiction and Associated Factors among medicine and Health Science Students (CMHS), Bahir Dar Ethiopia.

Hello good morning /good after noon, my name is_____, I am here today to collect data on Internet. The study is being conducted by Getachew Mengistu from Bahir Dar University.

The objective of this study is to assess the prevalence of internet addiction and its associated factors here in Bahir Dar University College of Medicine and Health Science. I request you to take part in this study and to respond genuinely. Your cooperation and willingness is greatly helpful in identifying problems related to internet addiction among students of CMHS. The study will be conducted through self-administered questionnaire and you are being asked for a little of your time, about 10 min, to help us in this study. Your name will not be written in this form and will never be used in connection with any information you tell us. There is no possible risk associated with participating in this study except the time spent for responding to the questionnaire. All information given by you will be kept strictly confidential. Your participation is voluntary and you are not obligated /enforced/ to answer any question you do not give to answer. If you feel discomfort with the question, it is your right to stop any time you want. If you have questions regarding this study or would like to be informed of the results after its completion, please feel free to contact the principal investigator.

Address of the principal investigator:

Getachew Mengistu

Tell: Mobile +251-0918024020

E-mail:getachewmengistuah07@gmail.com

Are you willing to participate in this study?

1. Yes - …….. Continue to the next page
2. No- …… Skip to the next participants in this study.

12.2. Consent form

In signing this document, I am giving my consent to participate in the study titled "Prevalence of internet addiction and associate factors among students of CMHS in Bahir Dar University". I have been informed that the purpose of this study is to assess the prevalence of internet addiction and associated factors among Medicine and Health Science students in CMHS.

I have understood that participation in this study is entirely voluntarily. I have been told that my answers to the questions will not be given to anyone else and no reports of this study ever identify me in any way. I have also been informed that my participation or non-participation or my refusal to answer questions will have no effect on me. I understood that participation in this study does not involve risks.

I understood that Getachew Mengistu is the contact person if I have questions about the study or about my rights as a study participant.

Respondent's signature_____

Interviewer

Name _____Signature_____Date_____

Supervisor's name _____ signature _____ Results of interview questionnaire

1.Completed 2. Refused 3. Partially completed You have a right to ask any question or if you need clarification on the study please contact the investigator, Getachew Mengistu, by the following address:

Questions	Response	skip option

12.3. Data Collect Tool

Part 1. Sociodemographic Characteristics

101	Age in years?	-------
102	Sex of participant?	1. Male 2. Female
103	What is your year of study?	1. 1st year 2. 2nd year 3. 3rd year 4. 4th year 5. 5th year 6. 6th year 7. 7th year
104	What is your program of study?	1. Doctor of medicine 2. Nursing 3. Medical laboratory science 4. Physiotherapy 5. Pharmacy 6. Anesthesia 7.midwifery
105	How much monthly pocket money you received from family_____ EBR?	_____
106	Where is your place of residence?	1. In campus

		2. Off campus	
107	What is your marital status?	1. In union 2. Not in union	
108	From whom did you receive your source of fund?	1. From family 2. From other sponsor	

Part 2: Characteristics of Internet Use

No	Questions	Responses	Skip option
201	What is your Gadget for Internet use?	1. College computers 2. Mobile phones 3. Laptops 4. Mixed	
202	What is the most common mode of Internet access?	1. College Wi- Fi alone 2. Mobile data 3. Broadband 4. Data card	
203	How often did you stay login?	1. Login and off occasionally during the day 2. Permanently day and night	
204	When did you start Internet use?	1. 0- 6 months 2. Less than 12 months	

		3. More than 12 months
205	For how long (time) did you use Internet in a day (in hours)?	1. Never 2._____hour(s)
206	How many hours do you spend for surfing in one day?_____	_____hours

Part 3. Reasons of Internet Use

No	Questions	Responses	Skip option
301	What is the reason you use internet? (more than one possible is possible)	301 a. Getting into relationship online 1. Yes 2. No 301 b. Playing mobile games 1. Yes 2.no 301 c. Downloading music/video 1. Yes 2. No 301 d. Watching videos online 1. Yes 2. No 301 e. 1 For watching pornographic videos.. 1.Yes	

		2.no 301 f. down loading reading materials 1.yes 2.no
302	Sometimes I tried to reduce the time I spend for surfing.	202a. because of my mobile bill 202b.in order to prevent burning eyes 202c. I've got backaches and similar aches because of too much time sitting in front of the computer. 202d Any other-------

Part 4. Psychoactive Substance use

401. Do you currently chew kchat?

1. Yes 2. No

402. Are you currently cigarette smoker?

1, yes 2.no

404. Are you currently drunker?

1. Yes 2.No

405. If yes, how often do you drink alcohol in a week?

1.1-3 times a week 2.4—6 times a week 3. 7 days a week

406. How much do you drink at a time you are drinking?

1. 1bottle 2. 2 bottles 3. 3 and more bottles

407. If you use all or any the above psychoactive substance, do you use any of the following?

1. Download reading materials 2. Facebook, Instagram, telegram, tiktok 3.watch pornographic videos using internet 4.

408. Do you have depression?

1. Yes 2.No

409. If yes to Q 410, what are the causes of the depression?

1. If I drink Alcohol 2. If I stop drinking alcohol

3. If I use khat 4.If I stop khat

5. If I stop using other psychoactive substance like cannabis.

Part 5. YOUNG's INTERNET ADDICTION TEST

sex----------

Male Female

Age Years ------

Online Do you use the Internet for work? Yes No

This questionnaire consists of 20 statements. After reading each statement carefully, based upon the 5-point Likert scale, please select the response (0, 1, 2, 3, 4 or 5) which best describes you. If two choices seem to apply equally well, circle the choice that best represents how you are most of the time during the past month. Be sure to read all the statements carefully before making your choice. The statements refer to offline situations or actions unless otherwise specified.

0 = Not Applicable

1 = Rarely

2 = Occasionally

3 = Frequently

4 = Often

5 = Always

No	Questions	Responses	Skip option
501	How often do you find that you	0 = Not Applicable	

	stay online longer than you intended?	1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
502	How often do you neglect household chores to spend more time online?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
503	How often do you prefer the excitement of the Internet to intimacy with your partner?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
504	How often do you form new relationships with fellow online users?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always

505	How often do others in your life complain to you about the amount of time you spend online?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
506	How often do your grades or school work suffer because of the amount of time you spend online?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
507	How often do you check your email before something else that you need to do?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
508	How often does your job performance or productivity suffer because of the Internet?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often

		5 = Always
509	How often do you become defensive or secretive when anyone asks you what you do online?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
510	How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
511	How often do you find yourself anticipating when you will go online again?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
512	How often do you fear that life without the Internet would be boring, empty, and joyless?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently

		4 = Often 5 = Always
513	How often do you snap, yell, or act annoyed if someone bothers you while you are online?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
514	How often do you lose sleep due to being online?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
515	How often do you feel preoccupied with the Internet when off-line, or fantasize about being online?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
516	How often do you find yourself saying "just a few more minutes" when online?	0 = Not Applicable 1 = Rarely 2 = Occasionally

		3 = Frequently 4 = Often 5 = Always
517	How often do you try to cut down the amount of time you spend online and fail?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
518	How often do you try to hide how long you've been online?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
519	How often do you choose to spend more time online over going out with others?	0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always
520	How often do you feel depressed, moody, or nervous when you are off-line, which	0 = Not Applicable 1 = Rarely

	goes away once you are back online?	2 = Occasionally 3 = Frequently 4 = Often 5 = Always

6. Kessler psychological distress scale (K10)

Please tick the answer that is correct for you:	All of the time (score 5	Most of the time (score 4	Some of the time (score 3)	A little of the time (score 2)	None of the time (score 1)
601. In the past 4 weeks, about how often did you feel tired out for no good reason?					
602. In the past 4 weeks, about how often did you feel nervous?					
603. In the past 4 weeks, about how often did you feel so nervous that nothing could calm you down?					
604. In the past 4 weeks, about how often did you feel					

hopeless?
605. In the past 4 weeks, about how often did you feel restless or fidgety?
606. In the past 4 weeks, about how often did you feel so restless you could not sit still?
607. In the past 4 weeks, about how often did you feel depressed?
608. In the past 4 weeks, about how often did you feel that everything was an effort?
609. In the past 4 weeks, about how often did you feel so sad that nothing could cheer you up?
610. In the past 4 weeks, about how often did you feel worthless?

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SCHOOL OF RESEARCH AND GRADUATE STUDIES

(DEPARTMENT OF HEALTH SYSTEMS MANAGEMENT AND HEALTH ECONOMICS)

THESIS APPROVAL SHEET

Students

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Sign. _____ Date: 26/8/2014 E.C

The following graduate faculty members certify that this student has successfully presented the necessary written final thesis and oral presentation for partial fulfilment of the thesis requirements for the degree of masters of public health in **General Master's in Public Health**

Approved by:

Advisor: MULUSEW ANDUALEM **(Associate Professor, PhD)**

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Name: -_____ Sign_____ Date: _____

Internal Examiner:

Name: -_____ Sign_____ Date: _____

Chair holder

Name: -_____ Sign_____ Date: 13-10-14

Faculty dean:

Name: -_____ Sign_____ Date: _____

Internal Examiner:

Name: -_____ Sign_____ Date: _____

Chair holder

Name: -_____ Sign_____ Date: _____

Faculty dean:

Name: -_____ Sign_____ Date: _____

12.4 Declaration

I, the undersigned, declare that the thesis comprises my own work. In compliance with internationally accepted practices, I have acknowledged and refereed all materials used in this work. I understand that non-adherence to the principles of academic honesty and integrity, misrepresentation/ fabrication of any idea/data/fact/source will constitute sufficient ground for disciplinary action by the University and can also evoke penal action from the sources which have not been properly cited or acknowledged.

Name of the student_____

Signature _____

Date of submission: _____

Place: Bahir Dar

This thesis has been submitted for examination with my approval as a university advisor.

Advisor Name: _____

Advisor's Signature: _____

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Chair holder

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