Addis Ababa University

College of Health Sciences

Department of Medical Laboratory Sciences

Laboratory personnel occupational stress, workload, and associated factors in selected public and private health facility at Addis Ababa, Ethiopia.

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COLLEGE OF HEALTH SCIENCE

DEPARTMENT OF MEDICAL LABORATORY SCIENCES

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Abbreviation and Acronyms

AOR	Adjusted odd ratio
COR	Crude odd ratio
CPD	Continues training program
DRERC	Department Research and Ethical Review Committee
HCW	Healthcare worker
IQC	Internal quality control
ISO	International Organization for Standardization
LIS	Laboratory information system
PSS	Perceived Stress Scale
SPSS	Statistical Package for Social Sciences
USA	United States of America

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Abstract

Background: Laboratory personnel plays a vital role in almost every aspect of patient care, from prevention to diagnosis and treatment. However, rising level of stress among them are becoming a public health concern. Heavy workload and job demand are leading to increase stress, which negatively impact job performance, satisfaction and overall well-being. Feeling of overwhelmed and anxious reduces staff ability to effectively manage their responsibilities.

Objective: To assess the occupational stress, perceived workload, and associated factors in selected public and private health facilities in Addis Ababa, Ethiopia, in 2025.

Method: Facility based cross-sectional study was conducted from January to April 2025 using quantitative and qualitative data from 411 laboratory professionals selected through convenience sampling. Data were collected using self-administered questionnaires and interviews. To assess occupational stress and workload, perceived stress scale measurement and NASA Task Load Index were employed respectively. Data was entered and analyzed by using the Statistical Package for Social Sciences (SPSS) program version 27. Logistic regression was employed to examine the association between dependent and independent variables. In multivariate analysis, a P-value of less than 0.05 were considered statistically significant. Qualitative data was analyzed by using thematic approach.

Result: This study had a total of 411 respondents with a 97.4% response rate. The overall prevalence of occupational stress was 40.6% with 46.6% among public facility and 34.6% of private facility laboratory professionals. Gender, monthly income, and training were significantly associated with occupational stress. The overall prevalence of high workload in this study was 51.8%, with 59.2% public and 44.4% private health facilities. Work experience, and facility type were significantly associated with workload.

Conclusion and Recommendation: Laboratory professionals are experiencing high level of stress and workload. Improving staffing levels, using LIS, having fair inclusive risk allowances, and increasing salaries would help to reduce occupational stress and workload.

Keywords: Occupational stress, laboratory personnel, and Workload.

1. Introduction

1.1.Background of the study

Medical laboratories play a significant role in determining clinical decisions and providing Clinicians with a clue in the treatment and management of diseases (1). Laboratory personnel plays a vital role in almost every aspect of patient care, from prevention to diagnosis and treatment (2). Globalization and the global financial crises have made occupational stress a major problem in all workplaces and are affecting almost all countries, all professions, and all categories of workers, as well as families and societies (3). Stress costs people in terms of their health, well-being, and job satisfaction. It also costs the company in terms of absenteeism and employee turnover, which can affect the quality of patient care (4). Healthcare is generally a stressful job due to its heavy workload, challenging working environment, handling challenging patients, uncertainty over patient treatment, and numerous occupational health and safety dangers (5).

Occupational stress can cause psychological, behavioral and physical manifestations potential1y leading to longer-term health effects. Occupational stress is also characterized as the negative physical and emotional reaction that arises when job requirements do not align or exceed an employee's capabilities, resources, or needs (6). Stress at work is a physical and emotional reaction when the job requirements do not meet the capabilities of the worker (7). Stress arises from an individual's inability to manage pressures that threaten his or her psychological stability. These external pressures have been known to arise from different factors within the environment and are known as stressors. When it is generated from our work environment it is called occupational stress (8).

The term workload describes as a range of demands paced on an individual, including quantitative, qualitative, mental, and physical tasks. Workload represents the amount of processing capacity required during work, balancing an individual energy sources and task demand. Workload reflects the level of difficulty of one's work that may include any variable. The workload is the total amount of work that must be completed by individuals within a specified period (9).

Workload is the number of tasks given to employees. It can have both positive and negative effects, especially if the work is not allocated to employees fairly. A normal workload helps employees to

stay focused and motivated completely. At the same time, a low workload makes employees lazy and pushes them to be involved in unnecessary office politics. Heavy workload gets employees so tired soon pushing them to cause imperfection in their work. It is not possible that an employee can always be assigned a normal workload. Sometimes, he or she needs to be allocated a heavy workload because, in the healthcare sector, it cannot be predicted when patient flow turns high and when it turns low (10). This study will provide valuable and timely evidence on the level of occupational stress and workload, along with the associated factors in both public and private health facilities.

1.2. Statements of the problem

Healthcare environments are known to pose high risk for occupational stress, and burnout, often leading to job dissatisfaction. This is largely due to increased patient load and the imbalance between patient and available health professional ratios. Its estimated that the global cost of work related stress is approximately $5.4 billion every year (11). Globally, occupational stress is estimated to affect one in three employees. Occupational stress occurs in all professions, particularly, healthcare professionals comprise an important group that can be affected by occupational stress due to high-pressure nature of their work environment. In health care, employee occupational stress can have a negative impact on the quality of patient care (12).

Healthcare workers in the developed world report high rates of sickness, absence from work, burnout, and distress when compared to other sectors. Approximately 2 million people die every year from occupational hazards, work-related stress, and injuries (13). There were 822,000 work-related stress, depression, or anxiety incidents, with a prevalence rate of 2480 per 100,000 employees (14). In low and middle income countries, the number of people suffering from work-related stress or worsening their condition as a result of stress is increasing at an alarming rate, and it is becoming a public health concern (15). Laboratory work is characterized by complex, repetitive, fixed, and procedurally rigid physical tasks. These demands have been linked to documented experiences musculoskeletal disorders, repetitive stress injury, pain, and disability. These conditions are exacerbated by prolonged work periods and inadequate rest which have an impact on both the well-being of laboratory personnel and the quality of their work (16).

Medical laboratory technicians are among healthcare professionals experiencing high level job stress (17). In regions like sub-Saharan Africa, they often the most overlooked professionals in the health systems. As a result, high turnover rates among laboratory staff can impact both performance and the quality of clinical services (18). Several factors can contribute to this situation, such as limited resources, low morale, understaffing that increase workload, and poor management support (19). Laboratory personnel are often involved in activities requiring prolonged standing and bending before the microscope, long sitting in front of the computer, and handling various chemicals. When these activities are performed with poor ergonomics patterns they cause occupational stress which will further affect their health (20).

Work overload happens when employees are assigned more takes than they can reasonably complete in given time. When job demand become too much employees may overwhelmed and anxious, making it harder to carry out their duties effectively (21). Thus, heavy workloads and job stress are significantly reducing job performance and satisfaction (22). There have been several studies that are conducted on occupational stress and workload among healthcare professionals, especially in nurses but research specifically focused on laboratory professionals is limited globally, specifically in Ethiopia. Therefore, this study seeks to explore the effects of occupational stress and workload on laboratory workers in Ethiopian context.

1.3. Significance of the study

The result of this study provides valuable insights for hospital management by assessing the level of occupational stress and workload on laboratory personnel in a Selected health facility in Addis Ababa, Ethiopia. By addressing these issues, the study was important in enhancing laboratory operations, which is crucial for health care delivery. Furthermore, this finding will serve as the foundation for developing strategies and policies to reduce occupational stress and manage the workload of laboratory personnel effectively. Moreover, this research is crucial for improving employee well-being by identifying factor that leads to stress and work overload.

2. Literature review

Laboratory medicine plays a fundamental role as it is integral to many clinical decisions from the prevention to management of patient disease. Laboratory professionals support clinical decisions by providing information necessary to provide high-quality, safe, effective, and appropriate care to patients (23). However, ensuring and maintaining high quality is challenging due to staff shortages, poor communication systems, lack of training, poor infrastructure, and lack of resources (24).

2.1. Occupational stress

Occupational stress is a widespread issue among healthcare professionals globally. A research conducted in Suital City (2023) among healthcare professionals reveled that stressed healthcare workers often reported physical discomfort that interfered with their daily tasks and social lives (25). In China, a study conducted in 2021 among medical staff found that 59.4% of participant were affected by occupational stress. This prevalence was particularly high among medical professionals aged 40 to 50, with advanced degrees, senior professionals titles 10–20 years of experience, and those working more than 48 hours a week (26).

Similarly, in Malaysia, a cross-sectional study conducted in state of Johor in 2023 reported that 74% of laboratory staff experienced occupational stress (27). In Nigeria, a cross-sectional conducted in tertiary hospital in Hospital in 2020 reported 64.5% prevalence of occupational stress among health care workers. The primary stressors included inadequate staffing, levels of absence of shift work, and long working hours being primary stressors faced by doctors, nurses, and laboratory scientists (13).

In Ethiopia, A systematic review and meta-analysis found that 52.9% experienced occupational stress, while 39.1% suffered burnout (28). Another cross-sectional study conducted in Ethiopia 2023 on the prevalence and determinants of occupational depression, anxiety, and stress among Ethiopian healthcare workers, occupational stress took the highest percentage with an overall prevalence of 39.0%, 57.6%, and 68.0%, respectively (29).

Additionally, institutional-based cross-sectional study conducted at Felege-Hiwot Referral Hospital found that the prevalence of workplace stress among healthcare professionals was 68.2%, with medical lab professionals score a mean stress score of 15.7 (12).

A comparative cross-sectional study in Zone 1 of the Afar region (2021), revealed that 67.5% of public and 47.2% of private healthcare workers experienced occupational stress, with an overall prevalence of 57.5% (15). Similarly in the Amhara Regional State (2016), a cross-sectional study conducted among laboratory professionals in public hospitals found that 65.5% of the have the intention to leave the jobs, largely due to stress related factors(18).

In East Gojam Zone (2016), a cross-sectional study among nurses found that 57.3% experienced occupational stress (30). Likewise, a hospital-based comparative cross-sectional study among 304 nurses in Dessie City, Amhara (2021) showed that 48.4% of nurses suffered from work related stress, with 51.6% in public hospitals and 46.4% in private hospitals (31)

In Jimma (2022), a cross-sectional study among 153 medical laboratory professionals found that the overall prevalence of burnout was 30.1% (32). In the Gurage Zone, Southern Ethiopia (2021) a cross-sectional study reported that 78.3% of healthcare workers experienced occupational stress (33). Furthermore, a study carried out in Amanuel Hospital, Addis Ababa (2017) among health care professional found that 46.8% of healthcare workers were experiencing stress related to their job (11).

2.2. Workload

Workload is another key concern in healthcare settings. A cross-sectional study involving 206 healthcare organizations in the USA (2020) revealed that the perceived work overload ranged from 37.1% and 47.4% among physicians and other clinical staff respectively (34). In the Philippines, a descriptive-correlational study conducted among the medical technologists in clinical laboratories in a city in Panay, Philippines, Medical technologists were experiencing excessive workloads but their level of overall performance was highly satisfactory (35).

In Northern Sweden, a cross-sectional study among home care workers (2016) found that 28% of participants experienced high workloads (36). Similarly, a study conducted among different-grade

hospitals in China (2013) revealed that the prevalence of workload among physicians is 31.8% in tertiary hospitals (37).

A cross-sectional analytical study done in Vasei Hospital, Iran (2016) found that 83.8% of nurses had a high workload and 16.2% had a moderate level, while 68.78% of them had a moderate level of stress, 20.00% had a high level and 11.25% of nurses had a low level of job stress. This result has important implications for performance and overall healthcare quality (38).In Denpasar City, a study found that workload had a negative and insignificant effect on employee performance but work stress had a negative and significant effect on employee performance (39).

A descriptive study conducted at El Santa Central Hospital, Egypt reported that 75.5% of respondents experience high workload (40). Similarly, a systematic review and meta-analysis found that 54% of nurses experience high mental workload. Which negatively affects their psychological well-being and performance (41).

According to a study conducted in public health institution at Harare, work overload has been greatly affecting employee's performance at work with a mean work overload score of m = 3.947 and a standard deviation of 0.405 (42). An institution-based cross-sectional study conducted at comprehensive specialized hospitals in Northwest Ethiopia, 180 participants reported a high workload. Three-quarters of the laboratory staff were dissatisfied with the salary and 54.9% reported no system for the employee recognition period (43).

2.3. Associated factors

A cross-sectional study conducted among healthcare providers in Saudi Arabia, found that most participants reported moderate stress levels (71%) and 12.2% of participants reported a high stress level. Several factors associated with increased risk of stress level for example being single were associated with higher risk of stress level in 74.6%, moderate and high stress levels were also reported in the group without enough income 75% and 15.6% respectively. Additionally, among those who were satisfied with their job, high-stress levels reported less than 5 (3%) compared to those who were unsatisfied 22.4% (44).

A cross-sectional study was conducted among nurses in Iran, with 78.4% of respondents reporting that their job was stressful. Female gender, being married, lower educational levels, increased work hours, and working in emergency, general wards are Risk factors for higher occupational stress that are identified through multivariate analysis (45). In another Iranian study reported a 26% prevalence of occupational stress among hospital staff, the major sources of occupational stress include inadequate pay, inequality at work, too much work, staff shortage, poor recognition and promotion, time pressure, job insecurity, and lack of management support (5).

According to the study in Meerut, 77% of nurses experience stress. The common causes of stress were due to poor attitude of male patients, the absence of separate washrooms for female nurses, posting in busy departments with increased workloads, and inadequate salary (46). A cross-sectional study was conducted among laboratory staff from both private and government sectors in Johor, Malaysia reported that 74% of participants experienced stress, and total daily patient specimens were associated with stress scores (27).

Similarly, a cross-sectional study conducted among healthcare professionals working at National Guard Health Affairs, Eastern Region, Kingdom of Saudi Arabia found that the overall prevalence of job stress was 66.2%. Job Stress Results indicated that the majority of the healthcare professionals who participated reported moderate to high stress levels, and those who worked more than 50 hours per week had significantly higher stress levels (79.4%; $p = .001$) (47).

An institutional-based cross-sectional study conducted among healthcare professionals in Gonder, Ethiopia, found that 69.9% of the participants had not received refresher training and 90.3% of participants were dissatisfied with their salary (48). Another cross-sectional study conducted among healthcare professionals at Bahir Dar, Ethiopia, found a prevalence of 48.6% workplace stress. Educational status and working experience were the factors associated with workplace stress (49).

An institutional-based cross-sectional study was conducted in the Hadiya zone, Ethiopia. 54% of participants reported being stressed at workplaces. Being female, rotating shifts, working in the intensive care unit, and having post-basic training were found to be significant with workplaces stress (50). Similarly, a cross-sectional study was conducted at private and public health institutions in Addis Ababa, 35.2% of respondents believed that their laboratories did not provide

quality laboratory services and the major reported factors affecting the provision of quality services were the shortage of resources 64.3%, poor management support 57.3%, poor equipment quality 53.4%, high workload 41.1%, lack of equipment calibration 38.3% and lack of knowledge 23.3% (24).

3. Conceptual frameworks

The conceptual frame work of this study shows how occupational stress and workload influenced by socio-demographic (Age, Sex, Marital status, educational level, Experience and Salary), organizational and environmental, and workload related factors. This factors interact to affect stress and workload level experienced by laboratory personnel, which can impact their well-being and performance.

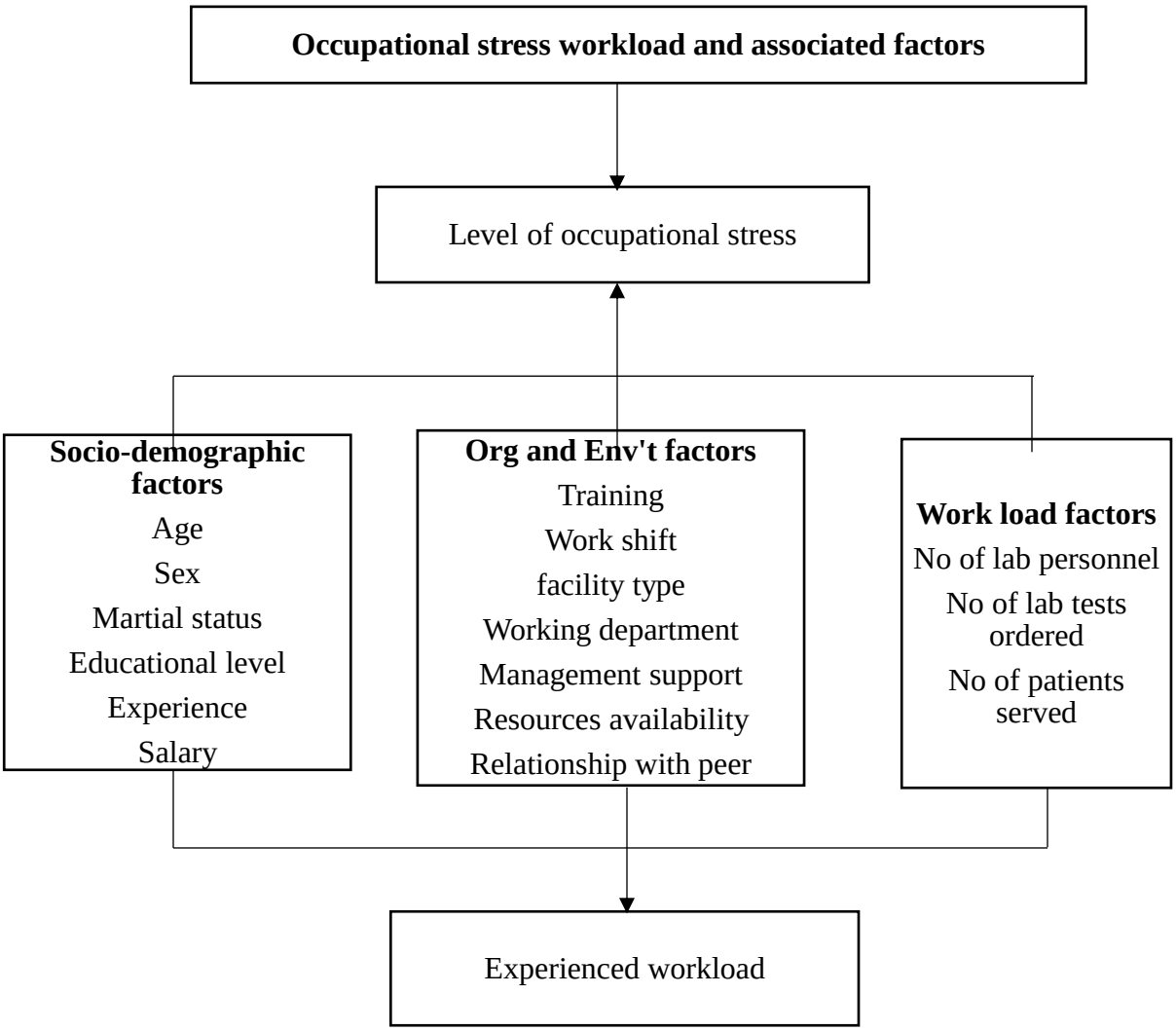

Figure 1: Conceptual framework showing the relationship between occupational stress, workload, and associated factors among laboratory professionals in Addis Ababa (44, 49, 51)

4. Objective

4.1. General objective

- ✓ To assess occupational stress, workload, and their associated factors among laboratory personnel in selected health facilities at Addis Ababa, Ethiopia, from January 2025 to April 2025.

4.2. Specific objectives

- ✓ To determine the level of occupational stress among laboratory personnel working in public and private health facilities.
- ✓ To measure the workload experienced by laboratory personnel in public and private health facilities.
- ✓ To identify factors associated with occupational stress and to workload among laboratory personnel.

5. Methodology

5.1. Study area and setting

The study was conducted in Addis Ababa, Ethiopia. Addis Ababa was the capital and largest city of Ethiopia with a population of 5, 461 000, and covers an area of 527 sq km with a 4.46 % growth rate in 2023. The health system in Addis Ababa was a complex interaction of private and public providers. There was a total of 15 public hospitals, 40 private hospitals, 98 health centers and more than 79 specialty clinics. The public sector is organized under three major bodies: Six were run by the Addis Ababa health bureau, six by the federal ministry of health, and three by the ministry of defense, all of which provide teaching, specialized care, and referral services (52). The private sector also provides a wide range of services through hospitals, and clinics and plays a significant role in health care delivery. In this study 4 government hospitals, 19 health centers, 12 private hospitals and 11 specialty clinics were included (table 1). This facility was selected based on their availability of laboratory services, willingness to participate, and representation of both public and private sectors.

5.2. Study design and period

Health facility based cross-sectional study using quantitative and qualitative study was conducted among laboratory personnel working in selected public and private health facilities in Addis Ababa, Ethiopia, from January 2025 to April 2025.

5.3. Population

5.3.1. Source population

All laboratory professionals are directly involved in laboratory activity such as technologists, technicians, and laboratory managers working in healthcare facilities at Addis Ababa Ethiopia.

5.3.2. Study population

Laboratory professionals who working in the 46 selected healthcare facilities in Addis Ababa Ethiopia and met inclusion criteria.

5.4. Sample size and sampling technique

5.4.1. Sample size

The sample size is determined using the single population proportion formula considering the following assumptions: Proportion of p=50%, level of confidence 95%, non-respondent's rate of 10%, and margin of error 5%, was considered and the sample size calculation was as follows:

$$n = \frac{Z^2 \cdot pq}{d^2}$$

n= [(1.96)2×0.5(1-0.5)] / (0.05)2=384

Where:

z=1.96 (95% CI)

p= Prevalence rate

q=100-p

d=5% margin of error

By adding a 10% sample for the non-respondent's rate, 384+ (384×10%) the final sample size was 422.

5.4.2. Sampling technique

In this study a combination of purposive and convenience sampling methods was used. First health facilities were selected purposively based on their type (public or private), accessibility during the data collection time and number of laboratory professionals. Then From the selected facilities laboratory professionals who were available at the time of data collection and willing to participate were selected using convenience sampling method. For qualitative study, Purposive sampling technique was used to select professionals until saturation level reached.

In this study, **211 participants from private health facilities** and **211 participants from public health facilities** were included.

Table 1: Lists of health facility that was included in the study

	Public hospital and health center	**Total number of laboratory professional**	**Recruited laboratory professionals**	**Private hospitals and specialty clinics**	**Total number of laboratory professional**	**Recruited laboratory professionals**
1	Alert General Hospital	39	24	Yanet General Hospital	11	10
2	Yekatit 12 General Hospital	54	33	MCM Comprehensive Specialized Hospital	29	26
3	Tikur Anbesa Comprehensive Specialized Hospital	66	39	Afran General Hospital	10	9
4	Yeka Kotebe General Hospital	28	18	Girum Hospital	17	15
5	Abebe Bikila Health Center	6	4	Bethezatha General Hospital	35	32
6	Kuas Meda Health Center	7	4	ICMC General Hospital	15	13

7	Lomi Meda Health Center	7	4	Hallellua General Hospital	18	16
8	Yeka Health Center	7	4	Kadisco General Hospital	11	10
9	Gerji Health Center	8	5	Ayu Primary Hospital	5	4
10	Yeka Abado Health Center	11	7	Yerer General hospital	7	6
11	Meri Health Center	9	6	Landmark General Hospital	11	10
12	Addisu Gebeya Health Center	8	5	Legehar General Hospital	10	9
13	Hidase (gullele) Health Center	6	4	Danu Orthopedic Specialty Center	4	4
14	Shiro Meda Health Center	7	4	Tsigereda Ananiya MCH Specialty Center	8	6
15	Hidase Health Center (lemi kura)	10	6	Ajora Maternal and Child Health Specialty Center	5	4
16	Dilfire Health Center	9	5	Cure Orthopedic Specialty center	4	4
17	Goro Health Center	8	5	Nordic Internal Medicine and Surgical Center	13	11

18	Summit Health Center	8	5	Selam Internal Medicine Surgical Center	9	7
19	Ferensay Akababi Health Center	9	5	Al-Hikma Specialty Center	2	2
20	Bole 17/20 Health Center	7	4	Lubbu Specialized Medical and MCH Center	5	4
21	AfinchoBer Health Center	13	8	Yoko Maternal and Child Health Center	3	2
22	Janmeda Health Center	13	8	Apex Indian Surgical and Internal Medicine Center	6	5
23	Maychew Health Center	7	4	Othorino ENT Specialty Center	2	2

5.5. Eligibility criteria

5.5.1. Inclusion criteria

- ✓ Medical laboratory professionals, including technologists, technicians, and laboratory managers, currently working in selected healthcare facilities at Addis Ababa.
- ✓ Participants who have worked in the laboratory for more than 6 months (53).

5.5.2. Exclusion criteria

- ✓ Laboratory professionals who do not want to participate in the study.

5.6. Study variable

5.6.1. Dependent variable

- ✓ Level of occupational stress
- ✓ Perceived workload

5.6.2. Independent variable

- ✓ Socio-demographic factors (age, marital status, sex, educational level, experience and Salary)
- ✓ Resources availability
- ✓ Management support
- ✓ Relationship with peer
- ✓ Training
- ✓ Work shift
- ✓ Working department
- ✓ Number of laboratory personnel in the healthcare
- ✓ Number of laboratory tests ordered per day
- ✓ Number of patients served per day in the healthcare

5.7. Data collection tool

Data were collected using Structured, self-administered questionnaires that had been adapted from various literature sources, alongside standard Perceived Stress Scale measurement (17, 54, 55) to measure stress levels. The questionaries consisted of different sections covering occupational stress, workload, and associated factors. Occupational stress was measured using the perceived stress scale (PSS), with response options for each question as follows: 0 – never, 1 - almost never, 2 – sometimes, 3 - fairly often, and 4 - very often. The workload was determined using the NASA Task Load Index (NASA-TLX) questionnaire, which includes six dimensions; Mental Demand, Physical Demand, Temporal Demand, Performance, Effort, and Frustration. Each dimension was measured on the Likert scale with the following response options: 1= very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. The average mean was calculated to assess stress level and

experienced workload. Objective workload was also measured by averaging test order per laboratory personnel in each facility.

A qualitative approach was implemented to gather information from laboratory heads. Semi-structured interviews with open-ended questions were used to explore managerial perspectives on occupational stress, workload, and associated factors. The data collection tool was developed in English since medical laboratory professionals had an educational background of at least a diploma or degree.

5.8. Data collection procedure

Data were collected by two trained medical personnel who were not employed in selected health facilities under the direct supervision of the principal investigator. The data collectors were given one-day training on data collection procedures and ethical considerations. The completeness of each questionnaire re-checked by the principal investigator daily upon receiving them.

5.9. Data quality measures

To ensure data quality, several activities were undertaken. A pretest was conducted on 5% of the sample size among laboratory professionals working at Menilik II Specialized comprehensive hospital before the data collection to ensure validity, reliability, and internal consistency. After collecting the pretest data, each individual questionnaire response was checked for any potential problem, such as any uncomfortable or unclear questions, and necessary corrective measures were taken.

5.10. Data processing and analyses

Data were entered and analyzed using the Statistical Package for Social Sciences (SPSS) program version 27. Data cleaning was performed by managing any missing or inconsistent values to ensure accuracy. Descriptive statistics such as tables, graphs, and charts were used to present the findings. Occupational stress was measured using the perceived stress scale (PSS), with response options for each question as follows: 0 – never, 1 - almost never, 2 – sometimes, 3 - fairly often, and 4 - very often giving a total score 0 to 40. The total score for each respondent was calculated by

summing the score of all 10 items. Then, the mean of all participant was calculated. Participant scoring above the mean were classified as having occupational stresse. The participant scoring less than or equal to the mean are classified as not having occupational stress.

The NASA Task Load Index (NASA-TLX) measures perceived workload in six dimensions; Mental Demand, Physical Demand, Temporal Demand, Performance, Effort, and. Each dimension was measured on the Likert scale with response options: 1= very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. The individual scores were averaged to produce a composite workload score for each participant. Then the mean workload score of all participants was calculated. Those who scored above the mean were classified as having high workload, while those scoring less than or equal to the mean are considered as having low workload.

Inferential statistics such as binary and multiple logistic regression were used to determine the relationship between variables. All variables with a value of $p < 0.2$ in the bivariate analysis were included in multiple logistic regression models to determine the significant association. A p-value < 0.05 was considered statistically significant. The qualitative data from interviews with laboratory heads were analyzed using thematic analysis, which involved transcribing the interviews, coding the data, and developing themes that reflected the key findings.

5.11. Operational definition

Occupational stress: professionals who score above the mean PSS are classified as stressed, and those who score below the mean PSS show no occupational stress (56).

Workload: professionals who score above the mean of the NASA Task Load Index are classified as having a higher workload, and those who score below the mean are classified as having a lower workload (57).

Perceived stress scale: a tool used to measure individuals' stress levels over the past months. For each question, it gives the following alternatives: 0 – never; 1 - almost never; 2 – sometimes; 3 - fairly often; 4 - very often (58).

5.12. Ethical consideration

Before data were collected, ethical clearance was obtained from the Department Research and Ethical Review Committee (DRERC) of Addis Ababa University College of Health Sciences School of Allied Health Sciences Department of Medical Laboratory Sciences as well as Addis Ababa Health Bureau. Approval from all hospital and health center managers was also obtained after informing them clearly about the purpose and benefit of the study. Written consent was obtained from each participant before conducting the study. Confidentiality and privacy of the study participant‘s information was ensured throughout the research process by giving the code for the questionnaires.

5.13. Plan for disseminating the findings

The results of the study were disseminated to the Addis Ababa University Department of Medical Laboratory Science. A copy of the results will be provided to the Addis Ababa Health Bureau and the participant health facilities to support improvements in laboratory quality. Additionally, the result will be made available in the University library to serve as reference material for students, researchers, experts, or policymakers for intervention. The findings will be prepared for dissemination through publication in peer-reviewed local and international journals and presented at related conferences and seminars.

6. Result

6.1. Socio-demographics factors

A total of 422 study participants were included in this study, and 411 were returned, making the response rate 97.4%. Of the respondents 211 (51.3%) were females. The average age of participants was 32 with a standard deviation of 5.85 years. Regarding marital status, most of the participants were singles 206 (50.1%), and 200 (48.7%) were married. The majority of respondents 240 (58.4%) reported that they had no children, while 171 (41.6) had children. Among those who had children, 130 (31.6%) had 1-2 children, and 39 (9.5%) had 3-4 children. Of the respondent's majority of them, 333 (81%) were degree holders. Concerning monthly income, 75 (18.2%) of respondents earned < 7000 ETB while 336 (81.8%) earned ≥7000 (Table 2).

Table 2: Socio-demographic factors of laboratory professionals included in the study

Variable	Category	Frequency	Percentage/%
Gender	Female	211	51.3
	Male	200	48.7
Age	<25	52	12.7
	25-29	131	31.9
	>29	228	55.4
Marital status	Single	206	50.1
	Married	200	48.7
	Divorced	5	1.2
Having children	Yes	171	41.6
	No	240	58.4
Educational level	Diploma	37	9
	Degree	333	81
	Masters	41	10
Monthly income	<7000	75	18.2
	≥7000	336	81.8

6.2. Organizational and environmental factors of respondents

Of the total respondents, 206 (50.1%) were working in public health facilities, while 205 (49.9%) worked in private facilities, as shown in Table 3. Regarding work experience 253 (61.6%) of participants had more than 5 years of experience. 88 (21.4%) were working in the chemistry department. In terms of support and resources, 208 (56%) of respondents reported getting necessary equipment "always" and 189 (46%) of respondents always received colleague support. Around half 224 (54.5%) of the respondents get supervisor support sometimes. About 370 (90%) of respondents worked on rotating shifts (Table 3).

Table 3: Organizational and environmental factors of laboratory professionals working in selected facilities.

Variables	**Category**	**Frequency**	**Percentage/%**
Facility type	Public	206	50.1
	Private	205	49.9
Working experience	<2	44	10.7
	2-5 years	114	27.7
	>5 years	253	61.6
Working department	Chemistry	88	21.4
	Hematology	73	17.8
	Microbiology	23	5.6
	Parasitology	56	13.6
	Sample collection	53	12.9
	Serology	30	7.3
	Other	88	21.4
Availability of necessary equipment	Always	208	56
	Sometimes	201	48.9
	Rarely	2	0.5
Colleague support	Always	189	46
	Often	36	8.8
	Sometimes	169	41.5
	Rarely	11	2.7
	Never	6	1.5
Supervisor support	Always	85	20.7
	Often	52	12.7
	Sometimes	224	54.5
	Rarely	41	10
	Never	9	2.2
Working on shift	Yes	370	90
	No	41	10

Training	No	213	51.8
	Yes	198	48.2
Frequency of training	Every six month and below	67	33.8
	Annually	126	63.7
	Rarely	5	2.5

6.3. Workload related factors

Out of 411 participants, 163 (39.7%) worked in the facility with more than 20 laboratory personnel, and 110 (26.8%) of them worked with 6-10 personnel. Among the total 411 participants, 318 (77.4%) of them, said they processed over 200 tests per day. Regarding the number of patients served per day 50 (12.2%) reported serving 151-200 patients per day (Table 4).

Table 4: Workload factors affecting laboratory personnel

Variables	Category	Frequency	Percentage/%
Number of laboratory personnel	1-5	31	7.5
	6-10	110	26.8
	11-15	76	18.5
	16-20	31	7.5
	>20	163	39.7
Number of tests ordered per day	<50	21	5.1
	51-100	29	7.1
	101-150	9	2.2
	151-200	34	8.3
	>200	318	77.4
Number of patients served per day	<50	40	9.7
	51-100	97	23.6
	101-150	85	20.7
	151-200	50	12.2
	>200	139	33.8

6.4. Prevalence of occupational stress

The overall prevalence of occupational stress was 167 (40.6%). The prevalence among government facilities was 96 (46.6%) with a mean of occupational stress of 21.14 ± 6.99, while the prevalence among laboratory professionals who work in private health facilities was 71 (34.6%) with a mean of 17.2 ± 6.6 (Figure 3).

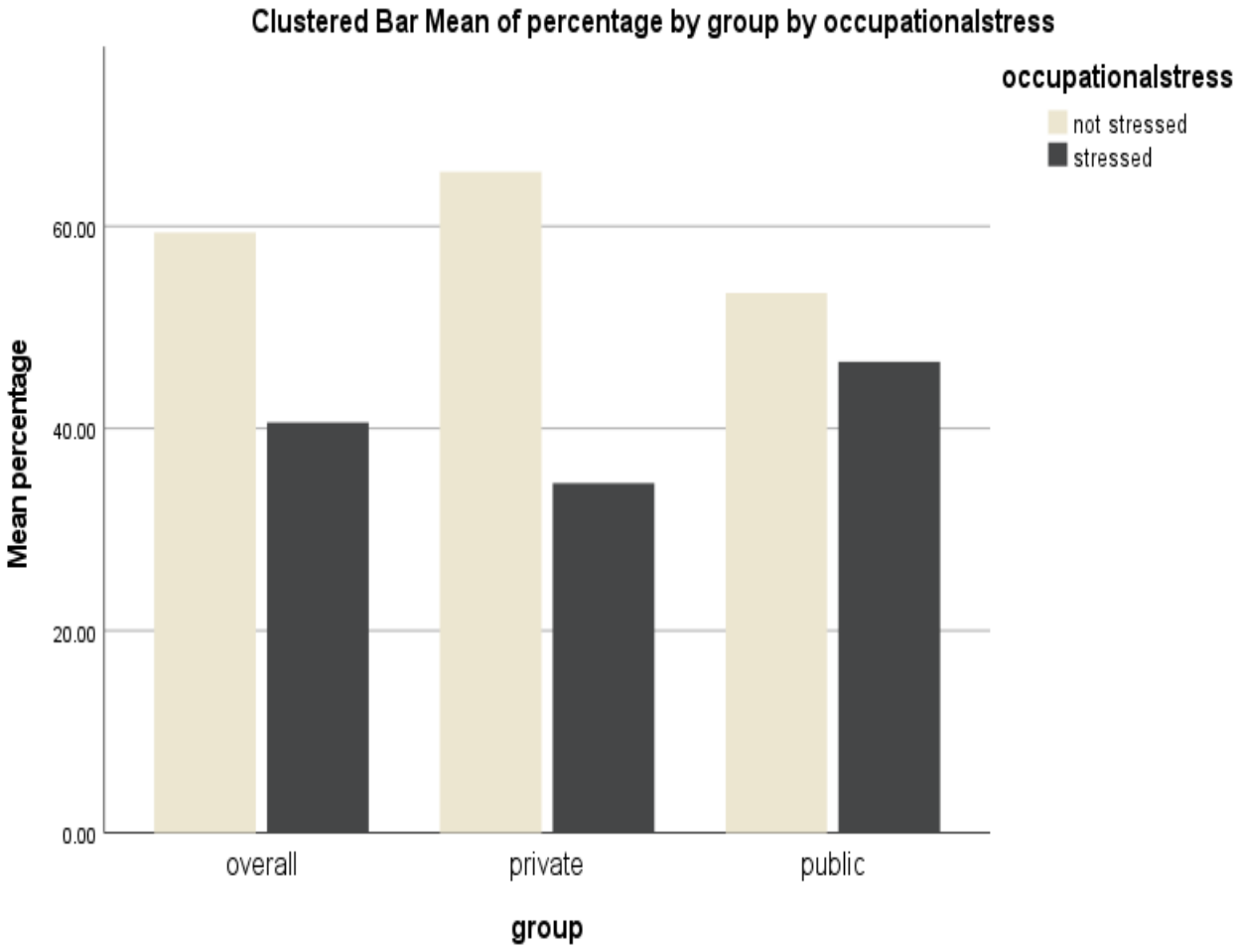

Figure 2: Prevalence of occupational stress among laboratory professionals working in private and public health facilities at Addis Ababa Ethiopia, 2025.

6.5. Prevalence of workload

Among the total respondents, 213 laboratory professionals (51.8%) reported a high workload based on NASA Task Load Index. Prevalence among laboratory professionals in public health facilities was 122 (59.2%) with a mean of workload 18.47 ± 3.9, while the prevalence among laboratory professionals who work in private health facilities was 91 (44.4%) with a mean of workload 15.6 ± 4.64 (Figure 4). Objective workload assessment was also performed by dividing the total number of laboratory test processed per day by number of laboratory personnel in each facility. The result show that laboratory professionals at private health facilities performed an average of 43 test per day, where as those in public facilities performed 38 tests daily. This objective measurement suggests a difference between actual workload volume and perceived workload report by NASA Task Load Index.

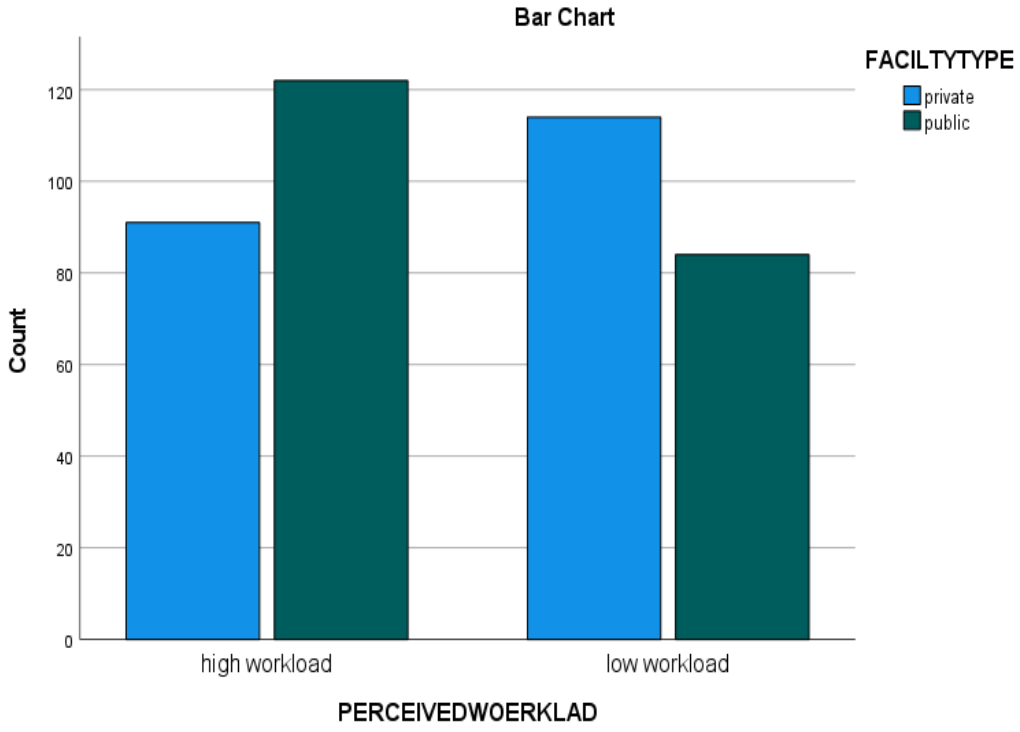

Figure 3: Perceived high perceived workload among laboratory professionals in public vs. private health facilities, Addis Ababa, 2025

6.6. Factors associated with occupational stress and workload

All independent variables were assessed for their association with dependent variables using binary logistic regression. In the bivariate analysis for occupational stress, the variables with p-value < 0.2 were: gender, facility type, monthly income, training, availability of necessary equipment, number of tests ordered per day and number of laboratory personnel (Table 5). In the multivariate analysis: for occupational stress, gender, monthly income, and training were found to be significant.

The gender of respondents was found to be significant with occupational stress, as compared to male respondents being female had 1.58 [AOR=1.58, CI 95% (1.05-2.38)] times higher odds of experiencing occupational stress. Laboratory professionals earning less than 7000 ETB were 2.12 [AOR=2.12, 95% CI (1.3-3.72)] times more likely to experience occupational stress than those earning greater than or equal to 7000 ETB. As compared to laboratory professionals who were receiving training, professionals who never received training were 2.19 [AOR=2.19, 95% CI 2.19(1.45-3.31)] times more likely to experience occupational stress.

Table 5: Bivariate and Multivariate analysis of factor associated with occupational stress.

Variables	Categories	Occupational stress		COR	P-value	AOR	P-value
		Yes	No				
Gender	Male	69	129	1		1	
	Female	98	115	1.593(1.07-2.371)	0.022*	1.58(1.05-2.38)	0.029*
Age	>29	94	134	1			
	<25	19	33	0.821(0.44-1.53)	0.534		
	25-29	54	77	1.0(0.65-1.55)	.999		
Marital status	Single and other	84	116	1			
	Married	83	128	0.895(0.604-1.33)	.583		
Having children	No	98	146	1			
	Yes	73	94	1.16(0.77-1.73)	.474		
Educational level	Masters	16	25	1			
	Diploma	19	18	1.03(0.53-1.99)	.939		

	Degree	132	201	1.65(0.67-4.06)	.276		
Monthly income	≥7000 ETB	123	213	1		1	
	<7000 ETB	44	31	2.46(1.475-4.10)	0.001*	2.12(1.3-3.72)	0.003*
Facility type	Private	71	134	1		1	
	Public	96	110	1.65(1.1-2.45)	0.014*	1.35(0.82-2.22)	0.241
Working Experience	>5 years	107	146	1		1	
	<2 years	14	30	0.923(0.59-1.45)	.727	0.52(0.25-1.099)	.087
	2-5 years	46	68	0.637(0.32-1.26)	.194*	0.763(.47-1.24)	.273
Availability of necessary equipment's	Always	77	131	1		1	
	Sometimes	90	113	1.36 (0.913-2.01)	.132*	1.09(0.71-1.69)	.691
Colleague support	Always	92	133	1			
	Sometimes	75	211	1.024(0.69-1.52)	.907		
Supervisor supports	Always	57	80	1			
	Sometimes	84	140	0.842(0.55-1.30)	.438		
	Rarely	26	24	1.52(0.79-2.91)	.207		
Working on rotating shift	Yes	148	222	1			
	No	19	22	1.29(0.68-2.48)	.434		
Training	Yes	60	138	1		1	
	No	107	106	2.32(1.549-3.481)	0.001*	2.19(1.45-3.31)	0.001*
Number of laboratory personnel	1-5 person	12	19	1		1	
	6-10 person	39	71	0.87(0.382-1.978)	0.739	0.54(0.22-1.35)	0.188
	11-15 person	36	40	1.425(0.608-3.34)	0.415	0.99(0.41-2.43)	0.993

	16-20 person	7	24	0.46(0.152-1.40)	0.172*	0.39(0.13-1.23)	0.108
	>20 person	73	90	1.284(0.585-2.82)	0.533	0.72(0.30-1.74)	0.471
Number of tests ordered per day	<50 test	6	15	1		1	
	51-100 test	12	17	1.77(0.53-5.86)	.354	2.57(0.71-9.37)	.152
	101-150 test	2	7	0.714(0.114-4.47)	.719	0.76(0.088-6.56)	.802
	151-200 test	10	24	1.04(.314-3.46)	.947	2.685(0.52-13.82)	.237
	>200 test	137	181	1.89(0.72-5.00)	.199*	2.171(0.49-9.59)	.306
Number of patients visit per day	<50 patient	15	25	1			
	51-100 patient	43	54	1.32(0.62-2.82)	.463		
	101-150 Patient	33	52	1.06(0.49-2.29)	.887		
	151-200 patient	14	36	0.65(0.27-1.58)	.339		
	>200 patient	62	77	1.34(0.65-2.76)	.425		

* = Shows Statistically significant

For workload, the variables with a p-value of <0.2 in bivariate logistic regression were: gender, monthly income, experience, number of laboratory personnel, number of patient visit per day, supervisor support and facility type (Table 5). To control for potential cofounders, multivariate logistic regression was performed. In multivariate logistic regression analysis, work experience, and facility type were found to be significant for workload among laboratory professionals (Tabel 6). Laboratory professionals with <2 years of experience were 2.11 [AOR=2.11 95% CI (1.072-4.16)] times more likely to report a high workload as compared to professionals who worked >5 years. Additionally, professionals working in public health facilities had 47% [AOR=0.53 95% CI (0.36-0.79)] times less chance of experiencing a high workload as compared to professionals working in private health facilities.

Table 6: Bivariate and Multivariate analysis of factor associated with workload

Variables	Category	Workload		COR	P-value	AOR	P-value
		High	Low				
Gender	Male	95	103	1		1	
	Female	118	95	0.74(0.5-1.1)	0.133*	0.77(0.52-1.15)	0.206
Age	>29	119	109	1			
	<25	25	27	1.18(0.65-2.15)	.592		
	25-29	69	62	0.980(0.64-1.51)	.930		
Marital status	Single/other	106	94	1			
	Married	107	104	1.09(0.74-1.61)	.643		
Having children	No	124	116	1			
	Yes	89	82	0.99(0.67-1.46)	.939		
Educational level	Masters	20	21	1			
	Diploma	19	18	0.87(0.45-1.66)	.675		
	Degree	174	159	0.90(0.37-2.19)	.821		
Monthly income	≥7000 ETB	169	167	1		1	
	<7000 ETB	44	31	0.71(0.429-1.184)	0.191*	0.82(0.46-1.45)	0.494
Facility type	Private	91	114	1		1	
	Public	122	84	0.55(0.37-0.81)	0.003*	0.534(0.36-0.79)	0.002*
Working Experience	>5 years	132	121	1		1	
	2-5 years	66	48	0.79(0.508-1.24)	0.309	0.75(0.477-1.18)	0.215
	<2 years	15	29	2.11(1.079-4.12)	0.029*	2.11(1.072-4.16)	0.031*
Availability of necessary equipment's	Always	105	103	1			
	sometimes	108	95	0.89(0.61-1.32)	.581		
Colleague support	Always	115	98	1			
	sometimes	110	88	0.94(0.64-1.38)	.750		
Supervisor supports	Always	71	61	1		1	
	Sometimes	106	118	1.38(0.91-2.13)	.133*	0.73(0.364-1.46)	.374
	Rarely	31	19	0.76(0.39-1.48)	.425	1.519(0.97-2.37)	.066
Working on rotating shift	Yes	194	176	1			
	No	19	22	1.28(0.67-2.44)	.460		
Training	Yes	99	99	1			
	No	114	99	1.15(0.78-1.69)	.475		
	1-5 person	13	18	1			
	6-10 person	55	55	0.72(0.323-1.62)	.428	2.579(0.49-13.6)	.266

Number of laboratory personnel							
	11-15 person	41	35	0.617(0.265-1.434)	.261	1.81(0.32-10.26)	.503
	16-20 person	12	19	1.144(0.414-3.157)	.796	3.39(0.53-21.72)	.196
	>20 person	92	71	0.557(0.256-1.213)	.141*	2.45(0.41-14.64)	.327
Number of tests ordered per day	<50 test	10	11	1			
	51-100 test	13	16	1.119(.363-3.452)	.845		
	101-150 test	5	4	0.727(.151-3.493)	.691		
	151-200 test	14	20	1.299(.434-3.883)	.640		
	>200 test	171	147	0.781(.323-1.892)	.585		
Number of patients visit per day	<50 patient	16	24	1		1	
	51-100 patient	51	46	0.601(0.285-1.27)	.182*	.366(0.08-1.66)	.192
	101-150 patient	43	42	0.651(0.304-1.395)	.270	.33(0.07-1.54)	.159
	151-200 patient	23	27	0.783(.337-1.817)	.568	.266(.051-1.39)	.117
	>200 patient	80	59	0.492(0.24-1.007)	.052*	.35(0.072-1.73)	.200

* = Shows Statistically significant

6.7. Qualitative results from the interview

For the qualitative part of the study, purposive sampling was used to select key informants. A total of 25 respondents were included in the in-depth interviews, from this 13 were male and 12 were female. Among them, 23 were laboratory heads and 2 were laboratory quality officers. The data were analyzed using thematic analysis, involving transcribing, coding, and identification of patterns across responses. The finding was categorized into seven major themes and are presented below using a narrative approach.

Theme 1: Primary causes of occupational stress

Most interviewed participants reported that occupational stress among laboratory professionals is caused by several interconnected factors. The most frequently listed causes of stress were inflation, low salary, workload, staff shortage, lack of risk allowance, transportation difficulties, and stockouts of laboratory supplies.

Inflation Vs Salary

Although responses varied slightly by sector, many participant from both public and private facilities mentioned low salary and increasing cost of living as major stressors. One participant said "The primary cause of occupational stress is inflation. The salary doesn't match the cost of living. The rent of the house keeps increasing, to cover all our expenses, many of us have to work in multiple facilities, which adds more stress." A participant from the health center confirmed this by stating "The income we get doesn't reflect the amount of the work we do. That mismatch is stress-full."

Workload

Several participant also mentioned workload as a major stressor. A respondent from a public hospital explained "There are some gaps in staff allocation. Some departments like clinical chemistry receive all the samples at once, especially when the patient arrives late to the laboratory and when there is system interruption this leads to long processing times due to accumulation of uncompleted work." Another participant from the health center said that "the main factor that causes of occupational stress here is simply the workload."

Staff shortage

Many participant from both public and private facilities stated that "The primary cause of occupational stress in our facility is the workload that is caused due to low staffing". Similarly, a participants from the health center noted, "We have increased our test menu, but staff numbers have not changed. This mismatch causes occupational stress among the staff".

Risk payment

A number of participants reported that laboratory professionals don't receive risk allowance. A respondent from the health center noted "Laboratory professionals handle all types of specimens, but there is no policy that includes us in risk allowance payment." A different individuals states

that “unlike other professionals, we don’t receive any risk payment, even though we work with infectious specimens.”

Transportation

A respondents from the health center said, “Our facility is far from the main road and transportation is a daily challenge.” Another respondent stated “Sometimes due to workload our staff members are unable to leave on time and to catch the available transport, and that causes stress”

Stock out

A private hospital respondent said, “Stress when laboratory reagents are stockout, or when machines are unfunctional”

Theme:2 Strategies to reduce stress

Different facilities reported implementing strategies to reduce stress among laboratory professionals. These strategies included flexible management practice, continuous professional development (CPD), additional staffing, the use of laboratory information system, improved workplace design, establishing agreements with different suppliers, and including laboratory professionals in income-generating campaigns.

Flexible management

A respondent from a public hospital described flexible management as helpful: “We allow staff to manage their task efficiently so they can use their free time productively.”

CPD

CPD was also widely cited, a participant from a public hospital said “We provide CPD training regularly, which is not only helpful in providing knowledge but to help them in renewing their license.”

Additional staffing

A respondent from a private hospital said, “We are trying to reduce stress in our facility by hiring additional staff and working with medical engineering teams to manage stockouts.” Another participant from the public hospital stated “We shift additional staff into departments experiencing higher workload.”

Lab information system

A participant from a public hospital noted “We monitor system interruption closely and prepare a backup system in case the system fails.” Another respondent added “Designing workflow based on patient areas such as separating, emergency and OPD samples, has helped us to reduce stress.”

Several participant also mentioned that using LIS to track results and workload has reduced some of the manual burden, although some facilities noted that frequent interruption of the LISas a source of frustration.

Agreements with different suppliers

Most of participant said “We signed agreements with suppliers to ensure timely delivery of reagents and laboratory materials.”

Including laboratory professionals in different Campaigns like vaccines.

A respondent from the health center stated “We include laboratory professionals in different income-generating campaigns”

Theme 3: Ensuring a fair and manageable workload among staff

Participants stated that rotation of the staff across workstations and recruitment of phlebotomists as strategies to ensure fair workload distribution.

A respondent from the health center said “We follow a duty roster that rotates a staff among different sections and the rotation is done every month.” A public hospital respondent added, “By rotating staff weekly across departments we balance workload effectively.”

Recuring phlebotomists

A respondent from a public hospital said “We hired a dedicated phlebotomist to reduce the workload from the laboratory.”

These responses were consistent across many of the interviewed facilities.

Theme 4: The connection between workload and staff stress level

Some of the participants agreed that there is a clear connection between workload and occupational stress. This was noticeable when the person was on annual leave and departments had large sample volume.

A respondent from the health center explained, “When someone goes on a leave workload increases for the remaining staff, which increases the stress.” Another participant from public hospitals said “In chemistry and hematology departments the high workload delays results and increases stress.”

Some laboratory managers reported that they manage stress by assigning staff from lower-load departments to support high load departments.

Theme 5: Resources to reduce stress and workload

Many respondent mentioned CPD training, private income, and counseling services as helpful resources for reducing stress and workload.

CPD

According to a respondents from a public hospital, “There is a CPD training which helps staff renew the license and stay updated.” A health center participant stated, “Training is beneficial, but its infrequent more frequent training should be provided.”

private income

A public hospital laboratory manager said, “Our hospital allows professionals to generate private income and offers refresher training.”

Counseling services

A respondent from a public hospital explained “In our facility there are psychological consultant groups and if staff are experiencing stress and we invest in automated machines to reduces manual workload.”

Theme 6: organizational factors contributed to workload and stress

Participants identified several organizational factors including high patient flow, inadequate laboratory infrastructure, non-selective test ordering, reduced weekend staffing, and large test menus.

High patient flow

A respondent from the health center said “Our facility provides OR services which result in high patient flow.” Another participant explained “The infrastructure is old and unsuitable. There are no nearby toilets or proper duty rooms.”

laboratory infrastructure

One of the respondents from the health center said “… our facility infrastructure is old which is inappropriate for the laboratory also the toilet is too far from the laboratory which is too much also there is no available duty room for laboratory personnel...”

Non-selective test

A participant from the health center said “Sometimes over 30 tests are ordered per patient unnecessarily, which increases workload.” A participant from the health center noted “We perform around 70 tests in our facility and the staff number don’t match the workload. Patients from closed nearby health centers are redirected to us.”

Several participant mentioned that weekend staffing insufficient, a respondents from health center explained, “The city’s health bureau commands only one staff on weekends, which increases the workload and reduces income.”

Theme 7: Recommendation to reduce workload and stress

Participants provide several recommendations to reduce stress and workload. Recruiting more staff, offering training, improving laboratory information system, increasing salary, objective SLIPTA assessment, and enhancing recognition of laboratory personnel.

Additional staffing

A respondent from a private hospital stated “Adding more staff will help to manage workload and occupational stress.” Another added “Management should respond quickly during turnover to avoid the workload and stress.”

Training

The common suggestion was training. One participant from a public hospital noted that “Training specially refreshment training can help to reduce stress.”

Fully automated LIS system

A respondent from the health center says, “Integrating a laboratory information system with the machine will help to reduce the manual work and it improves the TAT.” Another respondent from a public hospital said “In using LIS the system should be consistent, if there is an interruption it will cause match stress and workload” A participant from a public hospital noted, “Using state-of-the-art equipment will reduce the workload and stress issues in the laboratory.”

Salary

A respondent from a private hospital explained “Improving the salary of professionals in making different techniques like incentive would help to reduce occupational stress and workload…”

Another participant from the health center “Providing incentives and increasing salary will significantly reduce stress.”

SLIPTA assessment

One of the participants from the health center explained “SLIPTA assessment should be based on objective criteria. When they are subjective, they demotivate the staff and increase stress.”

Recognizing laboratory

Lastly, several respondent explained that “laboratory professionals are always overlooked there is no place to include laboratory professionals in risk allowance payment and fewer educational opportunities as compared to other healthcare professionals.” Another noted, “We should be included in procurement decisions for laboratory equipment and supplies.”

These qualitative findings emphasize the complex and diverse nature of occupational stress and workload. The contributing factors include low income, staff shortage, and increased service demands. Despite these challenges health care facilities are actively implementing different techniques including staff rotation, LIS implementation, and CPD training to reduce these issues. Addressing the needs of laboratory professionals through institutional support, equal benefit with other professionals, and improving working conditions is essential for improving employee well-being and preserving quality laboratory services.

7. Discussion

This study aims to assess the level of occupational stress, experienced workload, and identify associated factors among laboratory professionals working in public and private health facilities in Addis Ababa, Ethiopia. The overall prevalence of occupational stress among the participants was found to be 40.6%. This low prevalence may appear unexpected, considering the current protest by healthcare professional in Ethiopia during the study period. However, this may be due to the inclusion of professionals from private health facilities, where better salary was reported and the fact that laboratory professional's experiences less direct interaction with patients compared to other front-line workers such as nurses and physicians. This is lower than the prevalence reported in Malaysia, where 74% of laboratory staff experienced occupational stress. This difference may be due to variation in measurement tool, workload intensity and working condition across countries (27). But higher than a study conducted among hospital employees in Iran, where only 26% reported occupational stress (5), possibly due to difference in occupational roles, organizational structures, and support systems. However, the result is in line with a study conducted at Swami Vivekanand Hospital, Meerut, where the prevalence of occupational stress was reported to be 42% (4).

In this study, the prevalence of occupational stress among laboratory professionals working in public health facilities was 46.6%. This finding is lower than that of a study conducted in Zone 1 of Afar, where 67.5% of government health workers reported occupational stress (15), and another study in public hospitals in East Gojjam Zone, which reported a prevalence of 57.3% (30). This difference could be due to the difference in the study populations, geographic settings, and variation in professional categories. However, the prevalence reported in this study is higher than that found in Jimma zone, where 30.1% of participants reported occupational stress (32), and in a study conducted in public hospitals in Addis Ababa, which showed a prevalence of 37.8% (59). The prevalence of occupational stress among laboratory professionals who are working in private health facilities was 34.6%, which is lower than that observed in public health facilities. This could be due to differences in healthcare settings, working conditions, and incentives. It is also lower than a study conducted at Dessie Hospital, where 46.6% of participants working in private hospitals reported occupational stress(31).

In multivariate logistic regression analysis, gender, monthly income, and training are significantly associated with occupational stress. Female laboratory professionals were found to be 1.58 times more likely to experience occupational stress compared to male laboratory professionals, which is similar to the findings from other studies (15, 45). This may be due to females having a main role in the family in addition to work. Similarly, respondents earning less than 7000 ETB per month were more than twice as likely to experience occupational stress. This is in line with the finding from a study conducted in Saudi Arabia (44). A study from Swami Vivekanand Hospital, Meerut also reported that inadequate salary was the most common factor contributing to occupational stress among healthcare professionals (46). Professionals who never received training were also 2.19 times more likely to experience occupational stress than professionals who received training. This is supported by studies conducted in Taiwan, which reported the major sources of occupational stress were lack of pre or on-the-job trainings (60). Similarly a study conducted in Hadiya Zone, Ethiopia, reported that nurses who received training were 45% less likely to experience occupational stress (50).

This study also examines the perceived workload among laboratory professionals. The NASA Task Load Index was used to measure workload, and respondents were categorized into high and low workload groups based on the calculated mean workload index. The overall prevalence of high workload among laboratory professionals in this study was 51.8%, which is in line with a systematic review that reported a pooled prevalence of 54% for high workload (41). This similarity suggests that this high workload is a common challenge that health professionals face. However, the prevalence in this study is slightly higher as compared to the study conducted in the US in which 42.3% of physicians, Nurses, Clinical staff, and non-clinical staff experience high workover-load (34). This variation could be due to differences in healthcare systems, resources availability, staff to-patient ratios and time pressure to deliver accurate and timely results. However, high prevalence was found in study conducted among nurses, reported that 75% of nurses experience a high level of total workload (40). This difference may be due to differences in working conditions, and nurse's direct involvement in bedside procedures.

In multivariate analysis, work experience, and facility type were significantly associated with the workload. Laboratory professionals with less than two years of experience were 2.11 times more likely to report a high workload as compared to those with more than five years of experience.

This is in line with a study conducted in Iran, which reported people with less experience were more likely to experience high workload (38), this may be due to misunderstanding among new professionals regarding the various needs of their professions. Additionally, professionals working in public health facilities were 47% less likely to report a high workload as compared to private health facilities (AOR=0.53; 95% CI: 0.36-0.79). This may be due to the fact that private health facilities are for profit organizations. They may hire fewer employees in order to increase their profit, which results heavier workload per individual. Furthermore, private facilities prioritize customer satisfaction and rapid service which can put extra pressure on staff. This finding was supported by the objective workload assessment in this study, which indicate that laboratory personnel in public health facilities handled an average of 38 tests per day, compared to 43 tests per day in private health facilities.

Qualitative interviews with 25 key informants supported and enhanced the quantitative findings. Seven main themes emerged. The main stressors mentioned by respondents were poor pay, reagent stockouts, staff shortages, lack of risk allowances, inflation, and transportation difficulties. Strategies for reducing stress included flexible management, staff rotation, additional staffing, and the use of laboratory information systems. In order to reduce stress, facilities also mentioned offering chances for private income, counseling services, and CPD training. The workload was increased by organizational factors like high patient flow, non-selective test ordering, and inadequate staff on weekends. Finally, the participants suggested structural reformers such as increased staffing, objective SLIPTA assessments, better pay, and recognition of the role played by laboratory personnel.

8. Strengths and limitations of the study

This study has several strengths. It combined quantitative and qualitative data using mixed methods. To provide a comprehensive understanding of stress and workload among laboratory professionals. Data were collected from both public and private health facilities, allowing comparative analysis across different institutional settings. However, the study has some limitations, the study was limited to Addis Ababa, and the finding may not be generalizable to other regions in Ethiopia. Only laboratory managers and quality officers were involved in the qualitative component, which would have limited the perspectives of frontline staff who may experience stress differently.

9. Conclusions and Recommendations

9.1. Conclusion

This study assessed occupational stress, workload, and associated factors among laboratory personnel working in selected public and private health facilities in Addis Ababa, Ethiopia. The result showed that occupational stress (40.6%) and high workload (51.8%) among laboratory professionals. Public health facilities experience more occupational stress (46.6%) than private health facilities (34.6%). Similarly, public health facilities had a high workload (59.2%) as compared to private health facilities (44.4%). According to multivariate analysis, occupational stress was significantly associated with female gender, low monthly salary, and training. The workload was also significantly associated with work experience, and facility type. The qualitative findings supported these quantitative findings, which showed that the main causes of stress and workload are a lack of risk allowances, poor infrastructure, low salary, training, lack of recognition and staff shortages.

9.2. Recommendations

Based on the results, a number of suggestions are made to reduce laboratory personnel's occupational stress and workload. Adequate staffing should be a top priority for health authorities and facility managers, especially in private health institutions, to reduce workload imbalances. Having fair and inclusive risk allowance policies, improving salary scales, improving laboratory infrastructure, regular training, CPD opportunities and strengthening laboratory information systems would help to reduce the burden of workload and occupational stress issues among laboratory professionals.

10. Reference

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Annexes

Annex I: Individual information sheet

Good morning/good afternoon My name is **Abel Tsegaye** and I am MSc student at Addis Ababa University. I am conducting a research study titled "**Assessing occupational stress, workload, and associated factor among laboratory personnel in a selected health facility at Addis Ababa, Ethiopia**"

Objective: the main objective of this study was to assess occupational stress, workload, and associated factors among laboratory personnel at a health facility in Addis Ababa, Ethiopia.

Participation: we are kindly asking for your voluntary participation. Your insights and experience will provide valuable information for understanding the factors affecting occupational stress and workload among laboratory personnel, which may help improve working conditions and policies in the future.

Benefit: There is no direct benefit to participating in this study. However, the findings of this study will help in filling the gap in your workplace.

Risk: participating in this research will not cause any harm to you. All information you provided will be kept confidential and your personal identity will not be disclosed.

Confidentiality: All information collected and obtained in this study will remain confidential. Only research members will have access to the data and no part of this information will be shared. Your participation is voluntary and you are not obliged to answer that you don't wish to answer. Please be aware that all information you provide is valuable and important.

Contact information: Please don't hesitate to reach out to me if you would want more information on this study or if you have any questions at: Abel Tsegaye (tabel6998@gmail.com)

Advisors: Daniel Beshah (MSc, Ph.D.) (danibeshah@gmail.com)

Alemayehu Nigatu (MSc, MPH) (alemayehu.nigatu43@gmail.com)

Annex II: informed consent form

I have read and understood the information provided above. I clearly understand the benefit and purpose of the study. I hereby assure, you that I have voluntarily agree to participate in the study. I understand that my participation is essential for the successful completion of the research. Also, I understand that I have the right to withdraw from the study at any time. Additionally, I am assured that my privacy and confidentiality are maintained.

Sign_____ Date_____

Thank you for your cooperation.

Annex III: Questionnaire

Questionnaire for assessing occupational stress, workload, and associated factor among laboratory personnel in a selected health facility at Addis Ababa, Ethiopia

Part 1: socio-demographic variable		
1	Gender	1. Male 2. female
2	Age	1. < 25 2. 25-29 3. >29
3	Marital status	1. Single 2. Married 3. Divorced/widowed
4	Do you have any children?	1. Yes 2. No
5	Educational level?	1. Diploma 2. Degree 3. Masters
6	Monthly income?	1. < 5000 2. 5001-7000 3. >7000
7	Experience in years?	1. < 2 years 2. 2-5 years 3. >5 years
8	Types of institutions you are working?	1. Private health facility 2. Public health facility
9	Current working laboratory department?	1. Sample collection 2. Hematology 3. Serology 4. Chemistry 5. Parasitology 6. Microbiology
10	Availability of necessary equipment and supplies?	1. Always 2. Sometimes 3. rarely
11	Support from colleagues?	1. Always 2. Often 3. Sometimes 4. Rarely 5. Never
12	Support from the supervisor?	1. Always 2. Often

		3. Sometimes 4. Rarely 5. Never
13	Working on a rotating shift?	1. Yes 2. No
14	Have you received any formal training relevant to your current role?	1. Yes 2. No
15	If yes for question number 15 how often?	1. Monthly 2. Every 6 month 3. Quarterly 4. Annually

Part II: perceived stress scale measurement

The bellow question is to assess the thought and feeling you experienced in the last few months. For each question choose from the following options :- 0 - never 1 - almost never 2 - sometimes 3 - fairly often 4 - very often.

		0	1	2	3	4
1	In the last month, how often have you been upset because of something that happened unexpectedly in your workplace?					
2	In the last month, how often have you felt that you were unable to control the important things in your workplace?					
3	In the last month, how often have you felt nervous and stressed in your workplace?					
4	In the last month, how often have you felt confident about your ability to handle your personal problems at the workplace?					
5	In the last month, how often have you felt that things were going your way at your workplace?					
6	In the last month, how often have you found that you could not cope with all the things that you had to do in your workplace?					
7	In the last month, how often have you been able to control irritations in your workplace life?					
8	In the last month, how often have you felt that you were on top of things at your workplace?					
9	In the last month, how often have you been angered because of things that happened at your workplace that were outside of your control?					
10	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them at your workplace?					

Part III: NASATLX workload assessment

The bellow question is to assess the workload you are experiencing. For each question choose from the following options: 1= very low, 2 = low, 3 = moderate, 4 = high, 5 = very high

		1	2	3	4	5
1	How mentally challenging do you find your work?					
2	How physically challenging do you find your work?					
3	How much time pressure do you feel in completing your task?					
4	How well do you feel you perform in your job?					
5	How much effort do you feel you put into your work?					
6	How often do you feel frustrated with your work?					

Part IV: questions for the managers

The following question is to be field by the laboratory manager/head.		
17	How many laboratory personnel are currently working in your facility?	1. 1-5 2. 6-10 3. 11-15 4. 16-20 5. >20
18	On average how many laboratory tests are ordered per day?	1. <50 2. 51-100 3. 101-150 4. 151-200 5. >200
19	On average how many patients does your healthcare facility serve per day?	1. <50 2. 51-100 3. 101-150 4. 151-200 5. >200

Open-ended questions

1. What do you think are the primary cause of occupational stress in your facility?
2. What measure does the facility have to reduce stress or manage stress among staff?
3. How does a tour facility ensure fair and manageable workload distribution among laboratory staff?
4. Have you noticed any connection between workload and staff stress levels? If so please describe
5. What resources (such as training, counseling, or additional staffing) are available to support laboratory staff in managing workload and stress?
6. What organizational factors contribute to workload or stress in your facility?
7. Based on your experience what improvement or additional support would help to reduce occupational stress and workload issues among laboratory personnel?

Declaration I declare that this study is my original work in partial fulfillment of masters of sciences in clinical laboratory management and quality assurance and that all sources of materials used for this thesis has been fully acknowledged.

Name: **Abel Tsegaye**

Signature :- _____

Place: Addis Ababa University

Date of submission_____

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

Name: Dr. Daniel Beshah (Ph.D.)

Signature:_____

Mr. Alemayehu Nigatu (MSc, MPH)

Signature: _____