Physical Activity and Fitness Level of Healthcare Workers in a Tertiary Teaching Hospital

Maribeth Anne P. Gelisanga, MPT,[1] Sarah Faye A. Ramos, PTRP,[1]
Cynthia D. Ang, MD, MSc[2] and Sharon D. Ignacio, MD[2]

[1]*Department of Rehabilitation Medicine, Philippine General Hospital, University of the Philippines Manila*
[2]*Department of Rehabilitation Medicine, College of Medicine and Philippine General Hospital, University of the Philippines Manila*

ABSTRACT

Background and Objectives. Physical activity (PA) and fitness level are considered key factors in public health promotion, and as such, healthcare workers (HCW) need to be physically well because they are not only responsible for themselves, but of their clients as well. Therefore, we aim to determine the PA and health-related fitness (HRF) level of HCW in a tertiary hospital, disaggregated to age, sex, work assignments, and job tenure.

Methods. A cross-sectional research design was utilized to assess HCW from the administrative, medical, nursing, and paramedical cohorts. ALPHA-FIT Test Battery was used to assess cardiorespiratory fitness, muscular strength, lower extremity power and strength, upper body muscle endurance, balance, and body composition.

Results. Our study concurred with the results of previous studies on HCW yielding lower PA levels compared with the general population. We tested 282 participants (administrative: 97; medical: 36; nursing: 55; paramedical: 94), mean age 37.4 years, 64.54% females, 52.13% perceived average health status. Ninety percent of the HCW had PA levels below the World Health Organization's recommended levels. The ALPHA-FIT mean score per category revealed: one-legged stance, 2.67/3; figure-of-8 run, 2.45/3; shoulder-neck mobility, 4.58/5; modified push-up, 2.05/4; hand-grip strength, 2.5/5; jump and reach, 4/4; dynamic sit-up, 2.62/3; six-minute walk test, 475.38 meters covered. There were no significant differences in PA and HRF levels across cohorts except for modified sit-ups ($p<0.001$) and figure-of-8 run ($p=0.012$). The results showed significant inverse correlation between balance and shoulder-neck mobility and age ($p<0.001$), and modified push ups ($p=0.004$). Males had significantly higher sit-up scores ($p<0.001$), one-legged stance scores ($p=0.001$), and faster figure-of-8 run ($p=0.011$), while females had better jump and reach scores ($p<0.001$).

Conclusion. Physical activity levels of HCW did not meet the World Health Organization's recommended PA levels. Healthcare professionals who are expected to be aware of the benefits of PA and HRF have shown low to midfit levels of grip strength, upper extremity endurance, core strength, and cardiorespiratory endurance. Information on PA and HRF may aid in policy making on employee wellness that could highly impact health service delivery.

Keywords: physical activity, healthcare workers, health-related fitness, employee wellness, health promotion

Paper presentation – Philippine General Hospital Research Week, October 20, 2023, Manila; University of the Philippines Manila Science and Technology Week, November 30, 2023, Manila; Philippine Physical Therapy Association Annual Convention, December 9, 2023, Manila.

eISSN 2094-9278 (Online)
Published: November 15, 2024
https://doi.org/10.47895/amp.v58i20.9538

Corresponding author: Maribeth Anne P. Gelisanga, MPT
Philippine General Hospital
University of the Philippines Manila
Taft Avenue, Ermita, Manila 1000, Philippines
Email: mgelisanga@arthritisresearch.ca
ORCiD: https://orcid.org/0000-0002-4190-1062

INTRODUCTION

Health and wellness are pertinent in performing instrumental activities of daily living, especially in work-related tasks.[1] Employees need to be declared physically and mentally fit to get to work and effectively perform duties. Healthcare workers (HCW) are perceived to be exceptionally well, as they are informed in practice. Moreover, the demands of their work not only require them to be responsible for themselves, but also to take care of clients. This highlights the need to ensure health-related fitness of HCW for seamless client care delivery.

Physical activity (PA) refers to all movement including during leisure time, for transport to get to and from places, or as part of a person's work. Physical activity of moderate and vigorous intensities was known to positively impact health.[2] Physical activity and fitness are key factors in public health promotion. Public health strategies should include PA and fitness assessment and monitoring to deliver interventions likely to increase population PA and fitness levels.[1] Health-related fitness (HRF) assessments can be used to monitor level of fitness in different populations, and to identify those with increased health risks due to inadequate levels of fitness.[3]

Health-related fitness (HRF) is a distinct type of physical fitness related to the health potential of PA. The HRF is a state characterized by an ability to perform daily activities with vigor and demonstration of traits and capacities that are associated with a low risk of premature development of diseases and conditions related to physical inactivity. The HRF examinations can track the fitness levels across populations and may also determine those with elevated health risks because of low fitness levels.[3] Health-related fitness is composed of motor fitness, musculoskeletal fitness, cardiorespiratory fitness, body composition and metabolism.[4]

Good HRF consists of aerobic endurance, bodily control, muscular strength, joint mobility, and suitable weight. These components of good HRF enables a sufficiently healthy individual to perform basic activities of daily living without considerable fatigue. Health-related fitness therefore expands the conventional fitness concept being the functional capacity necessary for daily activities, beyond participation in sports and other forms of physical activity.[4]

The results of a previous study showed improved worker productivity and reduced short-term disability leaves with having a worksite fitness center.[5] Moreover, employee rehabilitation needs are decreased by creating better working conditions and prioritizing employee well-being in the workplace.[6] Further, it was found that companies that focus on the well-being and safety of their workforce are perceived to be more valuable by investors.[7]

The nature of job of the working population is found to be increasingly low intensity to sedentary that resulted in the low PA and HRF levels of this working group.[5,8] The US Bureau of Labor Statistics reported reducing trends in occupational physical activity between 1960 and 2010, where the activity requirements of the job declined by more than 100 calories per day.[9,10] With the reduced daily occupation-related energy expenditure, the workers have greater difficulty meeting the recommended PA levels for health while contributing to the overall increase in the population's body weight.[9,11]

The current COVID-19 pandemic quarantine protocols had advanced the levels of physical inactivity. A large survey conducted in China revealed that there was decrease in physical activity levels at 19.4 – 38.6% during lockdown.[12] In addition to this, an international online survey with respondents from Asia, Africa, Europe, and the Americas reported that home confinement had a negative effect on all populations with different physical activity levels.[13]

Population health is significant because of the relationship between health and prosperity, and more importantly, that the health of the workforce is directly linked to the health of the community.[3] Employee wellness programs highly impact health service delivery to the clients. Further, it may provide insight on programs and interventions specifically directed towards the specific components of physical activity and health-related fitness profile of HCW. The workforce's physical fitness levels have an effect on the clients, the employer, the company, and the society as a whole. The World Health Organization (WHO) conducted a survey based on the Global Physical Activity Questionnaire and revealed that Filipinos aged 20–65 had physical inactivity around 85% on average, across occupational, transportation-related, to leisure activities.[2] The largest public health problem in most countries is physical inactivity related non-communicable diseases (NCD). Effective public health interventions are urgently needed to improve PA participation across populations.[2] Fitness level is strongly related with favorable health outcomes, reducing risk and deaths from NCDs such as cardiovascular disease, type 2 diabetes, cancers, back pain, and high cholesterol, as well as reduced health care spending, productivity loss, absenteeism, short-term disability, and workdays lost and enhanced mood and work performance.[3]

Human relations managers prioritized the individuals' assessment for fitness for work, for pre-employment and promotion. In contrast, employees consider group-directed preventive functions to be more important, i.e. general medical screening, health education and medical surveillance.[1,14-16] In our setting, the University of the Philippines Manila Health Service (UPHS) provides pre-employment assessment for fitness to work and annual physical examination to employees. However, no recent information on compliance and health trends is available. It is unclear if health and wellness is a personal priority, and adherence to the annual physical examination is often neglected.

A survey conducted in Philippine General Hospital (PGH) showed that a significant number of employees did not reach the standard of WHO for levels of physical activity for health. Further, there was a remarkable difference of diabetes and obesity rates of HCW compared with the general Philippine population. The PGH has 66% of fiscal and administrative employees with borderline laboratory results towards diabetes compared with 31.1% Filipinos, and 33% employees are obese compared with 5.4% of the general population.[17] In this study, the administrative and fiscal employees were defined as those who draft communication; receive, sort, file, and release communication; reproduce materials; maintain records, reports, and other pertinent documents; keep records for daily transactions; prepare balance sheets; and prepare reports. Female employees have a higher obesity rate of 97% compared to 62% of males. The former were also found to be more sedentary spending 87%

in sitting, as opposed to males sitting for 66% of their work time.[17] The pandemic's quarantine policy has further increased daily sitting time from five to eight hours.[13] Another large-scale study yielded 42.6% of respondents sitting for more than eight hours a day during the lockdown phase.[18] Therefore, it is hypothesized that administrative and fiscal employees may have increased risk for physical inactivity compared with medical, paramedical, and nursing staff, on the basis of sitting time during working hours. Further, a systematic review conducted by DiPietro in 2001 described the patterns of activity in aging, which revealed that specific higher intensity activities decrease with older age among adults.[19] Another factor related to decreased physical activity is income.[20] Kari et al. found that higher income was associated with more physical activity, thereby predisposing those who are earning less to be more predisposed to inactivity.[20]

The authors believe that information on PA and HRF is highly valuable in employee wellness and service provision, thus the following aims of this study.

OBJECTIVES

General Objectives

1. Determine the physical activity level of PGH employees.
2. Determine the health-related fitness level of PGH employees.
3. Determine the difference of physical activity and health-related fitness level of PGH employees in terms of age group, sex, appointment, and work assignments.

Specific Objectives

1. Determine the degree of motor fitness (one-leg stance) of PGH employees.
2. Determine the degree of musculoskeletal fitness (shoulder-neck mobility, hand-grip, jump and reach, modified push-up) of PGH employees.
3. Determine the degree of cardiorespiratory fitness (6-minute walk test) of PGH employees.
4. Determine the body composition profile [body mass index (BMI), waist circumference] of PGH employees.
5. Determine the difference of PA and HRF level of PGH employees across different age groups, sex, appointment and work assignments (administrative, medical, nursing, paramedical).

METHODS

Research Design

A cross-sectional research design was utilized in this study to compare the characteristics of a given population, at a specific point in time.[21]

Sampling Method

Convenience sampling of all permanent and contractual employees of Philippine General Hospital was utilized.

Inclusion Criteria

Employees were included if: (1) 18-65 years old; (2) systolic blood pressure is less than 130 mm Hg (controlled by medications);[22] (3) diastolic blood pressure is less than 100 mm Hg; (4) BMI is less than 30 kg/m^2. BMI value is based on the ALPHA-Fit Battery Test for Adults, which is the value selected on the basis of research results on the limit value for "minor health risk" in relation to physical activity.

Exclusion Criteria

Employees were excluded if: (1) there is a report of any cardiorespiratory diseases or symptoms uncontrolled by medications; (2) chest pain or breathing problems either at rest or exertion; (3) they exhibit elevated resting blood pressure upon assessment prior to the fitness testing (systolic blood pressure >130 mm Hg, diastolic blood pressure >100 mm Hg); (4) pregnant; (5) diagnosed with stroke; (6) with neurologic deficits, such as progressive muscle weakness and sensory deficits; (7) degenerative musculoskeletal conditions; and (8) acute musculoskeletal injury within the last two weeks.

Withdrawal Criteria

Participants were informed that they may withdraw at any point in the study from any cause, without the responsibility to explain withdrawal nor affecting their employment. Participants who had an incident of increased blood pressure during testing were withdrawn from the study.

Data Collection Tool

In response to the need to assess physical activity and health-related fitness levels among the adult and working population, a group within the European Union developed Fitness for Health: Instruments for Assessing Levels of Physical Activity and Fitness Test Battery (ALPHA-FIT) for Adults Aged 18-69.[4] The ALPHA-FIT group developed evidence-based instruments for standardized assessment of PA levels, its underlying factors (e.g., build environment, transport, and workplace), and population-based health-related fitness, accompanied by evidence-based recommendations,[4] accompanied with standard operating procedures of health-related fitness testing for professionals working in the field of physical activity promotion. The ALPHA-FIT was proven to have criterion validity and test-retest reliability, and safe to be implemented by professionals in the field of physical activity promotion.[4,23]

The ALPHA-FIT Test Battery aimed to promote health and well-being of adult populations through valid PA and HRF assessment as basis for an appropriate individualized intervention. Physical activity and HRF testing require physical exertion that could bring about detrimental health risks to unfit or physically inactive individuals. The potential health risks include cardiovascular and musculoskeletal complications. To ensure safety during testing, a standard pre-test health screening is recommended, with recommendations on steps to be taken in case of an emergency while testing.

The ALPHA-FIT Test Battery for Adults consists of seven field-based test items representing the most important fitness factors for health and physical functioning: 2-km walk test assessing cardiorespiratory fitness, hand grip assessing muscular strength, jump-and-reach and figure of 8 run assessing lower extremity power and strength, modified push-up assessing upper-body and trunk muscular endurance, one-leg stance assessing balance, and body mass index and waist circumference assessing body composition.[4,23]

Data Collection Procedure

Data collection was done in a government owned tertiary hospital that caters to both in-patients and out-patients. To determine the HRF, a battery of tests adapted from ALPHA-FIT was implemented,[4] and the assessors underwent training through videotaped tutorial, actual demonstration, and feedback sessions to ensure uniformity in test implementation. The investigators informed the participant of the study protocol, implemented the informed consent process, and scheduled the participant for testing. Participants were screened for eligibility in participating in ALPHA-FIT. Instructions for the testing preparations were provided to increase the reliability of the test results and enhance safety of testing. The participants were instructed the following: (1) avoid severe physical exertion for 48 hours before the testing; (2) avoid physical exertion on the day of testing; (3) do not consume alcoholic beverages for 24 hours before the testing; (4) a good night sleep before testing is recommended (7-9 hours for younger and older adults);[24] (5) avoid heavy meal (breakfast, lunch or dinner) at least for 3-5 hours before the testing; (6) do not smoke, drink coffee, tea or stimulating soft drinks at least for 1 hour before the testing. On the day of the test, they should be in (7) sport shoes or other comfortable low heel shoes; (8) shorts or other sports clothing with short pant legs; (9) t-shirt or loose-fitting shirt.

On the day of the actual fitness testing, participants were screened for coronavirus signs and symptoms. The assessors guided the participant in accomplishment of physical activity and health-related fitness questionnaire. Assessors accomplished the forms for participants who had difficulty in answering. Blood pressure, waist circumference, and BMI were obtained. Participants who have reported cardiovascular diseases, episodes of shortness of breath without physical exertion, neurologic deficits, and pregnancy, were not tested and were referred for further medical advice. Those who have a BP of >130/100 mm Hg, did not undergo testing and were referred to a physician at the UP Manila Health Service for health management. The assessor determined if the participant should be excluded in selected tests due to potential health risks via the ALPHA-FIT Test Battery Manual. Before testing, the assessor prepared the testing environment by implementing recommended health and safety practice by our Hospital Infection Control Unit and ensuring at least level 2 personal protective equipment (face shield or goggles, face mask, and frequent sanitation with alcohol). The assessor then collected the equipment needed and measure the courses needed for run and walk tests. Assessor ensured uniformity of the testing environment by ensuring proper room temperature (20-21 degree Celsius), using an ambient room thermometer.

The ALPHA-FIT Test Battery was conducted in consistent order without warm-up or stretching exercises before testing. To standardize the testing, each participant was given specific instructions for each test performance. The participant was not allowed to perform preliminary trials unless explicitly instructed to do so. After accomplishing pre-test screening, HRF was tested in the following order: (1) motor fitness; (2) flexibility; (3) muscular power and strength; (4) muscular endurance; and (5) cardiorespiratory fitness using the 6-Minute Walk Test (6MWT).[25] The change of test to 6MWT was primarily due to the results of pilot testing. The ALPHA-FIT was pilot tested on 92 healthy volunteers; however, no one got a converted score of good using the 2-km walk test. The investigators related this to the difference in leg length increasing the step length, as the normal values were based on Europeans. No normal values for Asians are available on ALPHA-FIT, hence 6MWT and its normal values were used for testing and analysis. The total test ran for approximately 20 minutes including test trials (Figure 1). Results and interpretation of the tests were discussed with each participant. A pamphlet and home exercise program were given to maintain PA and fitness. All participants

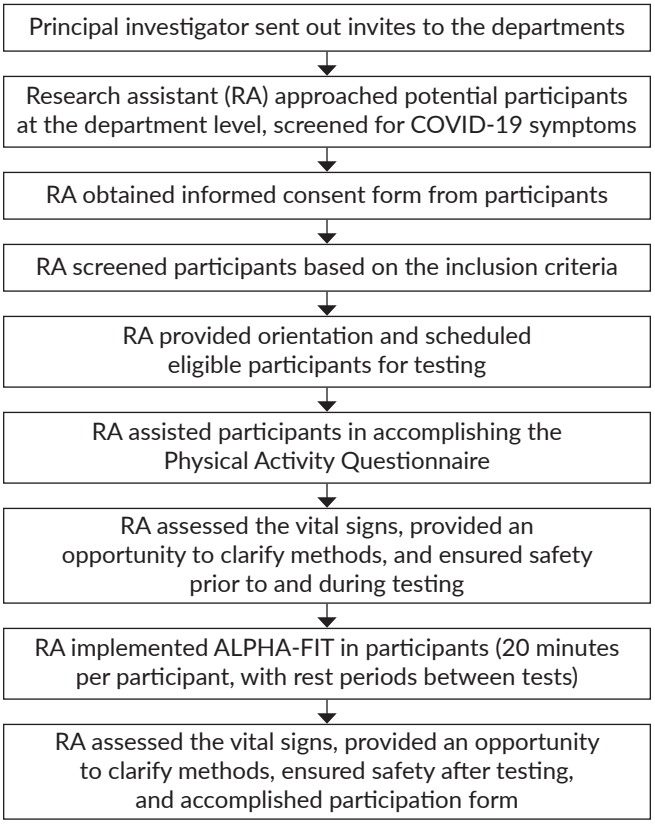

Figure 1. Data collection procedure.

accomplished a participation form that documented the presence or absence of any adverse events. Participants who incurred any injuries and/or needed medical attention were referred for appropriate management.

Data Analysis

Statistical Package for Social Science (SPSS 24 for Windows) was used for analysis. Fitness categories were assigned for each subtest based on the ALPHA-FIT, with categories classified according to sex and age group of the participant. Spearman's r was used to assess presence and strength of correlations. One-way ANOVA was used to determine group differences and regression analysis was used to assess the strength between variables and for modeling future relationships between them, while addressing the confounding variables. Level of significance was set at 0.05.[21]

RESULTS

A total of 282 participants (administrative: 97; medical: 36; nursing: 55; paramedical: 94) completed the physical activity and fitness levels testing (Table 1). There were no adverse events and incomplete testings in the duration of the data collection.The mean age was 37.4 years, 64.54% females, and 58.51% reported medium-heavy job type.

Only 9.57% had PA levels that adhere to the WHO recommendation of moderate to vigorous intensity for at least 150 minutes weekly. There were 95.74% who reported considerable to good possibilities to be physically active, 46.45% who reported no change in physical activity levels, 35.46% reported decreased physical activity levels in the last three months, 60.28% were very interested on being physically active, and 89.36% perceived "average," "good", and "very good" ratings in health status estimate (Table 1).

Forty-four of the participants (15.60%) had hypertension but were generally controlled by medications (Table 2). This was evidenced by the mean blood pressure 109.79/75.71 mm Hg, and without episodes of hypertension at the time of testing. The mean BMI of participants of 24.70 ± 3.87 m/s^2 revealed to be overweight based on the Asian BMI chart (overweight category = 23-26.9 m/s^2).

The ALPHA-FIT mean score per category revealed: one-legged stance, 2.67/3; figure-of-8 run, 2.45/3; shoulder-neck mobility, 4.58/5; modified push-up, 2.05/4; hand-grip strength, 2.5/5; jump and reach, 4/4; dynamic sit-up, 2.62/3; six-minute walk test, 475.38 meters covered. The results revealed good mobility (range of motion with shoulder-neck mobility), midfit with grip strength (dynamometry), high fit leg power (jump and reach), and midfit short-term endurance and upper extremity extensor muscles (modified push-ups). Males had significantly higher sit-up scores (p<0.001), one-legged stance scores (p=0.001), and faster figure-of-8 run (p=0.011), while females had better jump and reach scores (p<0.001). There were no significant differences in PA and HRF levels across other cohorts (Tables 3, 4, and 5).

With the regression analysis, while controlling for the other variables, HRF scores decreased with decreased physical activity (p=0.023) and increasing age (p<0.001). On the other hand, HRF scores increased with medium-heavy job tasks as compared to those with light job tasks (p=0.038) (Table 6). The nursing cohort had HRF scores lower than the administrative cohort (p=0.304), and the administrative cohort had lower HRF scores than the paramedical (p=0.117) and medical cohorts (p=0.229). Six-minute walk test revealed a mean scores of 485.8 m for males (normal values: 538 - 732 m) and 469.65 m for females (normal values: 483 - 664 m). Only 21 out of 100 males and 72 out of 182 females scored within the normal values.[26]

Table 1. Demographic Information

Characteristics	Frequency (%)
Age, in years (mean ± SD)	37.4 ± 11.09
21-29	93 (32.98)
30-39	88 (31.20)
40-49	39 (13.83)
50-59	56 (19.86)
60-69	6 (2.13)
Sex	
Female	182 (64.54)
Male	100 (35.46)
Position	
Admin	97 (34.40)
Medical	36 (12.77)
Nursing	55 (19.50)
Paramedical	94 (33.33)
Job type	
Light	86 (30.50)
Medium-Heavy	165 (58.51)
Heavy	31 (10.99)
Frequency of exercise	
Practically two physical activities weekly	51 (18.09)
Light or relaxed physical activity one or more times a week	88 (31.21)
About once a week	58 (20.57)
Twice a week	31 (10.99)
Three times a week	27 (9.57)
At least four times a week	27 (9.57)
Activity levels in the last 3 months	
Increased	51 (18.09)
No change	131 (46.45)
Decreased	100 (35.46)
Possibilities to be physical active	
Good possibilities	122 (43.26)
Considerable possibilities	148 (52.48)
Poor possibilities	12 (4.26)
Interest on being physically active	
Very interested	170 (60.28)
Somewhat interested	107 (37.94)
Not interested whatsoever	5 (1.77)
Estimate of health status	
Very poor	5 (1.77)
Poor	25 (8.87)
Average	147 (52.13)
Good	89 (31.56)
Very Good	16 (5.67)

Table 2. Health and Health-related Characteristics

Anthropometric measures	Mean ± SD
Systolic Blood Pressure (mm Hg)	109.79 ± 9.61
Diastolic Blood Pressure (mm Hg)	75.71 ± 8.58
Height (cm)	160.48 ± 8.18
Weight (kg)	63.83 ± 12.26
Body mass index	24.70 ± 3.87
Underweight	4
Normal	96
Overweight	56
Obese	126
Health characteristics	**Frequency (%)**
Has heart, circulation, or lung disease	31 (10.99)
Experienced chest pains or breathlessness	14 (4.96)
Has hypertension	44 (15.60)
Has smoked in the last 6 months	16 (5.67)
Has often felt faint or dizzy spells	16 (5.67)
Has inflammatory disease of the joints	11 (3.90)
Has low back pain or other musculoskeletal disease	91 (32.27)
Has other health conditions	41 (14.54)
Is currently taking medications	98 (34.75)
Had flu/fever in the past 2 weeks	9 (3.19)

DISCUSSION

Results of the study were similar to previous studies on HCW which showed that HCW had lower physical activity levels compared with the general population in Southeast Asia.[27] In our study, most HCWs (31.21%) defined their physical activity as light or relaxed physical activity for at least 20 minutes one or more times a week. Further, a total of 90.43% of the participants had PA levels below the WHO recommendation of at least 150 to 300 minutes of moderate aerobic activity per week (or the equivalent vigorous activity) for all adults for health and well-being. Physical activities were mostly household chores, in contrast to a foreign study where most HCW engaged in transport-related and health enhancing physical activities.[28] The Philippine setting might have a passive transport system composed mainly of cars, buses, and trains with limited level and non-level ambulation tasks that may limit physical activity.

Our participants had an average perception of their health and had considerable opportunities to improve their health status. Majority of the participants (60.28%) were very interested in being physically active. The interest in PA is reflected in PA levels of HCWs in Europe and East Asia which showed high levels, since 96% were physically active, mostly at work or in their spare time.[28] Healthcare workers want a balanced way of life and all the known benefits of PA. In a previous study, healthcare professionals who are expected to be well aware of the benefits of physical activity were found to be more adherent.[28] However, the participants' interest in being physically active may not result in actually engaging in physical activity, as reflected in the results of our study. In a study conducted in South Africa, healthcare workers' engagement may also be maximized by utilizing the TransTheoretical Model to identify appropriate stage of PA readiness and to design HCW and worksite-specific programs.[29] In addition, there were also some who have expressed that engaging in physical activity in an inpatient setting is not a priority for both patients and HCW.[30] It is therefore crucial to educate the HCW of other forms of physical activity such as transport-related, housework-related, and leisure-related activities.

The health-related fitness level of PGH employees showed similar trends as those sampled in ALPHA-FIT particularly with motor fitness on one leg stance and figure-of-8 run, and musculoskeletal fitness on jump and reach and shoulder neck mobility. Further, our participants showed low to midfit levels of hand grip, upper body strength, and cardiorespiratory fitness. The poor cardiorespiratory fitness may possibly be due to the low level of physical activity of employees, that mainly includes household chores, that may not include ambulation activities. Men having significantly higher upper body strength compared to women may be due to men engaging in health enhancing activities more than women.[27]

Table 3. Correlation of Age and Fitness Levels (n=282)

Fitness test	Age		Cohort		Sex	
	Spearman *r*	*p*-value	χ^2	*p*-value	χ^2	*p*-value
One-legged stance	-0.28	<0.001	4.03	0.673	14.13	0.001
Figure-of-8 run	-0.39	<0.001	16.41	0.012	9.03	0.011
Shoulder-neck mobility	-0.35	<0.001	10.65	0.559	4.71	0.318
Modified push-up	-0.17	0.004	17.28	0.139	4.92	0.296
Hand-grip strength	-0.03	0.564	5.25	0.949	9.38	0.052
Jump and reach	0.03	0.596	16.22	0.182	23.17	<0.001
Modified sit-up	-0.48	<0.001	34.92	<0.001	43.89	<0.001
Six-minute walk test	-0.01	0.924				

**significant at p-value = <0.05*

Table 4. Comparison of Six-minute Walk Test Results per Sex and Cohort (n=282)

Variables	ANOVA		Post-hoc comparison*	
	F	*p*-value	Contrast	95% C.I.
Sex Male vs. Female	4.62	0.032	16.15	1.36-0.92
Position	0.20	0.894		

**Bonferroni-adjusted*

Table 5. Mean Health-related Fitness Levels (n=282)

Age group	Sex	21-29		30-39		40-49		50-59		60-69	
		Fitness Category	Interpretation	Fitness Category	Interpretation	Fitness Category	Interpretation	Fitness Category	Interpretation	Fitness Category	Interpretation
One-leg stance	F	2/3 (57.27s)	mid fit*	2/3 (56.01s)	mid fit	2/3 (51.41s)	mid fit	2/3 (50.29s)	mid fit	1/3 (22.57)	low fit
	M	3/3 (60s)	high fit*	2/3 (59.52s)	mid fit	3/3 (60s)	high fit	2/3 (52.38s)	mid fit	1/3 (20.55s)	low fit
Figure-of-8	F	3/3 (7.44s)	best*	2.44/3 (7.75s)	best*	2/3 (8.2s)	mid fit	2/3 (8.6 s)	mid*	1/3 (11.19s)	Poor*
	M	3/3(6.5s)	best*	2.62/3 (6.64s)	best*	3/3 (6.92s)	best	2/3 (7.2 s)	mid*	3/3 (6.61s)	Best*
Shoulder-neck mob	F	4.91/5	min restrictions	4.7/5	min restrictions	4.46/5	min restrictions	4.13/5	min restrictions	4.4/5	min restrictions
	M	4.8/5	min restrictions	4.68/5	min restrictions	4/5	min restrictions	4.25/5	min restrictions	3/5	mod restriction
Hand-grip	F	2.77/5	second quintile	2.56/5	second quintile	2.5/5	second quintile	2.67/5	second quintile	2.6/5	second quintile
	M	2.13/5	second quintile	2.32/5	second quintile	1.77/5	poorest quintile	2.5/5	second quintile	5/5	best quintile
Jump and Reach	F	4/4 (72.79)	best quartile*	4/4 (70.01)	best quartile	4/4 (54.63)	best quartile	4/4 (58.98)	best quartile	4/4 (45.6)	best quartile
	M	4/4 (98.21)	best quartile*	4/4 (91.36)	best quartile	4/4 (76.75)	best quartile	4/4 (71.75)	best quartile	4/4 (39)	best quartile
Push-up	F	3/4 (11)	third quartile	2/4 (9)	second quartile	2/4 (9)	second quartile	1/4 (7)	poorest quartile	1/4 (5)	poorest quartile
	M	2/4 (13)	second quartile	2/4 (13)	second quartile	2/4 (12)	second quartile	2/4 (10)	second quartile	2/4 (9)	second quartile
Sit-up	F	2/3 (13)	mid fit*	2/3 (11)	mid fit	2/3 (8)	mid fit	1/3 (5)	low fit	1/3 (5)	mid fit
	M	2/3 (14)	mid fit*	2/3 (14)	mid fit	2/3 (13)	mid fit	2/3 (10)	mid fit	3/3 (15)	high fit

**No interpretation based on ALPHA-FIT*

Table 6. Regression Analysis of Average Fitness Scores (n=282)

Determinants	Model 1	Model 2	Model 3
Age	-0.02***	-0.02***	-0.02***
Sex			
Female	Ref		
Male	0.06	-0.02	
Cohort			
Admin	Ref		
Medical	0.12	-0.03	
Nursing	-0.09	-0.12	
Paramedical	0.12	-0.01	
Job type			
Light	Ref		
Medium-Heavy	0.15*	0.09	
Heavy	0.11	-0.05	
Frequency of exercise			
Practically no physical activities weekly	Ref		
Light or relaxed physical activity one or more times a week	0.03	-0.02	
About once a week	0.15	0.16	
Twice a week	0.16	0.14	
Three times a week	0.21	0.04	
At least four times a week	0.08	0.01	
Activity levels in the last 3 months			
Increased	Ref		
No change	0.03	0.16	
Decreased	0.17	0.21*	
Possibilities to be physical active			
Good possibilities	Ref		
Considerable possibilities	-0.01	-0.06	
Poor possibilities	-0.28	-0.30	
Interest on being physically active			
Very interested	Ref		
Somewhat interested	0.04	0.09	
Not interested whatsoever	-0.45	-0.16	
Estimate of health status			
Very poor	Ref		
Poor	0.23	0.09	0.17
Average	0.10	0.02	0.14
Good	0.26	0.21	0.32
Very good	0.32	0.26	0.37

**p<0.05; **p<0.01; ***p<0.001*

Model 1 – unadjusted linear regression model
Model 2 – linear regression model containing all independent variables
Model 3 – linear regression model after stepwise variable selection

Looking at work assignments, average fitness scores were higher by 0.12 units among paramedical staff than the administrative staff. This is aligned with the results in Ocon et al. in 2018 where participants had known comorbidities affecting their participation in physical activity and the nature of the administrative work fosters increased sitting time.[17] A previous study revealed that physiotherapists were more physically active when compared to the rest of health care professionals, similar to the current result of the medical and paramedical staff being more physically active than the other cohorts, possibly due to the nature of the daily tasks.[28]

For PGH, average fitness scores decreased by 0.02 units for every year increase in age. As with age, the result shows significant inverse correlation between balance and shoulder-neck mobility and age. Age related changes in flexibility were found to have resulted in impaired static and dynamic standing balance because of loss of spinal extension and reduced ankle mobility that consequently results in weakness of the ankle muscles and ultimately limiting patient's ability to perform ankle strategy with small perturbations.[31-33] Decreased functional range of motion of the spine also affects balance reaction, resulting in shorter functional reach and reduces function such as walking speed, both level and non-level.[33,34] Consistent with existing data, compliance with physical activity guidelines was significantly lower in the ≥45-year-old group compared to the <45-year-old group. Current literature supports that younger individuals and higher education have higher adherence to physical activity, thus substantiating creation of physical activity and fitness activities to prevent potential falls.[28]

Across cohorts and age groups, there were 138 (48.94%) overweight and 43 (15.25%) obese participants. This may have greatly affected their physical activity participation similar to studies conducted within Asia.[34,35]

Limitations

We collected data from 282 participants out of almost 5,000 HCWs, where there might have been unequal representation of the cohorts, particularly of the medical and nursing cohorts. Further, convenience sampling was employed and may have caused sampling bias resulting in limited generalizability of results. Future studies may focus on equal sampling of each cohort using stratified random sampling or quota sampling. We utilized a self-report physical activity questionnaire and social desirability may cause overreporting on physical activity. Future investigators may consider adding objective measures. Moreover, other sociodemographic factors should be considered, marital status, or living arrangements that may be factors in PA participation may also be included. In addition, we only tested participants who were deemed clear and safe for testing. This may have led to having favorable results. Further research may explore the safety and feasibility of testing patients with chronic conditions that may also impact participation in physical activity.

Recommendations

ALPHA-FIT is a quick and easy-to-administer PA and HRF assessment tool and may be used as a pre-employment screening tool and periodic assessment to ensure employee wellness and reduce injuries. Design studies and programs on PA and HRF of HCWs to match the work and the worker. Pay special attention to nursing HCWs as they have lower PA and overall HRF compared with other cohorts. Employers could create a wellness program and provide a workplace wellness facility focused on increasing PA engagement, UE and core strengthening, and cardiorespiratory fitness. Future researchers may use the TransTheoretical Model to identify appropriate stage of PA to optimize HCW participation and to design HCW-specific programs.[28]

CONCLUSION

Healthcare professionals who are expected to be aware of benefits of physical activity and health-related fitness have shown inadequate physical activity levels and low to midfit health-related fitness. Healthcare workers may benefit with targeted exercises to improve physical activity adherence, grip and core strength, and upper extremity and cardiorespiratory endurance. Information on physical activity and health-related fitness may aid in policy making on employee wellness that could highly impact health service delivery.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

All authors declared no conflicts of interest.

Funding Source

This study was funded by the Philippine General Hospital Paramedical Research Fund.

REFERENCES

1. Reid A, Malone J. A cross-sectional study of employer and employee occupational health needs and priorities within the Irish Civil Service. Occup Med (Lond). 2003 Feb;53(1):41-5. doi: 10.1093/occmed/kqg005. PMID: 12576564.
2. World Health Organization. A training manual for health workers on healthy lifestyle: an approach for the prevention and control of noncommunicable diseases [Internet]. 2009 [cited 2024 Jan]. Available from: https://healthworkerpreparedness.files.wordpress.com/2015/05/trainersguide.pdf
3. Pronk N. Fitness of the US workforce. Annu Rev Public Health. 2015 Mar 18:36:131-49. doi: 10.1146/annurev-publhealth-031914-122714. PMID: 25785887.
4. Suni J, Husu P, Rinne M. Fitness for Health: The ALPHA-FIT Test Battery for Adults Aged 18–69 [Internet]. UKK Institute. 2010 [cited 2024 Jan]. Available from: https://ukkinstituutti.fi/julkaisut/fitness-for-health-the-alpha-fit-test-battery-for-adults-aged-18-69/
5. Burton W, McCalister KT, Chen CY, Edington DW. The association of health status, worksite fitness center participation, and two measures

of productivity. J Occup Environ Med. 2005 Apr;47(4):343-51. doi: 10.1097/01.jom.0000158719.57957.c6. PMID: 15824625.
6. Lamminpaa A, Kuoppala J, Vaananen-Tompo I, Hinkka K. Employee and work-related predictors for entering rehabilitation: a cohort study of civil servants. J Rehabil Med. 2012 Jul;44(8):669-76. doi: 10.2340/16501977-1007. PMID: 22729795.
7. Raymond P, Hartmann J, Lauerwald R, Sobek S, McDonald C, Hoover M, et al. Global carbon dioxide emissions from inland waters. Nature. 2013 503:355–59. DOI 10.1038/nature12760 PMID: 24256802.
8. Clark M, Jenkins SM, Limoges KA, Hagen PT. Is usage of wellness center associated with improved qyuality of life? Am J Health Promot. 2013 May-Jun;27(5):316-22. doi: 10.4278/ajhp.120213-QUAL-87. PMID: 23398132.
9. Church T, Thomas DM, Tudor-Locke C, Katzmarzyk PT. Trends over 5 decades in US occupation-related physical activity and their associations with obesity. PLoS One. 2011;6(5):e19657. doi: 10.1371/journal.pone.0019657. PMID: 21647427; PMCID: PMC3102055.
10. Hoj K, Skriver MV, Hansen AL, Christensen B. Effect of including fitness testing in preventive health checks on cardiorespiratory fitness and motivation: study protocol of a randomized controlled trial. BMC Public Health. 2014 Oct 10;14:1057. doi: 10.1186/1471-2458-14-1057. PMID: 25300392; PMCID: PMC4197288.
11. Dodson E, Lovegreen SL, Elliot MB, Haire-Joshu D. Worksite policies and environments supporting physical activity in midwestern communities. Am J Health Promot. 2008 Sep-Oct; 23(1): 51–5. doi: 10.4278/ajhp.07031626. PMID: 18785375; PMCID: PMC3973737.
12. Zhou J, Xie X, Guo B, Pei R, Pei X, Yang S, et al. Impact of COVID-19 lockdown on physical activity among the chinese youths: The COVID-19 impact on lifestyle change survey (COINLICS). Front Public Health. 2021 Feb 4:9:592795. doi: 10.3389/fpubh.2021.592795. PMID: 33614578; PMCID: PMC7890242.
13. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukris O, Masmoudi L, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: results of the ECLB-COVID19 international online survey. Nutrients. 2020 May 28;12(6):1583. doi: 10.3390/nu12061583. PMID: 32481594; PMCID: PMC7352706.
14. Busbin J, Self DR. Wellness and prevention programs as internal marketing programs for hospitals: the current status. J Hosp Mark. 1991;6(1):131-48. PMID: 10116630.
15. Foley M, Thorley K, Van Hout MC. Assessing fitness for work: GPs judgment making. Eur J Gen Pract. 2013 Dec;19(4):230-6. doi: 10.3109/13814788.2013.786037. PMID: 23692217.
16. Shoaf LR. Health awareness and life-style practices of employees in extended-care facilities. J Am Diet Assoc. 1986 Dec;86(12):1693-7. PMID: 3782685.
17. Ocon MO, Mojica JP, Ang-Muñoz CD, Rey-Matias RR. Prevalence of risk factors that lead to chronic disabling diseases among Philippine General Hospital employees. PARM Proceedings. 2018;11(1):31-42.
18. Meyer J, Herring M, McDowell C, Lansing J, Brower C, Schuch F, et al. Joint prevalence of physical activity and sitting time during COVID-19 among US adults in April 2020. Prev Med Rep. 2020 Dec:20:101256. doi: 10.1016/j.pmedr.2020.101256. PMID: 33282638; PMCID: PMC7695441.
19. Dipietro L. Physical activity in aging: Changes in patterns and their relationship to health and function. J Gerontol A Biol Sci Med Sci. 2001 Oct:56 Spec No 2:13-22. DOI 10.1093/gerona/56.suppl_2.13 PMID: 11730234
20. Kari JT, Pehkonen J, Hirvensalo M, Yang X, Hutri-Kähönen N, Raitakari OT, et al. Income and physical activity among adults: evidence from self-reported and pedometer-based physical activity measurements. PLoS One. 2015 Aug 28;10(8):e0135651. DOI 10.1371/journal.pone.0135651 PMID: 26317865 PMCID: PMC4552741
21. Portney L, Watkins M. Foundations of clinical research. Philadelphia (USA): Pearson Education Inc; 2015.
22. Whelton PK, Carey RM, Aronow WS, Casey Jr DE, Collings KJ, Himmelfrab CD, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: Executive summary: A report for the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Hypertension. 2018 Jun;71(6):1269-324. DOI 10.1161/HYP.0000000000000066 PMID: 29133354
23. Burnstein B, Steele RJ, Shrier I. Reliability of fitness test using methods and time periods common in sport and occupational managment. J Athl Train. 2011 Sep-Oct; 46(5): 505–13. PMID: 22488138 PMCID: PMC3418957
24. Hirshkowitz M, Whiton K, Albert SM, Aless, C, Bruni O, Don Carlos L, et al. National Sleep Foundation's updated sleep duration recommendations: final report. Sleep Health. 2015 Dec;1(4):233-43. DOI 10.1016/j.sleh.2015.10.004 PMID: 29073398
25. Enright PL, Sherrill DL. Reference equations for the six-minute walk in healthy adults. Am J Respir Crit Care Med. 1998 Nov;158 (5 Pt 1):1384-7. DOI 10.1164/ajrccm.158.5.9710086 PMID: 9817683
26. Tsang RCC. Reference values for 6-minute walk test and hand-grip strength in healthy Hong Kong Chinese adults [Internet]. 2005 [cited Jan 2024]. Available from: https://core.ac.uk/download/pdf/82505802.pdf
27. Saad HA, Low PK, Jamaluddin R, Chee HP. Level of physical activity and its associated factors among primary healthcare workers in Perak, Malaysia. Int J Environ Res Public Health. 2020; 17(16), 5947. DOI 10.3390/ijerph17165947 PMID: 32824361 PMCID: PMC7459827
28. Marques-Sule E, Miró-Ferrer S, Muñoz-Gómez E, Bermejo-Fernández A, Juárez-Vela R, Gea-Caballero V, et al. Physical activity in health care professionals as a means of primary prevention of cardiovascular disease: A STROBE compliant cross-sectional study. Medicine (Baltimore). 2021 Jun 4; 100(22): e26184. DOI 10.1097/MD.0000000000026184 PMID: 34087883 PMCID: PMC8183826
29. Skaal L, Pengpid S. Physical activity, fitness level and health problems of healthcare workers in South Africa: The transtheoretical model as an explanatory framework. Afr J Phys Health Educ Recreat Dance. 2011; 17(1), 612-23.
30. Alsop T, Woodforde J, Rosbergen I, Mahendran N, Brauer S, Gomersall S. Perspectives of health professionals on physical activity and sedentary behaviour in hospitalised adults: A systematic review and thematic synthesis. Clin Rehabil. 2023 Oct;37(10):1386-405. DOI 10.1177/02692155231170451 PMID: 37070142 PMCID: PMC10426259
31. Vandervoort A, Hill K, Sandrin M, Vyse VM. Mobility impairment and falling in the elderly. Physiotherapy Canada. 1990 42(2),99-107.
32. Einkauf DK, Gohdes ML, Jensen GM, Jewell MJ. Changes in spinal mobility with increasing age in women. Phys Ther. 1987 Mar; 67(3):370-5. DOI 10.1093/ptj/67.3.370 PMID: 3823151
33. Katzman WB, Sellmeyer DE, Stewart AL, Wanek L, Hamel KA. Changes in flexed posture, musculoskeletal impairments, and physical performance after group exercise in community-dwelling older women. Arch Phys Med Rehabil. 2007 Feb;88(2):192-9. DOI 10.1016/j.apmr.2006.10.033 PMID: 17270517
34. Balzini L, Vannucchi L, Benvenuti F, Benucci M, Monni M, Cappozzo A, et al. Clinical characteristics of flexed posture in elderly women. J Am Geriatr Soc. 2003 Oct;51(10):1419-26. DOI: 10.1046/j.15325415.2003.51460.x PMID: 14511162
35. Wahyuti SA, Siswantoyo, Suhadi, Meikahani R, Paryadi, Putro WAS, et al. Relationship between physical activity and body mass index in women's volleyball athletes during COVID-19 pandemic in special region of Yogyakarta, Indonesia. J M Chem Sci. 2022 5(6): 1102-08. DOI 10.26655/JMCHEMSCI.2022.6.23