KNOWLEDGE, PRACTICE, AND ITS ASSOCIATED FACTORS OF PROPER BODY MECHANICS AMONG NURSES WORKING IN HOSPITALS IN HARAR CITY, EASTERN ETHIOPIA

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Knowledge, Practice, and its Associated Factors of Proper Body Mechanics among Nurses Working in Hospitals in Harar City, Eastern Ethiopia

A Thesis Submitted To School Of Graduate Studies of Haramaya University, College of Health and Medical Sciences, School of Nursing, in Partial Fulfillment of the Requirements for the Degree of Master of Science in Adult Health Nursing Specialty

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ABBREVIATIONS /ACRONYMS

AOR	Adjusted Odds Ratio
CI	Confidence Interval
CPD	Continuing Professional Development
COR	Crude Odds Ratio
ENA	Ethiopian Nursing Association
FPH	Federal Polis Hospital
HFCSH	Hiwot Fana Comprehensive Specialized Hospital
HGH	Harar General Hospital
HMIS	Health Management Information Systems
HU	Haramaya University
ICU	Intensive Care Unit
JH	Jugal Hospital
MOI	Muhibili Orthopedic Institute
OPD	Outpatient Department
OR	Operation Room
PBM	Proper Body Mechanics
RNs	Registered Nurses
WMSDs	Work-Related Musculoskeletal Disorders
WHO	World Health Organization

ABSTRACT

Background: Improper body mechanics during patient care tasks increase the risk of musculoskeletal disorders among nurses, leading to a high turnover rate and a shift to less physically demanding roles. Limited information exists about the nurse's level of knowledge and application of proper body mechanics and factors that impact practice of proper body mechanics during patient care tasks in the study setting.

Objective: The study aimed to assess the level of knowledge, practice, and its associated factors of proper body mechanics among Nurses working in Hospitals in Harar City, Eastern Ethiopia

Methods: An institutional-based cross-sectional study was conducted on 420 participants, from August 26 to September 26, 2024. A structured self-administered questionnaire adapted from relevant literature was used for the data collection. A simple random sampling technique was used to select study participants. Both descriptive and analytical statistical tests were utilized. Binary logistic regression was applied. Variables having a p-value of <0.25 in the bi-variable analysis were included in the multivariable analysis, and variables with a p-value <0.05 were disclosed as statistically significant with the outcome variable.

Results: A total of 416 participants were included in the study, making the response rate of 99%. The median age of the respondents was 29 years, with an interquartile range from 27-32 years. Almost half of the participants (50.24%) had good knowledge about body mechanics while only 20.9% (CI=17.1-25.14) of the participants had good practice of proper body mechanics. Marital status (married) [AOR 0.51(0.27-0.94)], availability of transfer materials [AOR 4.34(1.65-11.39)], Nurse-to-patient ratio (1:10 or fewer patients) [AOR 2.91(1.08-7.85)], physical activity [AOR 2.46(1.33-4.53), and training on body mechanics [AOR 28.25(4.55-175.25)] were factors significantly associated with the practice of proper body mechanics among Nurses.

Conclusion: This study revealed that almost half of the participants had good knowledge of body mechanics, but only one-fifth of the study participants had a good proper body mechanics practice. Therefore, stakeholders should devise strategies that enhance the knowledge of the nurses, and implementation of proper body mechanics.

Keywords: Body mechanics, Nurses, Knowledge, Practice, Harar, Ethiopia

1. INTRODUCTION

1.1 Background

Body mechanics is how people move their bodies when performing routine daily activities, including how they sit, stand, bend, lift, and sleep (Jaafar and AN, 2015b). Proper body mechanics are essential for safe and efficient performance including safely lifting and moving patients or heavy objects which protects the health of the spine. Some key principles include: seeking help when moving heavy patients, bending knees and hips when lifting, using a fabric sheet for patient transport, lowering center of gravity while keeping weight front and supported on outer feet, and keeping items close to one's body (Akhtar et al., 2017, Tuturo et al., 2023a, Jaafar and AN, 2015a).

However, repetitive tasks, prolonged standing or sitting in awkward positions, manual handling of heavy objects weighing more than ten kilograms, and other improper body mechanics practices are common causes of work-related musculoskeletal disorders (Ribeiro et al., 2017, Tuturo et al., 2023a). Lifting and handling patients, uncomfortable postures, inadequate equipment, intense physical labor, unsuitable workplace design and inadequate work organization are primary occupational risk factors for musculoskeletal disorders, specifically for back pain (Jaafar and AN, 2015a).

Nurses worldwide commonly experience work-related musculoskeletal issues, which are a significant occupational health concern (Ribeiro et al., 2017).Back pain impacts nurses' ability to work effectively and provide quality care to patients. A meta-analysis of 42 articles from around the world, with a total of 36,934 participants, found that the annual prevalence of work-related musculoskeletal disorders (WMSDs) among nurses was 77.2% (Sun et al., 2023).A study conducted in Thailand found that 47.8% of RNs experienced musculoskeletal disorders each year, leading to missed work days and decreased productivity (Thinkhamrop et al., 2017).In Uganda, study showed that over 80% of nursing professionals reported lower back pain (Munabi et al., 2014).And the main reason for low back pain experienced by nurses worldwide is the manual lifting and handling of heavy objects and patients, with most nurses who had back pain rarely utilized proper body mechanics (Sandhya et al., 2015, Akhtar et al., 2017, Jung and Suh, 2013).

Despite the significance of proper body mechanics in preventing musculoskeletal disorders among nurses, the majority of nurses still fail to utilize these techniques when carrying out nursing tasks (Jaafar and AN, 2015a). A study in India was conducted to evaluate how effective a self-instructional module on proper body mechanics was for 60 bedside critical care nurses. The result from the pretest showed that 60% had average practice, 40% had poor practice, and none had good practice (Kochitty and Devi, 2015). A study at Minia University Hospital in Egypt on 100 nurses revealed that 68% of the nurses had unsatisfactory knowledge about principles of body mechanics (Yossria et al., 2019).In Ethiopia a cross-sectional study conducted at Gondar comprehensive specialized Hospital on 258 nurses, 45.3% of the participants had poor knowledge regarding body mechanics and more than half of the participants had poor practice of body mechanics (Fentanew et al., 2023).

Various studies reported that educational qualification, sex, year of service, level of Hospital, and current unit of working are some of the factors associated with the knowledge of nurses about body mechanics (Kochitty and Devi, 2015, Jayakrishnan, 2016, Akhtar et al., 2017, Tuturo et al., 2023a). Age, Unit of current working, year of service, knowledge of body mechanics, availability of assistive equipment's, and nurse to patient ratio are among the factors that affect practice of proper body mechanics by Nurses (Akhtar et al., 2017, Jayakrishnan, 2016, Fentanew et al., 2023).

1.2 Statement of the Problem

Each year, due to poor body mechanics skills utilized during patient care thousands of nurses worldwide either receive medical reports or retire early (Tuturo et al., 2023b, Ovayolu et al., 2014). Similarly, since poor body mechanics practices often lead to work-related musculoskeletal disorders, most nurses seek a change of duty from direct patient care to a job in education or management (Jaafar and AN, 2015a).

The level of practice of proper body mechanics varies across different countries. In Chandigarh, India 24.1% of the participants had poor practice(Kumar and Damanpreet, 2021),in Malaysia 31.8% (Jaafar and AN, 2015a), in Egypt varied between 6.6%-100% (Hemed et al., 2017, Salah et al., 2012, Abdelal et al., 2022), and in Ethiopia 62.8% (Fentanew et al., 2023).

Improper body mechanics is the major factor that resulted in a high prevalence of work-related musculoskeletal disorders which varies among countries across the world. A study conducted in Saudi Arabia on 158 nurses revealed that 72.3 % of the studied nurses had back pain that was due to improper use of body mechanics and long working hours (Soliman et al.). Similarly, a study conducted in Port Said City, Egypt on 200 nurses reported that 69 % of the studied nurses had back pain which was due to poor practice of body mechanics (Moustafa et al., 2022).Annual costs associated with back injuries for nurses are estimated to be $20 billion. Roughly 40,000 nurses report work-related back pain each year, this indicates that more than three-quarters of a million lose workdays yearly due to back injuries, and a large number of these injuries are caused by manual patient transfer, and relocation activities (Kochitty and Devi, 2015, Scanlon, 2014).

Regarding the level of knowledge of body mechanics, a study conducted in Chandigarh, India showed that 78.74% had poor knowledge of body mechanics (Kumar and Damanpreet, 2021), additional study in Gujarat, India reported that 85% of nurses had average knowledge while only 4% of them had good Knowledge (Swamy et al., 2017), a similar study in Egypt revealed that 68% of nurses had unsatisfactory knowledge about principles of body mechanics (Yossria et al., 2019), in Ethiopia 60.9% had poor knowledge of body mechanics (Tuturo et al., 2023b).

Factors such as inadequate knowledge of body mechanics, absence of training on body mechanics, and lack of assistive equipment are among the reported barriers by nurses for not practicing proper body mechanics (SAINI et al., 2021, Richardson et al., 2019, Fentanew et al., 2023). Moreover, the level of education (Kochitty and Devi, 2015, Akhtar et al., 2017, Tuturo et al., 2023a), level of Hospital and unit of working reported as factors influencing it (Tuturo et al., 2023a).

Although it has a short-term effect, several prior studies have utilized various interventional training and educational programs to ensure the proper application of body mechanics techniques by nurses. There was a significant improvement in nurses' knowledge and practice level of body mechanics post-educational program on body mechanics (Ibrahim and Elsaay, 2015, BeRRíoS-LóPez et al., 2009, Hemed et al., 2017).However, to apply long-lasting interventions a lot has to be done because even having known the importance of proper body mechanics there are still nurses who do not practice it (Jaafar and AN, 2015b).

To the extent of our literature review, there is a paucity of information on organizational as well as work-related factors that are linked to practice of proper body mechanics. Moreover, there is no information on some psychological as well as behavioral factors that are thought to affect the body mechanics performance level of nurses in the study area which was addressed by this study. Therefore, to design appropriate interventions for such preventable disorders (MSDs) ample information should be generated, specifically to identify barriers to not implementing proper body mechanics, that is why this study was aimed at assessing knowledge, practice, and its associated factors of proper body mechanics among Nurses working in Hospitals in Harar City, Eastern Ethiopia.

1.3 Significance of the Study

The purpose of this study is to assess the knowledge, practice, and its associated factors of proper body mechanics among Nurses working in Hospitals in Harar City, Eastern Ethiopia. Primarily, Hospitals and Harari Regional Health Bureau will locally use the result of this study to develop a learning program and skill enhancement programs to further decrease morbidity. Also, it may be used for intervention purposes by researchers, non-governmental organizations, and other program implementers interested in proper body mechanics programs, and aim to minimize such preventable musculoskeletal disorders. Moreover, it may be used as a baseline for developing guidelines locally for improving the status quo in Health care facilities. Furthermore, the completion of this research will enable the principal investigator to complete her Master's Degree in Adult Health Nursing Specialty. Last but not least, it could be used by scholars and students for their future work as a reference

1.4 Objectives

1.4.1 General Objective

- To assess the level of knowledge, practice, and its associated factors of proper body mechanics among Nurses working in Hospitals in Harar City, Eastern Ethiopia, from August 26 to September 26, 2024.

1.4.2 Specific Objectives

- To determine the level of knowledge about proper body mechanics among Nurses working in Hospitals in Harar City, Eastern Ethiopia, 2024.
- To determine the level of proper body mechanics practice among Nurses working in Hospitals in Harar City, Eastern Ethiopia, 2024.
- To assess factors associated with the proper body mechanics practice among Nurses working in Hospitals in Harar City, Eastern Ethiopia, 2024.

2. LITERATURE REVIEW

2.1 Level of Knowledge about Body Mechanics

A cross-sectional study conducted on 174 participants in Chandigarh, India, found that 78.74% of the participants had poor knowledge of body mechanics, while the remaining 21.26% had good knowledge (Kumar and Damanpreet, 2021). A descriptive cross-sectional study on 100 nursing interns at Sumandeep College of Nursing in Gujarat, India revealed that 85% of the participants had average knowledge of assisted body mechanics, 11% had poor knowledge, and the remaining 4% had good knowledge (Swamy et al., 2017). Another study conducted in a selected Nursing College of Mangalore, Taluk, India, on 60 second-year nursing students revealed that, of the total participants, 86.7% had average knowledge, and the remaining 13.3% had poor knowledge regarding body mechanics (Pradap, 2015).

The effectiveness of a self-instructional module on proper use of body mechanics was evaluated in a study involving 60 bedside critical care nurses at the critical care units of D.Y. Patil memorial Hospital and Y.C.M Hospital in Pune, Maharashtra, India. During the pre-test, 61.7% of the participants had poor knowledge, 38.3% had average knowledge, and none of the participants had good knowledge regarding proper body mechanics (Kochitty and Devi, 2015).A true experimental study was carried out in selected Hospitals in Moradabad, India, to evaluate the effectiveness of a video-assisted teaching program on the knowledge regarding practice of body mechanics among 60 staff nurses. Both experimental and control groups had moderate knowledge during the pre-test, but following the post-test, 93% of the experimental group showed adequate knowledge compared to 93% of the control group who remained moderately knowledgeable (Thomas et al., 2017).

A descriptive cross-sectional survey on 100 staff nurses in IMS and SUM Hospitals in Odisha, India, revealed that 42% of the nurses had a moderate level of knowledge, 42% had a good level, 14% had excellent level, and the remaining 2% had a slight level of knowledge about body mechanics (Jayakrishnan, 2016). In Dehradun, Uttarakhand, India, a cross-sectional study on 100 ward attendants revealed that 70% of the participants had average knowledge of body mechanics, whereas 25% and 5% had poor and good knowledge, respectively. (Rawat et al.).

According to a quasi-experimental study done on 50 B.Sc. nursing students in their fourth year at a selected nursing college in Bhilai, India, 10% of the students had excellent body mechanics knowledge, 74% had good knowledge, and the remaining 16% had average level knowledge.

(Bibbin, 2018) . Similarly, 50 B.Sc. nursing students in their fourth year at Bee Enn College of Nursing in Jammu, India participated in the study; of the total participants, 12% had adequate knowledge, 82% had moderate knowledge, and the remaining 6% had inadequate knowledge regarding body mechanics (Frank and Pushpam, 2018).

In a cross-sectional study conducted at Punjab Institute of Cardiology Hospital, Lahore, Pakistan on 216 nurses, 65% of the participants had good knowledge, while 20% and 15% had average, and no knowledge respectively, regarding techniques of body mechanics(Akhtar et al., 2017). A study conducted in Malaysia at Hospital Kluang, Johor on 110 nurses working at surgical and orthopedic wards, 100% of the nurses knew body mechanics techniques (Jaafar and AN, 2015b).A cross-sectional study conducted on 280 nurses working in Jordanian Hospitals reported that out of the total 280 participants, 63.6% of them had good knowledge, 34.4% & 2.1% of them had average and poor level of knowledge regarding body mechanics respectively (Douhal et al., 2024).

A study conducted on 76 nurses working at Zagazig University Hospital, Egypt, reported that out of the total 76 nurses only 5.3% of the participants had satisfactory level knowledge regarding body mechanics (Hemed et al., 2017). A cross-sectional study conducted at Sohag University Hospital, Egypt, on 247 nurses working at Medical and Surgical units, classified the study participants into three based on their level of knowledge about body mechanics and reported that 44.1% of them had good knowledge, 47.8%, and 8.1% of them had fair and poor knowledge about uses of body mechanics respectively (Abdelal et al., 2022). According to a study conducted at Minia University Hospital Egypt on 100 nurses using correlation study design more than half of the participants (68%) had unsatisfactory knowledge about principles of body mechanics to control pain while the rest 32% of the participants had satisfactory knowledge (Yossria et al., 2019).

A quasi-experimental study conducted on 30 nurses working at the rehabilitation center in Al Helmia district, Egypt revealed that 46.7% of the nurses had satisfactory knowledge while the rest 53.3% of them had unsatisfactory knowledge level regarding body mechanics and occupational musculoskeletal hazards (Khalil Abd-Elhameed, 2018). An additional quasi-experimental study conducted at Eldemerdash and Ain Shams University Hospitals, Egypt on 35 nurses reported that around one-quarter of the participants(25.71%) had satisfactory level of knowledge regarding body mechanics(Salah et al., 2012).

In Ethiopia, an institutional based cross-sectional study conducted in East Shewa zone, on 422 participants revealed that 39.1% of them had good knowledge while the remaining 60.9% had poor knowledge of body mechanics (Tuturo et al., 2023a). And a cross-sectional study conducted at Gondar comprehensive specialized Hospital, North Western Ethiopia on 258 nurses 54.7% of the participants had good knowledge while the rest 45.3% of the participants had poor knowledge regarding body mechanics (Fentanew et al., 2023).

2.2 Level of Proper Body Mechanics Practice

A cross-sectional study done in selected wards of PGIMER, Chandigarh, India, on 174 participants observed for general activities, 23% of the participants had good practice while 52.9% of them had average practice followed by 24.1% practiced poorly. Out of 61 participants observed for activities of moving, lifting, and transferring heavy equipment like oxygen Cylinder, trolley, and heavy loads, 23% of the participants had average practice followed by 10.3% and 1.7% of them with poor and good practice respectively. Out of 77 participants observed for transferring patient from stretcher to bed and vice versa 31% of them had average practice, 21.3% of them were practicing poorly and the rest 7.4% of them had good practice during the activity. Finally out of 31 participants observed for transferring patient from wheelchair to bed and vice versa 17.8% of the participants practiced it poorly, 14.3% average and the rest 6.4% had good practice (Kumar and Damanpreet, 2021).

According to a cross-sectional study conducted at all India Institute of Medical Sciences, Jodhpur on 270 nursing officers, 70.37% had good Practice in body mechanics, 28.14% of them had average and the rest 1.5% had poor Practice (SAINI et al., 2021). A cross-sectional study conducted on 100 Nursing students who were in their internship period at Sumandeep College of Nursing, Gujarat, India, reported that 84% of the participants had good body mechanics techniques, 14% had fair and the rest 2% had poor practice of body mechanics (Swamy et al., 2017). According to a study conducted in the critical care units of D.Y. Patil Memorial Hospital and Y.C.M Hospital in Pune, Maharashtra, India to assess the effectiveness of a self-instructional module on proper use of body mechanics on 60 bedside critical care nurses, during the pre-test 60% of the participants had average implementation and the rest 40% of them had poor implementation of proper body mechanics while none of the participants had good practice however, during the post-test all of the participants had good practice regarding body mechanics (Kochitty and Devi, 2015). A cross-sectional survey in IMS and SUM Hospitals, Odisha India on 100 participants, classified the study participants into three based on their level of body mechanics practice in which 71% of the participants had moderate,18% of them mild and the rest 11% of the participants had excellent level of practice (Jayakrishnan, 2016).

A quasi-experimental study conducted on 50 B.Sc. 4th year nursing students from selected nursing college in Bhilai, India, regarding body mechanics practice level of the participants, 6% of them had excellent,78% and 16% of them had good and average score respectively (Bibbin, 2018). A cross-sectional study conducted in Punjab institute of Cardiology Hospital, Lahore Pakistan, on 216 participants, 60% of the study subjects were having a good practice, 30% of them average practice and the rest 10% did not practice proper body mechanics techniques (Akhtar et al., 2017).

From a cross-sectional study conducted in Malaysia Hospital Kluang ,Johor on 110 nurses working at surgical and orthopedic wards, 68.2% of the participants practice usage of body Mechanics all the time during working time while the rest 31.8% did not (Jaafar and AN, 2015a). A cross-sectional study conducted on 280 nurses working in Jordanian Hospitals, regarding their level of practice of body mechanics, it was reported that 17.1% of the participants had good practice, 80.4% had average practice and the rest 2.5% of them had poor practice (Douhal et al., 2024).

According to a cross-sectional study conducted at Sohag University Hospital, Egypt out of the total 247 nurses observed for their practice of body mechanics while sitting, 59.5% of the participants did it satisfactorily while the rest 40.5% of them did it unsatisfactorily, during standing 50.2% of nurses performed it satisfactorily whereas the left 49.8% of them performed it unsatisfactorily, when extending 53.4% of them did it satisfactorily while 46.6% of them did it unsatisfactorily, during moving the patient to the side of the bed without an assistant 99.6% of the participants performed it unsatisfactorily (Abdelal et al., 2022).A study conducted at Minia University Hospital Egypt, on 100 nurses using correlation study design revealed that most of the participants (> 90%) for activities like turning the patient away and towards one's self, transferring the patient from bed to chair, transferring the patient to a stretcher, moving a patient up in bed and so on did not perform body mechanics correctly (Yossria et al., 2019).

A study conducted on 30 nurses working at the rehabilitation center in Al Helmia district, Egypt, those nurses were observed for their performance level of body mechanics during sitting, lifting and standing, percentage of participants performed each of the activity correctly was 30% for lifting as well as sitting and 56.7% for standing (Khalil Abd-Elhameed, 2018). A quasi-experimental study conducted at Eldemerdash and Ain Shams University Hospitals, Egypt, on 35 nurses showed that none of the study participants had satisfactory level practice concerning general principles of physical tasks and principles during helping patient (Salah et al., 2012). A study conducted on 76 nurses working at Zagazig University Hospital, Egypt, revealed that out of the total participants 6.6% of them had satisfactory level practice of body mechanics (Hemed et al., 2017).

According to institutional based cross-sectional study conducted at Gondar Comprehensive Specialized Hospital, North Western Ethiopia on 258 nurses 37.2% (CI=31.4-42.6) of the participants had a good practice while the rest 62.8% had poor practice of body mechanics (Fentanew et al., 2023).

2.3 Factors Associated with the practice of proper Body Mechanics among Nurses

2.3.1 Socio-demographic factors

A cross-sectional survey done on staff nurses working in IMS and SUM Hospital ,India revealed that some of the demographic data of the participants like Age, department of service, year of service were significantly associated with the practice of body mechanics of the nurses while sex, position, and educational qualification were not (Jayakrishnan, 2016). A study conducted in the critical care units of D.Y. Patil memorial Hospital and Y.C.M Hospital in Pune ,Maharashtra, India, to assess the effectiveness a self-instructional module on proper use of body mechanics on 60 bedside critical care nurses revealed that educational qualification was found to be significantly associated with the knowledge of nurses about body mechanics however none of demographic factors including Age ,Sex ,number of Children, Educational qualification, and year of experience found to have a significant association with practice of nurses regarding proper body mechanics (Kochitty and Devi, 2015).

A cross-sectional study conducted at all India institute of medical sciences, Jodhpur, on 270 nursing officers reported that there was a significant association between some personal variables like, sex ($p=0.01$), area of current work ($p=0.000$), Professional experience ($p=0.03$), and Physical activity ($p=0.000$) of nurses and their practice of proper body mechanics (SAINI et al., 2021). A cross-sectional study conducted on 280 nurses working in Jordanian Hospitals showed that there was no statistically significant relationship between socio-demographic characteristics and body mechanics practice score of the participants (Douhal et al., 2024).

A study conducted in port said city, Egypt, on 200 nurses revealed that, marital status, service year, learning principles of body mechanics at school, working hours, Nurse-to-patient ratio, degree of back pain were in a statistically significant association with the practice of body mechanics while age, educational qualification and working overtime were not (Moustafa et al., 2022).A cross-sectional study conducted in Egypt, Zagazig University Hospital on 76 nurses revealed that there was a significant relationship ($p=0.045$) between age of the participants and their level of practice regarding body mechanics (Hemed et al., 2017).

An institutional based cross-sectional study conducted at Gondar Comprehensive Specialized Hospital, North Western Ethiopia on 258 nurses 60% of the participants were in the age group between 26-30 and more than half (66.3%) of the participants were having years of experience between 1-5 years as well as 86.4% of the participants were degree holder followed by 7.8% and 5.8% of them were Master's degree and diploma holder respectively and the study declared that there was no significant relationship between socio-demographic data of the participants and their practice of body mechanics (Fentanew et al., 2023).

2.3.2 Knowledge of Body Mechanics

A study conducted in Chandigarh, India, on 174 participants reported that there was no statistically significant association between knowledge of body mechanics and body mechanics practice (Kumar and Damanpreet, 2021). In contrast, a study conducted at Punjab institute of cardiology, Pakistan, reported that there was a significant relationship between knowledge and practice of body mechanics which showed a direct relationship in which those who are knowledgeable about body mechanics were more likely to practice it (Akhtar et al., 2017). A cross-sectional study conducted in Malaysia at Hospital Kluang, Johor, revealed that out of the total participants, 68.2% of them reported that lack of knowledge on how to practice proper body mechanics techniques was one of the barriers they encountered for not implementing proper body mechanics (Jaafar and AN, 2015a).

According to a cross-sectional study which was mixed conducted on 171 nurses at MOI (Muhibili Orthopedic Institute) Dar Es salaam, Tanzania, Almost half of the participants (49.7%) were knowledgeable about back care techniques, but the majority of the respondents (60%) were inconsistent in implementing the techniques, lack of knowledge was one of the perceived reason by the participants for not using back care techniques consistently (Mwilila, 2008). According to a cross-sectional study conducted at Sohag University Hospital, Egypt on 247 nurses more than half of the participants encountered different barriers for not practicing proper body mechanics techniques among those barriers, 67.6% of the participants reported that they did not have any information about body mechanics techniques (Abdelal et al., 2022).

An institutional-based cross-sectional study involving 258 nurses at Gondar Comprehensive Specialized Hospital in North Western Ethiopia revealed that there was a 4.22-fold increase in the likelihood of practicing proper body mechanics among study participants who had good knowledge of body mechanics (AOR=4.22, 95% CI: 2.24-7.97, p=0.00) compared to those who had poor knowledge (Fentanew et al., 2023).

2.3.3 Organizational Factors

A qualitative study titled "Perspectives in preventing musculoskeletal injuries in nurses," which involved ten participants in New Zealand, found that one perceived obstacle to not implementing musculoskeletal injury prevention strategies is the lack of equipment, particularly equipment that could help with lifting and moving overweight patients. Furthermore, regarding workplace attire, participants noted that "it is understandable that individuals who work 8 or 12 hour shifts wearing fashionable shoes or Crocs, which are the opposite of practical ones, will eventually experience pain and back problems." The majority of participants also agreed that wearing appropriate footwear could help promote good posture and reduce back problems among nurses (Richardson et al., 2019).

A study conducted in Pune, Maharashtra, India, on 60 participants showed that self- instructional module on proper use of body mechanics revealed that self- instructional module had a profound effect on the proper body mechanics practice score level of the participants, during the pre- test 40% and 60% of the participants had poor and average practice of body mechanics respectively while no participants had good body mechanics practice but during the post intervention all of the participants had good practice of body mechanics (Kochitty and Devi, 2015). A study conducted on 4th year B.Sc. nursing students from selected nursing college in Bhilai, India, revealed that video assisted educational program has improved the practice of participants regarding body mechanics in which participants with excellent score practice level during the pre- program was 6% that significantly increased to 60% post the program and no participants had average level practice score post program which was declined from 16% during the pre- program (Bibbin, 2018).

According to a cross-sectional study conducted on 171 nurses at MOI (Muhibili Orthopedic Institute) Dar Es salaam, Tanzania, 60% of the participants were inconsistent in implementing back care techniques, lack of training, lack of assistive devices and forgetting to apply the techniques were some of the perceived reasons reported by the participants for their inconsistent use of the techniques (Mwilila, 2008). A study conducted on 30 nurses working at the rehabilitation center in Al Helmia district, Egypt, showed that body mechanics performance level of nurses was improved after provision of program on proper body mechanics specifically their performance during standing and sitting with statistical significance as well as lifting with statistically no significance(Khalil Abd-Elhameed, 2018). A quasi-experimental study conducted at Eldemerdash and Ain Shams University Hospitals, Egypt, on 35 nurses revealed that there was high statistically significant differences (p=0.0000) between pre and post educational program implementation on body mechanics, before the program implementation, none of the study participants had satisfactory level practice of body mechanics however, post program implementation the number of participants with satisfactory level practice of body mechanics raised to as high as 57.14% (Salah et al., 2012).

In a cross-sectional study conducted on 247 nurses at Sohag University Hospital in Egypt, more than half of the participants reported barriers to practicing proper body mechanics. These barriers included: 66.4% of the participants lacking enough nursing staff to help with lifting and transferring patients or heavy objects; 60.7% of the participants lacking enough assistive equipment to help with body mechanics implementation; 64% of the participants not receiving any training on body mechanics techniques; 63.6% of the participants having an unbalanced nurse-to-patient ratio; and 61.9% of the participants lacking enough space to implement proper body mechanics (Abdelal et al., 2022).

A study conducted in port-said city, Egypt on 200 nurses, 58% of the participants were caring for 4-6 patients while the rest 42% were caring for 1-3 patients, and it was found that the participant's body mechanics practice was significantly associated with nurse-to-patient ratio. Additionally, 60.5% of the participants reported that patient handling equipment's are available and 47% of the participants reported that patient handling equipment was stored so that it would be simple to get it also, 24% of the participants could get the patient handling equipment's quickly whenever it is needed and 42% of the participants had received training on body mechanics while the rest 58% had not. The study also revealed that the participant's body mechanics practice was in statistically significant relationship with their training history on body mechanics in which participants who took training was more likely to apply proper body mechanics (Moustafa et al., 2022).

A study conducted on 76 nurses working in the Intensive Care Units, Dialysis Units, Orthopedic Units and Surgical Units at Zagazig University Hospital, Egypt reported that none of the participants had training on body mechanics before the study. However, post the educational program intervention by the study, there was a significant association between educational program on body mechanics and practice level of nurses regarding body mechanics in which the percentage of nurses with satisfactory level of body mechanics practice significantly increased from 6.6% to 85.5% post educational program (Hemed et al., 2017).

According to an institutional cross-sectional study on 258 nurses at Gondar Comprehensive Specialized Hospital in North Western Ethiopia, 55.8% of the participants said they wore appropriate attire (shoes), compared to 44.2% who did not; 71.7% of the participants said they worked more than eight hours a day; 65.1% said they cared for more than ten patients a day; and 77.5% of the nurses said they received the necessary assistance from their colleagues. 40.7% of the participants had received training on proper body mechanics compared to 59.3% who had not. The study found no statistically significant correlation between training and practicing proper body mechanics. Regarding assistive equipment's 35.3% of the participants had transfer equipment's while more than half of the them (64.7%) had not and the study revealed that nurses which had patient transfer equipment were 1.92 times more likely to practice proper body mechanics than those who had not (AOR=1.92, 95% CI: 1.03-3.51, p=0.04),

and also study participants who worked in work place with ergonomics were 2.05 times more likely to practice proper body mechanics than those who did not (AOR=2.05, 95% CI: 1.08-3.86, p=0.02), those participants who wore attire were 3.5 times more likely to practice than those who did not wear (AOR=3.50, 95% CI: 1.81, 6.76, p=0.00), moreover those nurses who had more than 10 patients per day were 2.16 times more likely to practice proper body mechanics than those who had not (AOR=2.16, 95% CI: 1.06,4.39, p=0.00) however, working time per day did not show a statistically significant relationship with practice of proper body mechanics (Fentanew et al., 2023).

2.4 Conceptual Framework

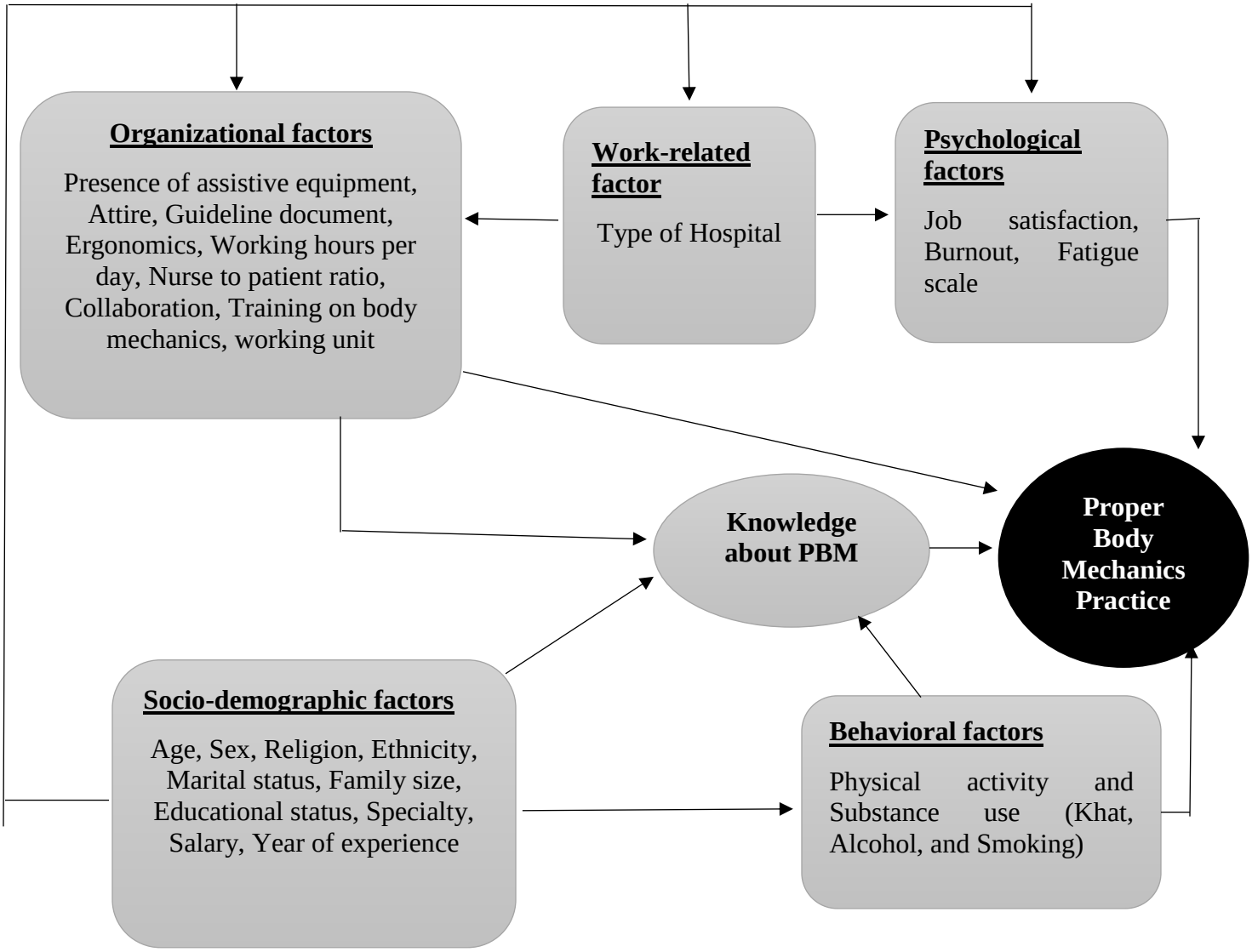

Figure 1.Conceptual framework which shows the relationship between various factors and proper body mechanics practice which is developed by the investigator after reviewing relevant literatures.

Source;-Extrapolated from literature review (Tuturo et al., 2023a, Douhal et al., 2024, Jaafar and AN, 2015a)

3. METHOD AND MATERIALS

3.1 Study Area and Period

The study was conducted in four Hospitals which are found in Harar City, Harari region, which is located at 526 km far from Addis Ababa capital City of Ethiopia. According to the 2022 Ethiopian Central Statistical Agency Population Projection, it has a total population of 276,000(49.6% female and 50.4% male). According to the regional Health Office report the region has 4 Hospitals, 3 Governmental (Haramaya University/Hiwot Fana Comprehensive Specialized Hospital, Jugal General Hospital, and Federal Polis Hospital), and 1 Private Hospital (Harar General Hospital). According to each Hospital's human resource report, the total number of Nurses in four Hospitals was 594. Haramaya University/Hiwot Fana Comprehensive Specialized Hospital has around 360 Nurses working in several units. Surgical ward, Medical ward, Emergency, Obstetrics and Gynecology, Pediatrics, Oncology, and Psychiatry are a few of the units. Another governmental Hospital is Jugal General Hospital, where 151 nurses are employed overall in a variety of departments. Surgical and Medical wards, Dialysis units, Obstetrics and Gynecology wards, Emergency unit, and Psychiatry ward are some of the wards in which those Nurses are working. The third Governmental Hospital in the City is Harar Federal Polis Hospital which has a total of 36 Nurses working in different units like the surgical ward, Medical ward, Operation room, Emergency ward, and Obstetrics ward. The fourth Hospital is Harar General Hospital which is a private Hospital with a total of 47 Nurses. Obstetrics, Medical, Surgical, Pediatrics, and Gynecology ward, ICU, and OR are some of the wards in which those Nurses are working. The study was conducted from August 26 to September 26, 2024.

3.2 Study design

An institutional-based cross-sectional study was employed.

3.3 Population

3.3.1 Source Population

The source population of the study were all Nurses working in Hospitals in Harar City.

3.3.2 Study Population

Nurses working in Hospitals in Harar City during the study period.

3.4 Inclusion and Exclusion Criteria

3.4.1 Inclusion criteria

Nurses who were working at different units for at least 6 months in those Hospitals and are involved in direct patient care as well as those who had a willingness to participate were included in the study.

3.4.2 Exclusion criteria

Those nurses on annual, maternal, or sick leave, Nurses working for free service, Nurses working in central sterilization room, liaison, HMIS, and management only during the data collection period were excluded from the study.

3.5 Sample size determination

The sample size was calculated using STAT CALC of Epi info version 7 software using a single proportion formula for the first objective and second objective while a double proportion formula was used for the third objective.

The first objective sample size determination was done by using a single population proportion formula with the following assumptions 54.7% of the participants had good knowledge of body mechanics according to institutional-based cross-sectional study conducted at Gondar Comprehensive Specialized Hospital, North Western Ethiopia (Fentanew et al., 2023). , 95% Confidence level CI, 5% margin of error, and 10 % contingency for non-response rate.

Where:

n = required sample size

Zα/2 = 1.96 for a 95% confidence interval

P=population proportion (54.7%)

d= margin of error between the sample and population (5%)

$$n = \frac{\left(z\frac{a}{2}\right)^2 p(1-P)}{d^2}$$

n = $1.96^2 * (0.547) * (0.453)$ / 0.0025 = 380.8~381

After considering 10% for a possible non-response rate the total sample size was **420**.

For the second objective also the sample size determination was done by using a single population proportion formula with the same above assumptions. 37.2% of the participants had a good practice of body mechanics according to a cross-sectional study conducted at Gondar Comprehensive Specialized Hospital, North Western Ethiopia (Fentanew et al., 2023) and substituting the values in the above formula the final sample size after adding a 10% non-response rate is 395.

For the third objective sample size determination was done using a double proportion formula on Epi info version 7 considering the following assumptions Table 1:

Table 1: Sample size calculation for the third objective of the study based on different factors associated with practice of proper body mechanics for the study to be conducted among Nurses working in Hospitals in Harar City, Ethiopia

Associated factors	% outcome among		The ratio of unexposed to exposed	Odds ratio	Total sample	With 10% Non - response rate	References
	Exposed	Unexposed					
Equipment	51.65	29.34	1:1	2.57	168	185	(Fentanew et al., 2023)
Ergonomics	52.84	22.96	1:1	3.76	94	104	
Nurse-to-patient ratio	45.24	22.22	1:1	2.89	148	163	

Therefore, the sample size obtained from the first objective was the highest which is **420** and it was the final sample size for the study.

3.6 Sampling procedure and sampling technique

Regarding the sampling procedure, 4 Hospitals in Harar city were identified for this Study. Since there are only 4 Hospitals (3 Governmental Hospitals, and 1 private Hospital) in the city, all of them were considered for the study and then the calculated sample size was proportionally allocated to each Hospital based on the total number of Nurses of each Hospital. The total number of Nurses in four Hospitals was 594 and after excluding those who do not have direct patient contact (those who work in liaison, central sterilization room, HMIS, and management only), the total number became 547. The final total number was proportionally allocated to each unit. Then the list of all nurses was taken from the respective Hospital's human resources and the list of Nurses specific to their unit of work was taken from their respective case team leader/head of each department and then a sampling frame of them was prepared. Finally, Nurses for the study were

selected from each Hospital's specific unit of work by using a simple random sampling method until the calculated sample size was achieved.

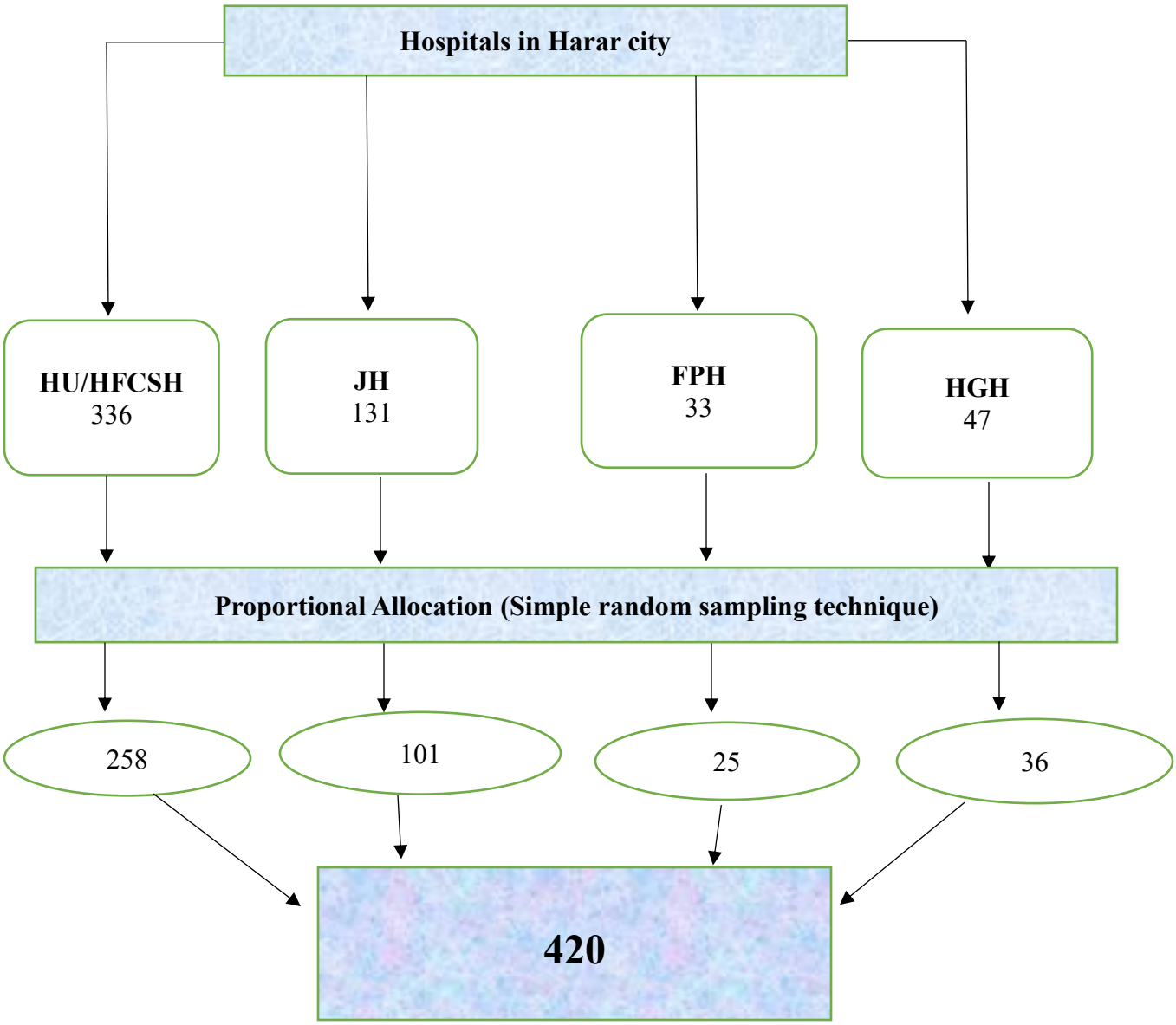

Figure 2.Schematic presentation of the sampling procedure for the study on knowledge, proper body mechanics practice, and its associated factors among Nurses working in Hospitals in Harar City, 2024

Key: HU/HFCSH-Haramaya University/Hiwot Fana Comprehensive Specialized Hospital, JH-Jugal Hospital, FPH-Federal Polis Hospital, Harar General Hospital

3.7 Data Collection Methods

3.7.1 Data collection tool

Data was collected using a structured self-administered questionnaire adapted after reviewing relevant literature and modified according to the study area with some questions appropriate to the study. The items were prepared in English to collect information from study participants. The questionnaire has seven parts to obtain information on the main variables including socio-demographic, work-related, knowledge-related, practice-related, and organizational, behavioral, and psychological questions.

3.7.2 Data collectors and supervisors

Four B.Sc. degree holders data collectors, and one M.Sc. degree holder supervisor was recruited. Before commencing data collection, both data collectors and supervisor received a comprehensive one-day training session, regarding the objective of the study, on how to fill the questionnaire as well as on how to approach and respect the study subjects giving a great priority to ethical consideration. Throughout the entire duration of data collection, the supervisor has been providing all the necessary guidance to the data collectors and checking the collected questionnaire for accuracy, completeness, and consistency.

3.7.3 Data collection procedure

Data were collected using a structured self-administered questionnaire that was developed after reviewing relevant literature. The primary outcome variable for this study was proper body mechanics practice, while socio-demographic factors and other practice-related variables served as independent variables. Proper body mechanics practice was evaluated using six questions with dichotomous responses: “yes” (correct) and “no” (incorrect), with two questions being reverse coded. Participants were categorized into two groups based on their practice status according to Bloom’s cut-off point: those who scored 75% or higher on the correct practice-related items were considered to have a “good practice “while those scoring below 75% were considered to have “poor practice”. Knowledge of participants was assessed using 14 items, which offered three response options: “yes” (correct), “no” (incorrect), and “I do not know”. In analysis, “yes” was coded as 1, while “no” and “I do not know “were combined and coded as 0.using Bloom’s cut-off point again, participants who scored 80% or higher on correct answers were considered to have “

good knowledge", whereas those who scored below that threshold were classified as having "poor knowledge" (Ashebir et al., 2022). Nurse satisfaction with their profession was assessed via a single question in which participants were asked whether they are satisfied or not with their profession. And also, burnout and fatigue scale of the participants were assessed using a single question for each in which they were asked to rate their frequency of feeling burnt out and fatigue based on the choices prepared respectively. For physical activity, participants were asked two questions, participants were asked whether they engaged in exercise or not, and detailed their activity levels per week according to the choices prepared based WHO guidelines on physical activity. Additionally, regarding substance use respondents identified any substances they had used in the past 3 months to identify current users. Furthermore, variables such as age, years of service, salary, and nurse-to-patient ratio were categorized based on previous studies with similar topic to the current study (Fentanew et al., 2023, Tuturo et al., 2023a).

3.8 Study variables

3.8.1 Dependent variables

-Knowledge of body mechanics

-Proper body mechanics practice

3.8.2 Independent variables

Socio-demographic factors: Age, Sex, Religion, Ethnicity, marital status, family size, educational level, Specialty, Salary, year of experience

Work-related factor: Type of Hospital

Organizational factors: Presence of assistive equipment, Attire, Guidelines, Ergonomics working hours per day, Collaboration/assistance, Nurse-to-patient ratio, Unit of working, Training on body mechanics

Behavioral factors: Physical activity and Substance use (Khat, Alcohol, and Smoking)

Psychological factors: Job satisfaction, Burn out, Fatigue scale

3.9 Operational definition

Knowledge of body mechanics: Having an understanding of that body mechanics helps to maintain balance during performance and not using proper body mechanics results in injury and musculoskeletal problems, especially low back pain (Tuturo et al., 2023a).

Good knowledge: Based on the modified Bloom's cut-off point, the respondents who score greater than or equal to 80% of 14 questions about knowledge of body mechanics will be considered as having a "good knowledge" (Ashebir et al., 2022).

Poor knowledge: : Based on the modified Bloom's cut-off point, the respondents who score less than 80% of 14 questions about knowledge of body mechanics will be considered as having a "poor knowledge" (Ashebir et al., 2022).

Practice of body mechanics: Implementation/utilization of the most efficient and safest techniques to lift and move patients or large objects (Jaafar and AN, 2015a).

Good practice of proper body mechanics: Based on the modified Bloom's cut-off point, the respondents who answer 75% or more of 6 questions about practice of proper body mechanics will be considered as having a "good practice of proper body mechanics" (Ashebir et al., 2022).

Poor practice of proper body mechanics: The respondents who answer less than 75% of 6 questions about the practice of proper body mechanics will be considered as having a "poor practice of proper body mechanics" (Ashebir et al., 2022).

Burnout: is a psychological condition characterized by emotional and physical exhaustion that can result in feeling powerless, losing interest and concern for work, developing a negative attitude towards clients, experiencing distress and discomfort, and a decrease in productivity at the workplace (Alfuqaha and Alsharah, 2018).

3.10 Data Quality Control

Two weeks before the actual data collection period the data collection instrument was pre-tested on 5% of the sample size at Haramaya General Hospital other than the study area as a result some amendments on the wording and printing style were done. The Cronbach's alpha reliability test was computed for the knowledge items and it was 0.815 which shows good internal consistency and for the practice items it was 0.721 which is in an acceptable range of internal consistency of Cronbach's alpha. Data collectors and the supervisor were given clear and intensive training for one day about the questionnaire and data collection process which includes the objective of the study, privacy, and confidentiality regarding the information from the study subjects, and voluntary informed consent. Starting from the first day of data collection, close and strict supervision was done and the filled questionnaires were checked for completeness daily. Finally, the data was entered and cleaned carefully before analysis.

3.11 Data processing and analysis

Upon the completion of data collection, the data underwent entry into Epi data version 3.1, cleaned for completeness, and for comprehensive analysis, it was exported to STATA version 17 software. Various statistical analysis methods have been used, descriptive analysis was carried out to generate frequency, percentage, measures of central tendency, and measures of central dispersion as well as appropriate tabular and graphic presentation. Bloom's modified cut-off point was used to categorize the knowledge and practice level of the Nurses (Ashebir et al., 2022). A binary logistic regression model was used to determine factors independently associated with the proper body mechanics practice. To measure the strength of association between the dependent and independent variables, crude odds ratio (COR) and adjusted odds ratio (AOR) with a 95% confidence interval (CI) was calculated. All the variables with P- value<0.25 during the bi-variable analysis were selected as candidate variables for further multivariable analysis to control all possible confounders. During the multivariable analysis variables with p-value < 0.05 were considered as significantly associated variables with the practice of proper body mechanics. Model fitness was tested using Hosmer-Lemshaw goodness-of-fit test, it was not significant with a value of 0.785 that showed a good alignment of the proposed model with the data at hand and multi-collinearity also checked using variance inflation factor and tolerance as collinearity diagnostic tests and it yielded < 5 and >0.1 respectively that showed the absence of multi-collinearity.

3.12 Ethical consideration

The data collection process was initiated after being granted approval for the study and receiving ethical clearance from Haramaya University College of Health and Medical Science's Institutional Health Research Ethics Review Committee (IHRERC). An official letter was obtained from the school of Nursing to the Harari Health Bureau and to each Hospital where the data collection process took place. Before data collection informed, voluntary, written, and signed consent was obtained both from each Hospital's Head and each study subject after explaining the purpose of the study and the importance of participation. After data collection Confidentiality of the information from the participants has been ensured through proper handling of the collected data which was stored and kept with no identifiers and only accessible to the principal investigator.

4. RESULTS

4.1 Socio-Demographic Characteristics

Out of the total sample size of 420, 416 individuals took part in the study, resulting in a response rate of 99%. The median age of the respondents was 29 years, with an interquartile range from 27-32 years. The majority of participants, specifically 226(54.33%), fell within the age range of 26 to 30 years. Among the study participants, 222 (53.37%) were males. In terms of educational level, 331(79.57%) individuals, held a B.Sc. Degree. Additionally, more than half of the participants, comprising 222(53.37%) had between one to five years of work experience. Further Socio-demographic details can be found in (*Table 2*.)

Table 2.Socio-demographic characteristics of Nurses working in Hospitals in Harar City, Eastern Ethiopia, 2024 (n=416)

Variable	Category	Frequency	Percent (%)
Sex	Male	222	53.37
	Female	194	46.63
Age	20-25	48	11.54
	26-30	226	54.33
	31-35	94	22.60
	36-40	35	8.41
	41 and above	13	3.13
Religion	Orthodox Christianity	175	42.07
	Muslim	173	41.59
	Protestant	64	15.38
	Others*	4	0.96
Ethnicity	Oromo	211	50.72
	Amhara	135	32.45
	Harari	30	7.21
	Somali	4	0.96
	Others**	36	8.65
Marital status	Single	179	43.03
	Married	226	54.33
	Divorced	11	2.64
Family size	1-3	190	45.67
	4-6	171	41.11
	7 and above	55	13.22
Educational level	Diploma	49	11.78
	B.Sc. Degree	331	79.57
	Master	36	8.65
Salary	<7071	240	57.69
	7071-9056	118	28.37
	>9057	58	13.94
Work experience (in years)	1-5	222	53.37
	6-10	138	33.17
	11-15	42	10.10
	>=16	14	3.37

Note: Others*=Atheist, Wakefata

Others**=Guragie, Tigre, Wolaita

4.2 Knowledge of Nurses about Body Mechanics

The finding showed that nearly half of the study participants209 (50.24%) had good knowledge about practice to proper body mechanics. The present study showed that, out of the total participants, 266(63.94%) knew that the body should be close an object to be lifted, and 337(81.01%) knew that improper use of body mechanics techniques causes spinal injury. Around 15% of the participants did not know what the purposes of proper body mechanics are (*Table 3*).

Table 3.Level of knowledge of body mechanics of Nurses working in Hospitals in Harar City, Eastern Ethiopia, 2024 (n=416)

Variable	Category		
	Yes	No	I do not know
	n (%)	n (%)	n (%)
Does the use of proper body mechanics reduce back pain?	348(83.65)	51(12.26)	17(4.09)
Is lifting heavier patients using bed sheets better than hands?	321(77.16)	69(16.59)	26(6.25)
Do you have back pain if you do not maintain good posture while doing procedures?	321(77.16)	61(14.66)	34(8.17)
Do proper body mechanics practices maintain proper body function?	342(82.21)	46(11.06)	28(6.73)
Do proper body mechanics practices reduce strain/spasm?	324(77.88)	40(9.62)	52(12.50)
Do proper body mechanics practices maintain balance?	337(81.01)	35(8.41)	44(10.58)
Does the use of continuous muscle tension cause injuries and musculoskeletal problems/pain?	313(75.24)	58(13.94)	45(10.82)
Does an object has to be close to the body during lifting?	266(63.94)	82(19.71)	68(16.35)
Do the principles of body mechanics suggest that using techniques to reduce friction can make moving patients easier and safer?	322(77.40)	43(10.34)	51(12.26)
Do injuries can be avoided through the use of proper body mechanics?	350(84.13)	31(7.45)	35(8.41)
Do you know the purpose of using proper body mechanics?	355(85.34)	61(14.66)	-
Does a heavy work activity like bending, twisting and frequent heavy lifting contribute to low back pain?	337(81.01)	62(14.90)	17(4.09)
Does improper use of body mechanics techniques cause spinal injury?	337(81.01)	50(12.02)	29(6.97)
Does attire (shoes) play an important role to influence back pain?	332(79.81)	48(11.54)	36(8.65)
Overall knowledge level	Good	209	50.24%
	Poor	207	49.76%

4.3 Level of Proper Body Mechanics Practice among Nurses

From the total of 416 participants, more than half of the participants, 257(61.78%) straighten their knees and bend their back when lifting an object from the floor. Additionally, 226(54.33%) of the participants close their legs when moving a patient in bed. Furthermore, Fifteen percent of the participants did not ask for help if they must lift a big patient or a heavy object. Finally, of the total 416 study participants, only 20.91% (CI=17.1-25.14) had a good level of proper body mechanics practice (Table *4*).

Table 4. Frequency distribution of proper body mechanics practice level of Nurses working in Hospitals in Harar City, Eastern Ethiopia, 2024 (n=416)

Variable	Category	
	Yes	No
	n (%)	n (%)
Do you ask for help from a friend/significant other if you must lift a big patient or heavy objects?	352(84.62)	64(15.38)
Do you straighten your knees and bend your back when lifting an object from a floor?*	257(61.78)	159(38.22)
Do you use principles of body mechanics during the procedure for removing a patient from bed to chair?	323(77.64)	93(22.36)
Do you close your legs when moving a patient in bed?*	226(54.33)	190(45.67)
Do you wear proper attire (e.g. shoes) during working time?	319(76.68)	97(23.32)
Do you practice principles of body mechanics all the time while working?	136(32.69)	280(67.31)
Overall practice level	Good (%)	87(20.91)
	Poor (%)	329(79.1)

Note:*=Reversed questions/items

4.4 Organizational related factors

Of all 416 participants, 403(96.9%) of them did not receive training on body mechanics. Two hundred eighty six (68.75%) participants said that there is assistive equipment within their hospital & 108(25.96%) of the participants said there is no assistive equipment within their hospital, and the remaining 22(5%) did not know whether there is assistive equipment within their hospital or not. Out of those participants who said that there is assistive equipment within their hospital, 153(53.5%) of them reported that those materials are readily available when needed while the rest 133(46.5%) of them reported that they are not readily available. Regarding the presence of appropriate shoes in their hospital, 208(50%) of the participants reported saying there are appropriate shoes in their hospital, 177(42.55%) of them said that there are no appropriate shoes in their hospital while the remaining 31(7%) do not know whether there are appropriate shoes in their hospital or not (Table *5*).

Table 5.Organizational and work related information of Nurses working in Hospitals in Harar City, Eastern Ethiopia, 2024 (n=416)

Variable	Category	Frequency	Percent (%)
Unit of work	Emergency unit	55	13.22
	Medical ward	28	6.73
	Surgical ward	29	6.97
	Obs/gyn unit	62	14.90
	Others	242	58.17
Training on body mechanics	Yes	13	3.13
	No	403	96.88
Assistive materials in Hospital	Yes	286	68.75
	No	108	25.96
	I do not know	22	5.29
Availability of appropriate shoes in hospital	Yes	208	50
	No	177	42.55
	I do not know	31	7.45
Documented guideline about body mechanics	Yes	10	2.40
	No	323	77.64
	I do not know	83	19.95
Presence of sufficient space for efficient movement	Yes	273	65.63
	No	143	34.38
Presence of appropriate height work surfaces	Yes	278	66.83
	No	138	33.17
Working time per day	<=8 hours	215	51.68
	>8 hours	201	48.32
Nurse-to-patient ratio	<=10 patients	361	86.78
	>10 patients	55	13.22
Required assistance from colleagues	Yes	344	82.69
	No	72	17.31

4.5 Behavioral and psychosocial related characteristics

Most of the participants, 225(54.1%) did not perform physical activity. The study showed that almost all study participants, 408(99%) did not smoke. Regarding satisfaction of participants with their work as a Nurse, 285(68.51%) reported that they were satisfied and the rest 131(31.5%) were not satisfied. Related to burnout, 86(20.7%) participants never felt burnt out, 243(58.4%) and 87(20.9%) of the participants felt burnt out sometimes and always respectively. About one third of the study participants, 127(30.5%) rated their fatigue during their nursing shifts as low, 200(48.1%) of the participants as moderate, and the left 89(21.4%) of participants as high (Table *6*).

Table 6. Behavioral and Psychosocial related characteristics of Nurses working in Hospitals in Harar City, Eastern Ethiopia, 2024 (n=416)

Variable	Category	Frequency	Percent (%)
Physical activity	Yes	191	45.91
	No	225	54.09
Any substance use in the past 3 months	Yes	148	35.58
	No	268	64.42
Satisfaction towards Nursing	Yes	285	68.51
	No	131	31.49
Feeling burnt out	Never	86	20.67
	Sometimes	243	58.41
	Always	87	20.91
Level of fatigue during the shift	Low	127	30.53
	Moderate	200	48.08
	High	89	21.39

4.7 Factors associated with practice of proper body mechanics

The result of the bi-variable analysis indicated that marital status, educational level, monthly income, unit of working, availability of assistive materials, availability of appropriate shoes, presence of sufficient space and clearance for movement, presence of proper height work surfaces, working time per day, nurse-to-patient ratio, required assistance from colleagues, physical activity, Substance use, fatigue scale, training on body mechanics, and knowledge of body mechanics had a significant relationship with the practice of proper body mechanics.

The multivariable analysis revealed that marital status, availability of transfer equipment, nurse-to-patient ratio, physical activity, and training in body mechanics were factors significantly associated with practice of proper body mechanics.

Those married Nurses were 50% less likely practiced good proper body mechanics compared to single Nurses [AOR=0.51, (95% CI=0.272-0.936)], and the odds of practicing good proper body mechanics was 4.34 times higher among Nurses who reported having assistive equipment or transfer materials in their Hospital compared to those who reported not having assistive equipment or transfer materials [AOR=4.34, (95%CI=1.654-11.391)].

The likelihood of practicing good proper body mechanics was 2.9 times higher among Nurses who cared for ten or fewer patients in a day compared to those Nurses who cared for more than ten patients in a day [AOR=2.911, (95%CI= 1.080-7.847)].

Study participants who engaged in physical activity were 2.5 times more likely to practice good proper body mechanics compared to those who did not engage in physical activity [AOR=2.46, (95%CI= 1.334-4.531)]. Furthermore, the odds of practicing good proper body mechanics was 28 times higher among those who received training on body mechanics compared to those did not receive training on body mechanics [AOR=28.25, (95%CI=4.554-175.25)].

Table 7. Factors associated with the practice of proper body mechanics among Nurses working in Hospitals in Harar City ,Eastern Ethiopia,2024 (n=416)

Variable	Category	Proper body Mechanics		COR(95% CL)	AOR (CI 95%)
		Good N (%)	Poor N (%)		
Marital status	Single	49(27.37)	130(72.63)	1	1
	Married	37(16.37)	189(83.63)	0.519	**0.51 (0.272-0.936)***
	Divorced	1(9.09)	10(90.91)	0.265	0.255 (0.0259-2.497)
Educational Level	Diploma	6(12.24)	43(87.76)	1	1
	B.Sc. degree	68(20.54)	263(79.46)	1.85	1.94 (0.668-5.621)
	Masters	13(36.11)	23(63.89)	4.05	5.195 (0.99-27.26)
Salary	<7071	46(19.17)	194(80.83)	1	1
	7071-9056	22(18.64)	96(81.36)	0.97	1.007 (0.485-2.091)
	>9057	19(32.76)	39(67.24)	2.05	1.128 (0.378-3.366)
Working unit	Emergency unit	16(29.09)	39(70.91)	1	1
	Medical ward	8(28.57)	20(71.43)	0.97	0.702(0.184-2.669)
	Obs/gyn unit	9(14.52)	53(85.48)	0.41	0.493(0.163-1.489)
	Surgical ward	3(10.34)	26(89.66)	0.28	0.503(0.107-2.348)
	others	51(21.07)	191(78.93)	0.65	0.606(0.264-1.392)
Availability of Transfer equipment	Yes	76(26.57)	210(73.43)	4.52	**4.34(1.654-11.391)***
	No	8(7.41)	100(92.59)	1	1
	I do not know	3(13.64)	19(86.36)	1.97	4.651(0.932-23.198)
Availability of shoes	Yes	59(28.37)	149(71.63)	3.11	1.903(0.949-3.818)
	No	20(11.30)	157(88.70)	1	1
	I do not know	8(25.81)	23(74.19)	2.73	3.164(1.001-9.998)
Presence of sufficient space for movement	Yes	66(24.18)	207(75.82)	1.85	0.590(0.278-1.253)
	No	21(14.69)	122(85.31)	1	1
Presence of appropriate height work surfaces	Yes	72(25.90)	206(74.10)	2.87	1.877(0.842-4.186)
	No	15(10.87)	123(89.13)	1	1
Working time per day	Less than or equal to 8 hours	55(25.58)	160(74.42)	1.81	1.597(0.851-2.995)
	More than 8 hours	32(15.92)	169(84.08)	1	1
Nurse-to-patient ratio	<=10 patients	81(22.44)	28077.56)	2.36	**2.911(1.080-7.847)***
	>10 patients	6(10.91)	49(89.09)	1	1
Assistance from colleagues	Yes	80(23.26)	264(76.74)	2.81	0.958(0.354-2.588)
	No	7(9.72)	65(90.28)	1	1
Physical activity	Yes	57(29.84)	134(70.16)	2.76	**2.46(1.334-4.531)***
	No	30(13.33)	195(86.67)	1	1
Substance use over the last 3 months	Yes	21(14.19)	127(85.81)	1	1
	No	66(24.63)	202(75.37)	1.97	2.893(0.375-22.303)
Fatigue scale	Low	38(29.92)	89(70.08)	1	1
	Moderate	31(15.50)	169(84.50)	0.43	0.585(0.297-1.153)
	High	18(20.22)	71(79.78)	0.6	1.241(0.525-2.931)
Training on body mechanics	Yes	11(84.62)	2(15.38)	23.7	**28.249(4.554-175.25)***
	No	76(18.86)	327(81.14)	1	1
Knowledge	Good	61(29.19)	148(70.81)	2.87	1.787(0.965-3.308)
	Poor	26(12.56)	181(87.44)	1	1

Key:*=Significantly associated

5. DISCUSSION

This study was conducted to determine the level of knowledge, practice, and its associated factors of proper body mechanics among Nurses working in Hospitals in Harar City, Eastern Ethiopia. In this study, the level of good knowledge of body mechanics was found to be 50.24% (95%CI=45.33-55.15%). On the other hand, the level of proper body mechanics practice among Nurses accounted for 20.91 % (95% CI: 17.1- 25.14%). Marital status, availability of transfer equipment, Nurse-to-patient ratio, physical activity, and training in body mechanics are factors significantly associated with the practice of proper body mechanics.

In the current study, our finding shows some alignment with the finding from the study conducted in Gonder, Ethiopia (Fentanew et al., 2023) which found that 54.78% of participants had a good body mechanics knowledge level. This resemblance could be due to similarities in study design, and participant classification approach.

However, our result is higher than the study conducted in the East Shewa zone, Ethiopia (Tuturo et al., 2023a) that revealed 39.1% of the participants had good body mechanics knowledge level. The differences in findings may stem from various factors, including the location of study area, basis to classify participants, the number, and types of study settings involved. The study in East Shewa zone was carried out across multiple Hospitals than the current study and, outcome was classified into two based on the mean value in contrast to our study which was based on bloom's cut-off point.

Nevertheless, the level of knowledge is lower than in studies conducted in India (Bibbin, 2018), Pakistan (Akhtar et al., 2017), and Jordan (Douhal et al., 2024) in which 74%, 65%, and 63.6% of participants had good body mechanics knowledge respectively. The discrepancy in results may be attributed to disparities in training environment, sample sizes, and study participants. Countries like India, Pakistan, and Jordan might have better quality training environments, and on-the-job training opportunities for Nurses, which may lead to more positive outcomes (Bibbin, 2018). Almost all studies in these countries used smaller sample sizes, and study subjects like nursing students while ours used nurses working in health facilities.

Regarding proper body mechanics practice, the finding of this study was slightly in line with the study done in Jordan in which 17.1% (Douhal et al., 2024) of the participants had good proper body mechanics practice. The possible explanation for this may be similarity in number, type of the study setting, and study design. This Jordanian study was conducted in a multi-center including a private one like ours, and used a cross-sectional study design too.

However, the result of our study is lower than the study conducted in, Jodhpur, India(SAINI et al., 2021), Gujarat, India (Swamy et al., 2017), Bhalia, India (Bibbin, 2018), Pakistan (Akhtar et al., 2017) , and Gonder, Ethiopia (Fentanew et al., 2023) in which 70.37%, 84%, 78%, 60%, and 37.2% of participants had a good proper body mechanics practice respectively. The possible explanation for the discrepancy may be due to the difference in socio-demographic characteristics of the participants (in which almost the majority of the above-listed study areas have a comfortable working environment equipped with assistive materials so that participants apply the principles of body mechanics easily), number of the study setting (all of the above-mentioned studies were done in a single study setting), target population (in Gujarat and Bhalia, India, the study was conducted among Nursing students).

Marital status (married) showed an association with practice of proper body mechanics. This result was supported by the study done in Port Said, Egypt (Moustafa et al., 2022) which reported that marital status is significantly associated with the practice of proper body mechanics by Nurses. Married Nurses may prioritize family and domestic duties over personal health and training in body mechanics. Juggling work and family responsibilities can lead to physical exhaustion and pain, affecting their ability to use proper body mechanics at work. The added responsibilities at home may leave them in with less energy to focus on proper body mechanics during their shifts.

The present study showed that having assistive equipment or transfer materials was associated with practice of proper body mechanics. This finding was supported by previous studies done in New Zealand (Richardson et al., 2019), Tanzania (Mwilila, 2008), Sohag Egypt (Abdelal et al., 2022), Port Said, Egypt (Moustafa et al., 2022), and Gonder, Ethiopia (Fentanew et al., 2023) that reported those participants who worked in areas with transfer equipment were more likely to practice good proper body mechanics. Using assistive equipment is a key principle of body mechanics, serving as a constant reminder to apply proper techniques. Nurses are more conscious of their movements when using the right tools, rather than relying solely on manual methods that

can lead to poor body mechanics over time. Equipment for lifting, and transferring patients reduce the need for bending, twisting, or exerting excessive force, promoting safe practices, and preventing back, and joint injuries. Access to such equipment can alleviate physical and mental strain on nurses, allowing them to focus on proper techniques and avoid rushing or using improper body mechanics due to fatigue. Assistive equipment also saves time and reduces fatigue, discouraging neglect of proper body mechanics in favor of speed.

Caring for 10 or fewer patients per day, showed association with good proper body mechanics practice. The result was supported by studies conducted in Sohag (Abdelal et al., 2022), and Port Said Egypt (Moustafa et al., 2022). A balanced nurse-to-patient ratio is crucial for ensuring proper body mechanics among Nurses. When Nurses are responsible for a high number of patients, they may experience physical fatigue, and neglect proper body mechanics, leading to potential injuries. Maintaining a balanced ratio promotes safe practices and prevents injuries. Nurses caring for a high number of patients may feel rushed and use improper body mechanics due to time pressure. In busy settings, limited breaks and self-care time can lead to neglect of safe practices. High patient loads may also require more assistive devices, and if these are unavailable, nurses may use improper body mechanics.

However, our findings differ from a study conducted in Gonder, Ethiopia (Fentanew et al., 2023), which found that Nurses with more than ten patients are more likely to practice good proper body mechanics when compared to those with 10 or fewer patients to care for per day. This discrepancy could be attributed to differences in study locations, settings, and sample sizes.

Moreover, in this current study, engagement in physical activity showed an association with practice of good proper body mechanics. The finding of this study is supported by the result of the study done in Jodhpur, India(SAINI et al., 2021) which reported that physical activity was significantly associated with practice of proper body mechanics by the Nurses. Physical activities can help nurses improve their physical conditioning, strength, flexibility, and endurance, making it easier for them to perform tasks like lifting patients safely. Maintaining good posture and body mechanics is essential to prevent strain and injuries. Being physically active can also promote proper posture and reduce the risk of injuries, supporting overall ergonomic health for nurses.

Furthermore, having training on body mechanics was a factor associated with good practice of proper body mechanics. This result is supported by those research done in India (Kochitty and Devi, 2015, Bibbin, 2018), and Egypt (Hemed et al., 2017, Khalil Abd-Elhameed, 2018), which was carried out in Nursing colleges and Hospitals, and showed that training programs on body mechanics improved participants' body mechanics practice scores.

Additionally, studies done in Dar Es Salaam, Tanzania (Mwilila, 2008), Sohag University Hospital in Egypt (Abdelal et al., 2022), and Port-Said City, Egypt (Moustafa et al., 2022), showed that training in body mechanics is essential for Nurses to prevent injuries. Studies show that trained Nurses are more likely to use correct techniques, reducing the risk of back injuries and musculoskeletal disorders. Understanding the consequences of poor body mechanics encourages Nurses to apply proper techniques. This training provides crucial knowledge, enhances physical abilities, and promotes a culture of safety, leading to improved proper body mechanics practices.

However, this result contradicts the findings of a study conducted at Gondar Comprehensive Specialized Hospital in North Western Ethiopia (Fentanew et al., 2023), which found no statistically significant correlation between training and practice of proper body mechanics. This discrepancy may be attributed to differences in study settings (a single study setting), sample size (lower sample size), and the number of participants who received training on body mechanics (higher number of participants who received training compared to our study).

6. Strength and limitation

This study was conducted across multiple centers, including private hospitals, with a large sample size, enhancing the reliability of the findings and making them more representative of the broader nursing community. It examined various factors to provide a thorough understanding of the variables influencing practice of proper body mechanics. However, it is important to note that the study relied on self-reported data, which may introduce biases such as social desirability bias and could lead to an overestimation or underestimation of the magnitude of the problem. Furthermore, most comparisons made in the discussion section were drawn from studies conducted in other countries due to scarce studies on the same topic within Ethiopia.

7. CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

This study revealed that almost half of the participants demonstrated good knowledge of body mechanics, despite that only one-fifth of the study participants had good proper body mechanics practice. This highlights a significant gap between theoretical knowledge and actual practice. Factors such as marital status, availability of transfer equipment, Nurse-to-patient ratio, physical activity, and training on body mechanics were found to significantly impact the practice of proper body mechanics by Nurses.

7.2 Recommendations

Based on the findings of the study the following recommendations are forwarded to the respective bodies:

- For Healthcare Institutions, and Administrators:- To enhance periodic training programs on personal development, and body mechanics, to do regular and periodic nurse rotations so that the burden of caring for a higher number of patients will not be on some Nurses all the time
- For Governmental, and Non-Governmental Organizations:-Allocate as well as grant assistive materials to healthcare facilities
- For Health Bureau: - Encourage research and raise awareness about body mechanics, while advocating for policy reforms, ongoing education initiatives, and certification programs
- For ENA: - ENA must develop a training manual and provide training in the implementation of proper body mechanics as part of CPD

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8. ANNEXES

8.1 Information sheet and informed voluntary consent form for the head of Hospital

My name is Hayat Hussen Mohammed, I am the investigator for the study being conducted in this Hospital, as a requirement for the completion of my Master's degree at Haramaya University, College of Health and Medical Sciences. I kindly request you to lend me your attention to explain to you about the study.

1. The study title:

Assessment of Knowledge, practice, and its associated factors of proper Body Mechanics among nurses working in Hospitals in Harar city, Harari Region, Ethiopia 2024.

2. Purpose/aim of the study:

The findings of this study can be of a paramount importance for the regional health office to plan intervention programs to prevent Injury and Musculoskeletal problems among nurses; and as a result of the recommendation thereby improve health and survival of nurses in general. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of my Master's degree Program in Adult Health Nursing.

3. Procedure and duration:

Data will be collected from study participants working in this hospital using a questionnaire to provide me with pertinent data that is helpful for the study. Totally, there are around 48 questions to be answered by participants, and the questionnaire will take about a maximum of 20 minutes.

4. Risks and benefits:

The risk of being participating in this study is very minimal, only taking few minutes from participant's time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for the local health planners and other stakeholders.

5. Confidentiality:

The information participants will provide us will be confidential. There will be no information that will identify them. The findings of the study will be general for the study participants and will not reflect anything particular of individual person. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

6. Rights:

Participation for this study is fully voluntary. Participants have the right to declare to participate or not in this study. If they decide to participate, they have the right to withdraw from the study at any time and this will not label them for any loss of benefits which they otherwise are entitled. They do not have to answer any question that they do not want to answer. Additionally, the Hospital has the right to stop the data collection process/the study if any unethical procedures or misdeeds are observed.

7. Contact Address:

If there are any questions or enquires anytime about the study or the procedures, please contact me (principal investigator) via my E-mail address:-hilwanahussen@gmail.com as well as my phone number :-0910658312 or via address of the responsible Institutional Health Research Ethics Review Committee (IHRERC),office phone number 0254662011 /P.O.Box 235,Harar,Ethiopia.

8. Declaration of informed voluntary consent:

I have read the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating, and the contact address for any queries. I have been allowed to ask questions about things that may have been unclear. I was informed that the hospital has the right to stop this study from being conducted if any misdeeds and unethical procedures are observed during the data collection process on the Hospital's premises. Therefore, I declare my voluntary consent on behalf of Hospital to allow this study to be conducted in this hospital with my initials (signature).

Name and signature of Head of the Hospital _____ Date _____

Name and signature of PI: _____ ____ Date _____

8.2 Participant Information Sheet and Informed Voluntary Consent Form for Nurses (participants)

My name is _____. I am working as a data collector for the study being conducted in this Hospital by Hayat Hussen who is studying for her Master's degree at Haramaya University, College of Health, and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant.

1. The study title:

Assessment of Knowledge, Practice, and its associated factors of proper Body Mechanics among nurses working in Hospitals in Harar city, Harari Region, Ethiopia 2024

2. Purpose/aim of the study:

The findings of this study can be of a paramount importance for the regional health office to plan intervention programs to prevent Injury and Musculoskeletal problems among nurses; and because of the recommendation thereby improve health and survival of nurses in general. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Program in Adult Health Nursing for the principal investigator.

3. Procedure and duration:

You will be filling this questionnaire to provide me with pertinent data that is helpful for the study. There are 48 questions to answer. Filling the questionnaire will take about 20 minutes, so I kindly request you to spare me this time for filling it.

4. Risks and benefits:

The risk of being participating in this study is very minimal, but only taking few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for the local health planners and other stakeholders.

5. Confidentiality:

The information you will provide us will be confidential. There will be no information that will identify you. The findings of the study will be general for the study participants and will not reflect anything particular of individual person. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

6. Rights:

Participation for this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefits which you otherwise are entitled. You do not have to answer any question that you do not want to answer.

7. Contact Address:

If there are any questions or enquires anytime about the study or the procedures, please contact the principal investigator By her E-mail address:-hilwanahussen@gmail.com as well as her phone number :-0910658312 or via address of the responsible Institutional Health Research Ethics Review Committee (IHRERC),office phone number 0254662011 /P.O .Box 235,Harar,Ethiopia.

8. Declaration of informed voluntary consent:

I have read the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent to participate in this study with my initials (signature).

Signature of participant: _____ _____ Date _____

Name and signature of Data Collector: _____ _____ Date _____

N.B

- This is signed face to face in the presence of the data collector.
- Please provide a copy of this signed consent to the participant.

8.3 English version questionnaire

PART ONE: Socio-Demographic Characteristics			
S.No	**Questions**	**Response**	**Remark**
101.	Age (in years)	Specify……..	
102.	Sex	1. Male 2. Female	
103.	Religion	1. Muslim 2. Orthodox Christianity 3. Protestant 4. Other (Specify)……	
104.	Ethnicity	1. Oromo 2. Amhara 3. Harari 4. Somali 5. Other (specify)……	
105.	Marital status	1. Single 2. Married 3. Divorced 4. Widowed	
106.	Family size	Specify……	
107.	Educational level	1. Certificate 2. Diploma 3. B.Sc. degree 4. Masters	
108.	Salary (monthly income)		

		Specify…….	
109.	Work experience (in years)?	Specify……..	
110.	Which of the following describes your nursing role?	1. General/Comprehensive nurse 2. Midwifery 3. Psychiatry	
PART TWO: Work-related variable			
111.	In which Hospital do you work?	1. Haramaya University/Hiwot Fana Comprehensive Specialized Hospital 2. Jugal Hospital 3. Federal police Hospital 4. General Hospital(Private)	
PART THREE: Knowledge Related Questions			
112.	Does the use of proper body mechanics reduce back pain?	1. Yes 2. No 3. I don't know	
113.	Is lifting heavier patients using bed sheet better than Hands?	1. Yes 2. No 3. I don't know	
114.	Do you have back pain if you do not maintain good posture while doing procedures?	1. Yes 2. No 3. I don't know	

115.	Do proper body mechanics practices maintain proper body function?	1. Yes 2. No 3. I don't know	
116.	Do proper body mechanics practices reduce strain/spasm?	1. Yes 2. No 3. I don't know	
117.	Do proper body mechanics practices maintain balance?	1. Yes 2. No 3. I don't know	
118.	Does the use of continuous muscle tension cause injuries and musculoskeletal problems/pain?	1. Yes 2. No 3. I don't know	
119.	Does an object has be close to the body during lifting?	1. Yes 2. No 3. I don't know	
120.	Do the principles of body mechanics suggest that using techniques to reduce friction can make moving patients easier and safer?	1. Yes 2. No 3. I don't know	
121.	Do injuries can be avoided through the use of proper body mechanics?	1. Yes 2. No 3. I don't know	
122.	Do you know the purpose of using proper body mechanics?	1. Yes 2. No	

123.	Does a Heavy work activity like bending, twisting, and frequent heavy Lifting contribute to low back pain?	1. Yes 2. No 3. I don't know	
124.	Does improper use of body mechanics techniques cause spinal injury?	1. Yes 2. No 3. I don't know	
125.	Does Attire (shoes) play an important role to influence back pain?	1. Yes 2. No 3. I don't know	
PART FOUR: Practice Related Questions			
126.	Do you ask for help from a friend/significant other if you have to lift a big patient or heavy objects?	1. Yes 2. No	
127.	Do you straighten your knees and bend your back when lifting an object from a floor?	1. Yes 2. No	
128.	Do you use principles of body mechanics during the procedure for removing a patient from bed to chair?	1. Yes 2. No	
129.	Do you close your legs when moving patient in bed?	1. Yes 2. No	
130.	Do you wear proper attire (e.g. shoes) during working time?	1. Yes 2. No	
131.	Do you practice principles of body mechanics all the time during working?	1. Yes 2. No	
PART FIVE: Organizational factors related questions			
132.	Current unit/Ward/Department of working?	Specify…….	
133.	Have you ever taken training related to body mechanics?	1. Yes 2. No	
134.	Do you have assistive materials (e.g. transfer equipment) in your Hospital?	1. Yes 2. No	**If "no " or I don't know" Skip to Q136**

		3. I don't know	
135.	If yes to question number "134" is it readily available and accessible to you when needed?	1. Yes 2. No	
136.	Do you have appropriate Attire (shoes) in your Hospital?	1. Yes 2. No 3. I do not know	
137.	Is there any documented guideline specifically addressing body mechanics and safe patient handling in your Hospital?	1. Yes 2. No 3. I don't know	
138.	Is there sufficient space and clearance for safe and efficient movements of health care workers, patients and equipment within your facility?	1. Yes 2. No	
139.	Are work surfaces at appropriate heights to minimize bending and reaching for commonly used items and supplies?	1. Yes 2. No	
140.	Working time per day?	1. Less than /equal to 8 hours 2. More than 8 hours	
141.	On average, how many patients do you care for each day (Nurse-patient ratio)?	Specify……	
142.	Do you get a required assistance from colleagues when it is necessary?	1. Yes 2. No	
PART SIX: Behavioral factors			
143.	Do you perform physical activity?	1. Yes **2.** No	**If No to Q"143"skip to Q"145"**
144.	If yes, which response below describes your activity level per week? **Moderate intensity aerobic activity:-** these activities notably elevate your heart rate and breathing but still allow you to converse, such as brisk walking(walking at	1. < 150 minutes of moderate intensity or < 75 vigorous intensity 2. 150-300 minutes of moderate intensity	

	increased pace than usual), cycling, or swimming **Vigorous intensity aerobic activity:-** These activities significantly increase your heart rate and breathing rate which make you breath hard and fast, making it difficult to hold a conversation comfortably, such as running or jogging, aerobic dancing & competitive sports.	or 75-150 minutes of vigorous intensity 3. >300 minutes of moderate intensity or >150 minutes of vigorous intensity 4. An equivalent combination of both moderate intensity and vigorous intensity 5. I don't engage in regular physical exercise 6. Other (Specify)…….	
145.	Over the past 3 months, which of the following substances have you used ?please select all that apply:	1. Khat 2. Alcohol 3. Cigarettes 4. None of the above 5. Other (specify)……..	
PART SEVEN: Psychological factors			
146.	Are you satisfied with your work as a nurse?	1. Yes 2. No	
147.	How often do you feel burnt out in your work as a nurse?	1. Never 2. Sometimes 3. Always	

148.	How would you rate your overall level of fatigue during your nursing shifts?	1. Low fatigue 2. Moderate fatigue 3. High fatigue	

8.4 Curriculum vitae of the principal investigator

HAYAT HUSSEN MOHAMMED

HARAR, ETHIOPIA

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PERSONAL INFORMATION

Full Name	Hayat Hussen Mohammed
	Harar, Ethiopia
	+251-910658312
	hilwanahussen@gmail.com
	State personal website(s)
	Telegram Address:@Hilwi
Sex: Female | Date of birth: 11/1/1998 | Nationality: Ethiopian	

SEP 2017-FEB2021	Bachelor of Science in clinical Nursing
G.C	Haramaya University, Harar, Ethiopia

Major Courses taken

- Fundamental of nursing
- Medical surgical Nursing
- Pathophysiology
- Pharmacology

SEP 2015– JUNE 2016	Certificate of Ethiopian Higher Education Entrance Examination (EHEEE) Gechi Preparatory School, Gechi, Bunno Bedelle zone,Oromia
SEP 2013 – JUNE 2014	High School Gechi High School, Gechi, Bunno Bedelle zone,Oromia
SEP 2005 – JUNE 2012	Primary School Gechi Number 3 Primary School, Gechi, Bunno Bedelle zone,Oromia

EDUCATION&TRAINING

Training programs attended

- Basic Level Public Health Emergency Management Training organized by Ethiopian public health institute in collaboration with Haramaya university, college of health and medical science from February 01-05,2021.
- Oral Presentation Skills organized by career development service directorate of Haramaya University from April 13-14, 2019.
- Online leadership development training for early career nurses and midwives, organized by Salford University, Manchester, from July 2021-2022 G.C

LANGUAGE SKILLS

Languages	Speaking	Reading	Writing	Listening
Afan Oromo	Excellent	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent	Excellent
Amharic	Excellent	Excellent	Excellent	Excellent

COMPUTER AND SOFTWARE SKILL

- Basic computer skills
    - Able to use Microsoft word, Excel and power point
- Software skills
    - Able to use, enter, manage and analyze data using the following software's
        - ☺ STATA
        - ☺ SPSS
        - ☺ Epi-data
        - ☺ End note

Personal skills

- Good communication skills with others
- Team working and planning skills.
- Making judgments and problem-solving skills
- Good written and oral communication skills

Social skill (experience)

- **CBTP(Community Based Training Program)**

  Place-Shenkor woreda, Harar Ethiopia

  Duration - one month

- **TTP(Team Training Program)**

  Place- Hakim Woreda, Harar Ethiopia

  Duration - 1 month and days

HOBBIES & INTERESTS

- Updating self with new information
- Working with others in harmony
- Writing on different topics
- Writing poems and short Novels
- Listening to different lectures , poems and narrations
- Reaching out to needy people
- Going to mosque

REFERENCES

- Mr.Haftu Asmerom (MSc.) Lecturer at Haramaya University College of Health and Medical Sciences,Medical Laboratory Department.wawhaftu12@gmail.com
  - 0910089878
- Mr.Henok Legesse (MSc.) Lecturer at Haramaya University College Of Health and Medical Sciences,Nursing Department .henok legesse@yahoo.com
  - 0921646772