RESEARCH ARTICLE

REVISED A cross-sectional study on the pursuit of happiness among healthcare workers in the context of health systems strengthening: The case of Meru County, Kenya. [version 2; peer review: 1 approved, 1 approved with reservations]

Rose Nabi Deborah Karimi Muthuri ¹, Flavia Senkubuge¹, Charles Hongoro¹⁻⁴

¹School of Health Systems and Public Health, University of Pretoria, Pretoria, Gauteng province, Pretoria 0002, South Africa

²Developmental, Capable and Ethical State Division, Human Sciences Research Council, Pretoria, Gauteng province, Pretoria 0001, South Africa

³Faculty of Science, Tshwane University of Technology, Pretoria, Gauteng province, Pretoria 0183, South Africa

⁴Faculty of Health Sciences, University of Fort Hare, Alice, Eastern Cape, Alice 5700, South Africa

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Abstract

Background: Happiness is one of the ultimate goals of every human being. Happiness is a significant factor of health system efficiency. Healthcare workers are at the core of every health system. However, up-to-date literature on happiness among healthcare workers is limited. The purpose of this study is to investigate the factors influencing the self-assessed happiness among healthcare workers in public and mission hospitals in Meru County, Kenya.

Methods: Using a cross-sectional design, a total of 553 healthcare workers in 24 hospitals completed the Orientations to Happiness questionnaire between June and July 2020.

Results: Healthcare workers' overall happiness was significantly different between hospitals of public and mission ownership ($p < 0.05$). The orientations to happiness mean scores of both pursuits of pleasure and meaning were significantly different between public and mission hospitals ($p < 0.05$). However, there were no statistically significant differences in the pursuit of engagement among the healthcare workers between public and mission hospitals ($p < 0.05$). In both public and mission hospitals, income and the type of toiletry facility were significant factors of overall happiness ($p < 0.05$ or $p < 0.1$). In mission hospitals, eight more variables were statistically significant factors of overall happiness namely type of employment, occurrence of water unavailability, safe drinking water, acceptable main source of water, type of toiletry facility, hospital disposal of garbage, availability

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1. **Ian Couper** , Ukwanda Centre for Rural Health, Stellenbosch, South Africa

2. **Zhuo Chen** , University of Georgia, Athens, USA
 University of Nottingham Ningbo China, Ningbo, China

Wei Jiang , University of Nottingham Ningbo China, Ningbo, China

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of water for hand washing, and overall safety of the hospital working environment ($p < 0.05$ or $p < 0.1$). In public hospitals, additional statistically significant factors of overall happiness were qualification level, and a functional workplace safety and health committee ($p < 0.05$ or $p < 0.1$).

Conclusion: Demographic, work-related, and physical work environment factors significantly contribute to healthcare workers overall happiness in both mission and public hospitals. The findings present possible areas of focus for policy and practical implications related to healthcare workers' happiness aimed at health workforce and health systems strengthening in Kenya.

Keywords

Happiness, healthcare workers, human resources for health, physical work environment, health systems, Kenya

Corresponding author: Rose Nabi Deborah Karimi Muthuri (u19391189@tuks.co.za)

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REVISED Amendments from Version 1

In the new version, revisions in various sections have been made following the reviewers recommendations. Thus, the order of intext citations and references changed throughout the document.

Abstract: Following additional analysis, similar and different statistically significant factors were included according to hospital ownership. The conclusion was also slightly modified to incorporate the updated results of the study.

Introduction: For clarity, accuracy, and improvement of the flow, rearrangement of the content has been done and current literature, included. Following a question posed by the reviewer, objectives 3 and 4 were merged to form a single objective due to similarity.

Methods: As suggested by the reviewers, the following information is included in this new version: a brief description of the Meru County health system, clarification of the role of the COVID-19 pandemic in the study and globally, a descriptive summary of the variables assessed, and statistical information regarding the Welch's T-test, and double-log regression.

Results: Following the reviewers recommendations, t-test results were included, clarification of the response rate was done, reduction of the descriptive results of demographic factors was done because they are presented in the methods section and regression results tables. Following sub-group regression analysis as suggested, Table 6 and Table 7 present the results of mission and public hospitals separately because a statistically significant difference was found between hospital ownership and happiness. As recommended, the double-log regression results are included and show a significant relationship between income and happiness in both public and mission hospitals.

Discussion: After the additional results, information and references to relevant studies are included. Where appropriate as recommended, references to tables are presented in this version. Regarding the problem of the last sentence referring to the next paragraph, changes have been made to solve this problem.

Conclusion: Following the new results, updates were also made accordingly.

Any further responses from the reviewers can be found at the end of the article

Introduction

Research on the growing epidemic of mental health-related issues among healthcare workers, such as anxiety, burnout, depression, and substance abuse, confirm the challenges they are experiencing¹⁻⁵. In comparison, there is a dearth of research on healthcare workers' positive mental health aspects such as happiness, especially in low- and middle-income countries^{1,2}. According to the United Nations General Assembly consisting of 193 heads of state, happiness is a prime goal of each individual⁶. In this study, happiness is defined as, the collective experience of pleasure, positive emotions, engagement, and a sense of meaning in life^{7,8}. Experiencing happiness most of the time does not mean eliminating the negative affect from all aspects of life, because both are important depending on the situation⁹. Happiness has been reported as a significant factor of health systems efficiency, which implies the importance of having enabling health systems that promotes the happiness of healthcare workers

and to improve health service delivery and health systems performance¹⁰.

According to the World Health Organization (WHO) healthcare workers are the core of any health system¹¹. Researchers often interchangeably use the terms healthcare professionals and healthcare workers; in this study we primarily refer to the latter. Healthcare workers are defined as individuals who have undergone clinical training to practice ethical and evidence-based medicine, in order to provide quality health services¹². Healthcare workers' happiness is often a neglected component in medical school curricula and in-service training, for example physicians are trained to always be stoic while providing healthcare services¹³. However, healthcare workers are human beings, and mental balance is essential for them to avoid mental illness, while enabling them to operate optimally at work and in their personal lives. To effectively develop and implement happiness policies and programs among healthcare workers, empirical research is necessary to capture empirical realities¹⁴.

The theoretical framework applied in this study is the authentic happiness theory. The authentic happiness theory by Seligman¹⁵ explains the pursuit of happiness in three orientations, namely, the pursuit of pleasure, pursuit of engagement, and pursuit of meaning⁸. The pursuit of pleasure is a basic level of happiness, characterized by an emotional expression such as smiling or laughter and short term activities that maximize pleasure and minimize pain¹⁵. The pursuit of engagement is the experience of flow¹⁶. Flow occurs when an individual utilizes all their cognitive and emotional resources, strengths, and skills when engaging in a task^{16,17}. Csikszentmihalyi explains that, although joy is not experienced instantly while being engulfed in the activity, it is the aftermath of the flow experience that is energizing and elicits happiness⁸.

The third orientation to happiness is the pursuit of meaning, which, according to the authentic happiness theory, is the ultimate level of happiness¹⁵. Seligman believes when an individual serves something that is larger than themselves that is a positive institution, such as family, community, religion, organizations, among others, an individual stands to achieve a sense of meaning¹⁵. Peterson and colleagues⁸ stated the higher scores on all three orientations to happiness equate to a full life. A full life is experienced by pursuing all three orientations associated with a life driven by intrinsic goals and high self-control¹⁸. A low score on all three orientations equates to an empty life⁸. The sole pursuit of pleasure, also known as hedonism, is associated with an empty life and low self-control¹⁸.

The World Happiness Report (WHR) is published annually on International Happiness Day every 20th March since the year 2012¹⁹. In the WHR, the state of happiness is reviewed globally²⁰. Using the science of happiness, various factors affecting happiness of the general population are reported, to inform government policy²⁰. Some of the identified factors of happiness in the general population include age, gender, income, work, governance, education, mental and physical health, values, and family experience²¹. In 2020, a systematic review reported both

individual and organizational factors are significant for healthcare professionals' happiness¹⁴. The factors identified were age, gender, positive attitude, altruism, a sense of meaning, mental and physical health, time management, work-life balance, and quality of life¹⁴. Both having a job and being happy at work are important, as people with jobs spend most of their lives at work²².

In the 2020 WHR, the environment quality significantly impacted individuals' happiness²³. Thus, this study aimed to assess the relationship between the physical work environment in the hospital and healthcare workers' happiness. Previous studies assessing healthcare workers' happiness reported that small sample sizes as a major limitation^{24–26}. Researchers have recommended more studies need to be done among larger and more heterogeneous samples exploring multidimensional aspects of happiness among healthcare workers in multiple health system contexts¹⁴. Hence, the present study was conducted on a relatively large sample, across different cadres of healthcare workers in Kenya, which is a lower-middle-income country in Sub-Saharan Africa²⁷. According to World Health Assembly (WHA) resolution WHA69.19 titled "The Global strategy for human resources for health: workforce 2030", urges the member states to actively address the health workforce needs through an intersectoral approach²⁸. Since health systems are comprised of both the public and private health sectors²⁹, this empirical study was conducted in both public and private not-for-profit (e.g., mission or faith-based) hospitals.

The objective of this study was to investigate the factors influencing the self-assessed happiness among healthcare workers in public and mission hospitals in Meru County, Kenya. To the best of our knowledge this is the first quantitative study investigating happiness among healthcare workers in public and mission hospitals in Kenya. This study will contribute to bridging knowledge gaps related to the role of healthcare workers' happiness in the Kenyan health system. Empirical evidence is paramount in informing happiness policies related to the quantity and quality aspects of employment²². By investigating the role of demographic, work-related, and physical work environment factors on happiness, this study will also contribute to evidence-based happiness strategies and policies geared towards health workforce strengthening. For example, Blanchflower and Oswald reported that the higher the income the higher the levels of happiness among a random sample of American and European adults³⁰. Frey and Stutzer stated that in addition to measuring the relationship between income and happiness, it is equally important for happiness research to capture empirical realities by assessing additional aspects, which should no longer be disregarded³¹. Hence, in this study, in addition to income, other factors were assessed and, their association with healthcare workers' overall happiness in public and mission hospitals in Kenya. The present study focuses on the following aims:

1. To find the relative importance and strength of agreement of the orientations to happiness among healthcare workers.
2. To assess the significant difference between healthcare workers' overall happiness in public and mission hospitals.
3. To identify the relationship between healthcare workers' overall happiness and demographic, work-related, and physical work environment factors.

Methods

Study design

Using a cross-sectional design, this study was performed in public and mission hospitals in Meru County, Kenya. Meru County is a rural area with a total population of 1,545,714 persons³². By 2019, the human resources for health (HRH) within Meru County was 1872 with 954 clinically trained healthcare workers, distributed across 183 health facilities^{33,34}. The focus of this study was on all the 24 sub-county and county referral service hospitals in Meru County, Kenya.

Study setting

In Meru County, the health system consists of five-levels namely: level 1: community health services; level 2: health dispensaries and clinics; level 3: health centers and maternity homes; level 4: sub-county and medium-sized private hospitals; and level 5: the county referral hospital^{34,35}. This study was done in level 4 and 5 health facilities, where different cadres of healthcare workers are present.

The present study was done between June 15, and July 31, 2020, which was during the COVID-19 global pandemic. In Meru County, by the end of June 2020, 16 cases were reported and towards the end of July 2020, 32 cases were reported in a population of 1,545,714 people³². The COVID-19 pandemic did not negatively influence the data collection process of this study as the number of COVID-19 cases were relative few at the time. Despite the relatively low COVID-19 case load at the time in Meru County, researchers reported that the COVID-19 pandemic is a health system shock that has adversely affected healthcare workers' mental health during spikes of COVID-19 cases³⁶. A scope review also revealed that the increased spread of the COVID-19 virus has resulted in healthcare workers reporting higher levels of anxiety, burnout, depression, and distress, consequently researchers have recommended the need of studies aimed at enhancing healthcare workers' well-being³⁷.

Study sample

Participant selection within the hospitals was made among healthcare workers across different cadres using simple random sampling. To minimize selection bias, simple random sampling was selected as a sampling method because it allowed for each eligible respondent to have an equal probability of being selected. A list of clinically trained healthcare workers in each hospital was obtained from the hospital administration. Then respondents were selected according to a simple random number table. In person, respondents were invited and presented with an informed consent form explaining this study, subsequently the willing participants signed and voluntarily agreed to participate.

Data collection and data source

The Orientations to Happiness Questionnaire (OTH) was established and validated by Peterson *et al.*, in 2005 to assess an individuals' orientation to happiness (<https://doi.org/10.1007/s10902-004-1278-z>)⁸. The orientations constitute the three primary constructs that are measured in the 18-item questionnaire⁸. Each of the orientations to happiness has six items on a five-point Likert scale ranging from 1 representing "Not at all like me" to 5 representing "Very much like me"⁸. Respondents' happiness index ranges from 18 (lowest possible), signifying an empty life, to 90 (highest possible score), signifying a full-life⁸. Various studies reported a Cronbach alpha for all the three orientations to range from 0.77 to 0.88^{8,38,39}. The OTH has been used in various countries such as Australia³⁹, South Africa^{38,40}, Italy⁴¹, Switzerland⁴², USA³⁹, and Croatia¹⁸.

On a scale of 0 to 1, when the Cronbach's alpha is greater than 0.70, this means the instrument is reliable⁴³. In this study, the Cronbach's alpha was 0.833, which shows that the instrument was reliable in measuring happiness among the respondents. The dataset analyzed in this study can be found in the Figshare repository⁴⁴.

Statistical analysis

Statistical analysis was done using STATA® 15.1 (StataCorp., College Station, TX, USA). We calculated measures of central tendency, the relative importance index (RII), analysis of variance (ANOVA), Welch's t-test, double-log regression, and used a multivariate linear regression model to determine statistical significance of slope coefficients at 90% and 95% confidence levels of each independent variable. To control for confounding variables, we used multivariate linear regression analysis which can handle multiple confounders at the same time⁴⁵. The questionnaires that were had up to 50% missing data were excluded from the data analysis.

The RIIs were calculated using the following formula:

$$RII = \sum \frac{W}{A \times N} \quad (1)$$

The RII formula applied shows W represented the weighting as per each respondent on a five-point Likert scale where 1 implies lower happiness scores and 5 higher happiness score. A represented the highest weight, in this case 5 based on the five-point scale. N represented the entire sample. The RII score is between 0 and 1; thus, the high values were $0.8 \leq RII \leq 1$, high-medium values were $0.6 \leq RII \leq 0.8$, medium values were $0.4 \leq RII \leq 0.6$, medium low values were $0.2 \leq RII \leq 0.4$, and low values were $0 \leq RII \leq 0.2$ ⁴⁶.

The mean of the median absolute deviation (MADM) was calculated in a four-step process involving: (a) calculation of the median value of each of the 18 happiness variables; (b) calculation of the absolute deviation for each dependent variable represented as (x) in the sub-formula $[x_i - \text{median}]$; (c) calculation of the median absolute deviation; (d) calculation of the MADM⁴⁷. The MADM classifications signify the following: values of < 1.08 indicates high agreement, $1.08 - 1.41$ indicates moderate agreement and, > 1.41 indicates low agreement⁴⁸.

Using Analysis of Variance (ANOVA), we examined if there was a statistical difference the orientations to happiness between participants working in public and mission hospitals. In addition, a two-sample Welch's t-test was used to compare overall happiness mean scores between public and mission hospitals with unequal sample sizes.

In this study, the independent variables assessed were demographic and work-related, and physical work environment namely: hospital ownership (0 = public or 1 = mission hospital), sex (0 = male or 1 = female), age (participants' age in years), income per month in Kenyan Shillings (KES) (1 = $\leq 14,999$, 2 = 15,000-24,999, 3 = 25,000-44,999, 4 = 45,000-64,999, 5 = 65,000-74,999, 6 = 75,000-84,999, 7 = 85,000-104,999, 8 = $\geq 105,999$), marital status (0 = single, divorced, widowed, or 1 = married), level of qualification (0 = certificate and diploma or 1 = bachelor's degree or higher), years of work experience, healthcare worker cadre, employment type (0 = part-time (i.e., ≤ 40 hours per week) or 1 = full-time (i.e., ≥ 40 hours per week)), in-service training (0 = no or 1 = yes), number of hours worked per week, household size, and staff housing (0 = no or 1 = yes)^{44,47,49}.

The physical work environment variables were consistent supply of water (0 = no or 1 = yes), occurrence(s) of water unavailability (0 = no or 1 = yes), safe drinking water (0 = no or 1 = yes), acceptable primary source of water (0 = no or 1 = yes), type of toiletry facility (0 = flush or pour flush or 1 = pit latrine), risk when using toiletry facility (0 = no or 1 = yes), hospital disposal of garbage (0 = informal disposal or 1 = formal collection service), availability of water for hand washing (0 = no or 1 = yes), constant availability of soap for hand washing (0 = no or 1 = yes), hand washing station $\leq$ five meters from the toilet (0 = no or 1 = yes), workplace safety and health committee (0 = no or 1 = yes), perceived overall safety of hospital working environment^{44,47,49}.

A multivariate linear regression analysis was performed to discover the significant factors that influence healthcare workers' overall happiness in mission and public hospitals. Where happiness (Y_k) was the dependent variable and the demographic, work-related, and physical work environment factors were the 24 independent variables (X_{jk}). The multivariate linear regression model applied was as follows⁵⁰:

$$Y_k = \beta_0 + \beta_1 X_{1k} + \beta_2 X_{2k} + \dots + \beta_{24} X_{24k} + \epsilon_k \quad (2)$$

Where: β_0 indicates the constant or intercept term capturing the unexplained variations in the dependent variable Y. β_1 indicates the slope coefficient measuring the amount by which Y will change when X changes by a single unit. k goes from 1 to n, in this case the 24 independent variables. X_{jk} stands for the k^{th} observation value for the independent variable X_j . ϵ_k is the error (disturbance) term that captures errors in model specification and other factors that influence healthcare workers' happiness but are not explicitly considered in the model.

In addition, a double-log regression model, was performed to measure the non-linear relationship between the dependent

variable (overall happiness) and independent variable (income) which were transformed into logarithms then regressed according to hospital ownership. The double log regression formula applied in this study is⁵⁰:

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \epsilon \quad (3)$$

Where: $\ln Y$ indicates the log of overall happiness. β_0 refers to the intercept term capturing the unexplained variations in overall happiness Y . β_1 indicates the slope coefficient measuring the amount by which Y will change when X changes by a single unit. $\ln X_1$ refers to the log of income as the independent variable. ϵ is the error term that captures errors in the model. The elasticities in a double-log equation are constant thus an indifferent curve can be produced based on the results⁵⁰.

Ethical considerations

The protocol of this study was ethically approved by three institutions, namely:

1. The Faculty of Health Sciences Research Ethical Committee, University of Pretoria, South Africa (Reference number: 718/2019).
2. The Institutional Review Board (IRB), United States International University-Africa, Kenya (Reference number: USIU-A/IRB/130-2020).
3. The National Commission for Science, Technology, and Innovation (NACOSTI), Kenya (Research license number: NACOSTI/P/20/4133 and reference number: 901924).

The Meru County Government Department of Health also provided clearance for the conduct of this study (CGM/COH/1/17(50). This was followed by hospital administrative approvals from each of the 24 hospitals. The investigator provided respondents with informed consent forms explaining: the purpose of the study; participation in the research study was voluntary; refusal to participate would not have negative effect on their job; s/he has the liberty withdraw from the study at any time; and this research poses no risk. Following this explanation,

respondents in this study voluntarily signed the informed consent forms, agreeing to participate.

Results

In this study, from 566 questionnaires 553 were analyzed, thus the response rate was 97.7%, because 13 questionnaires were 50% incomplete thus excluded from analysis^{47,49}. The study involved a sample of $n=553$ healthcare workers⁴⁴. This study revealed that majority of the healthcare workers under study worked in public hospitals (78.48%), were female (61.30%), worked as nursing professionals (30.56%), held a diploma (60.58%), were employed full-time (93.49%), had attended in-service training (66.00%), were married (63.11%), had 10.7 years of work experience, lived in a median household size of three individuals, were not accommodated within the hospital compound (86.62%), were between the ages 20 and 78 years (the mean age was 36.5 years), and earned between 46,000-65,000 Kenyan shillings (KES) which is about US\$439-615 (at an exchange rate of US\$1=107KES by May 13, 2021)).

Orientations to happiness and hospital ownership

Among all the participants ($n=553$), the mean overall happiness score was 64.59 (SD = 11.09). The mean overall happiness score in public hospitals was 65.14 (SD = 10.98), whereas the mean in mission hospitals was 62.57 (SD = 11.31). A two-samples Welch t-test showed a statistically significant difference between overall happiness scores and hospital ownership, $t(184.579) = 2.208, p=0.0285$.

Table 1 shows the mean scores and standard deviations of the three orientations to happiness by the overall sample ($n=553$) and hospital ownership sub-samples (public hospitals $n=434$ and mission hospitals $n=119$).

Among the orientations to happiness, the pursuit of meaning had the highest mean scores. In the overall sample, the pursuit of pleasure had the second highest mean scores, followed by the pursuit of engagement. The opposite order was reported for the second and third highest mean scores in mission hospitals, where the pursuit of engagement was second and pursuit of pleasure third (as shown in **Table 1**). The overall

Table 1. Mean scores* (SD) (1–5 Likert scale) of the three orientation to happiness for the sample of $n=553$ healthcare workers by hospital ownership.

Orientation to happiness	Overall (N=553)	Public hospitals (n=434)	Mission hospitals (n=119)
Pursuit of pleasure	3.30 (0.24)	3.36 (0.23)	3.07 (0.28)
Pursuit of engagement	3.29 (0.62)	3.31 (0.61)	3.23 (0.66)
Pursuit of meaning	4.18 (0.29)	4.19 (0.28)	4.12 (0.36)

*Reported on 1–5 scale with higher values are suggestive of higher happiness

happiness average score was 64.59; 65.14 in public hospitals and 62.57 in mission hospitals (on an 18–90 scale).

Orientation to happiness - MADM analysis

The MADM results showed that healthcare workers moderately agreed to the pursuit of pleasure items as an orientation to happiness. Three items were moderately supported, and the healthcare workers strongly supported three other items. The healthcare workers highly agreed that the pursuit of engagement contributed to their happiness. Four items of the six were strongly supported, and the remaining two had moderate and low support in terms of their contribution to happiness. The pursuit of meaning items were all strongly supported as contributors to the healthcare workers happiness, signified by the high levels of agreement (see Table 2).

Orientation of happiness - RII

The relative importance of the orientations to happiness showed the pursuit of meaning was the most important, followed by

the pursuit of pleasure. The pursuit of engagement was ranked third important orientation to their happiness (as shown in Table 3).

Factors of healthcare workers' overall happiness

ANOVA analysis results. Hospital ownership explained 0.91% of the variance in overall happiness score among the healthcare workers. The ANOVA analysis results show there was a statistically significant difference between healthcare workers' happiness and hospital ownership ($p=0.2551$) (as shown in Table 4).

There was a statistically significant difference between the hospital ownership, in the mean scores of pursuit of pleasure ($p<0.001$) and pursuit of meaning ($p=0.024$) orientations to happiness. No statistically significant difference between the 'pursuit of engagement' scores and hospital ownership ($p=0.241$) were reported (as shown in Table 5).

Table 2. The median and mean absolute deviation from the median for the orientations to happiness items (n=553).

Orientations to happiness	Items	Number (%) rating <4	Median	MAD ¹	MADM ²
Pursuit of pleasure	Life is too short to postpone the pleasures it can provide.	271 (49.01)	4	1	1.12
	I go out of my way to feel euphoric (joyful).	310 (56.06)	3	1	1.12
	In choosing what to do, I always consider whether it will be pleasurable.	265 (47.92)	4	1	1.10
	I agree with this statement: "Life is short-eat dessert first."	356 (64.38)	3	1	1.25
	I love to do things that excite my senses.	259 (46.84)	4	1	1.10
	For me, the good life is the pleasurable life.	291 (52.62)	3	1	1.16
Pursuit of engagement	Regardless of what I am doing, time passes very quickly.	260 (47.02)	4	1	0.96
	I seek out situations that challenge my skills and abilities.	158 (28.57)	4	1	0.80
	Whether at work or play, I am usually "in a zone" and not conscious of myself.	441 (79.75)	2	1	1.13
	I am always very absorbed in what I do.	210 (37.97)	4	1	0.87
	In choosing what to do, I always consider whether I can lose myself in it.	270 (48.82)	4	1	1.08
	I am rarely distracted by what is going on around me.	320 (57.87)	3	1	0.99
Pursuit of meaning	My life serves a higher purpose.	123 (22.24)	5	0	0.76
	In choosing what to do, I always consider whether it will benefit other people.	119 (21.52)	4	1	0.82
	I have responsibility to make the world a better place.	92 (16.64)	5	0	0.63
	My life has a lasting meaning.	106 (19.17)	5	0	0.66
	What I do matters to society.	99 (17.90)	5	0	0.65
	I have spent a lot of time thinking about what life means and how I fit into its big picture.	236 (42.68)	4	1	0.95

¹MAD: Median absolute deviation.

²MADM: Mean absolute deviation from the median.

Table 3. Relative importance of orientations to happiness among healthcare workers (n=553).

Orientations to happiness	Relative Importance Index	Importance
Pursuit of pleasure	0.668	2
Pursuit of engagement	0.658	3
Pursuit of meaning	0.835	1

Table 4. ANOVA of overall happiness and hospital ownership.

	N	R ²	Adjusted R ²	F	Sig. F change
Overall happiness	553	0.0091	0.0073	5.04	0.0251*

* $p < 0.05$ indicates statistical significance.

Table 5. ANOVA results of orientations to happiness and hospital ownership (n=553).

Orientations to happiness	Hospital ownership	n	Mean	Std. dev.	F	Sig.
Pursuit of pleasure	Public	434	3.36	0.23	132.581	0.0001*
	Mission	119	3.07	0.28		
Pursuit of engagement	Public	434	3.31	0.61	1.550	0.214
	Mission	119	3.23	0.66		
Pursuit of Meaning	Public	434	4.19	0.28	5.121	0.024*
	Mission	119	4.12	0.36		

Reported on 5-point Likert scale with higher values are suggestive of higher happiness.

* $p < 0.05$ indicates statistical significance.

Regression analyses results. In mission hospitals, according to the multivariate linear regression model, nine statistically significant variables namely income, type of employment, occurrence of water unavailability, safe drinking water, acceptable main source of water, type of toiletry facility, hospital disposal of garbage, availability of water for hand washing, and overall safety of the hospital working environment, explained the healthcare workers' overall happiness ($p < 0.05$ or $p < 0.1$) (as shown in Table 6).

Table 7 shows, based on the multivariate linear regression model, three statistically significant variables namely level of qualification, type of toiletry facility, and the presence of a functional workplace safety and health committee, explained the overall happiness of healthcare workers employed in public hospitals ($p < 0.05$ or $p < 0.1$).

The results of the double-log regression model showed a statistically significant relationship between healthcare workers' overall happiness and income ($n = 553$, $p = 0.003$). In

mission hospitals, income explained 5.1% of the variance in healthcare workers' overall happiness ($adjusted R^2 = 0.0429$, $df = 118$, $F = 6.28$, $p = 0.0136$). Whereas in public hospitals, the double log regression model showed that 1.13% variance in healthcare workers' overall happiness was significantly explained by income ($adjusted R^2 = 0.0090$, $df = 433$, $F = 4.93$, $p = 0.0269$). Thus, income significantly contributes to the healthcare workers' overall happiness in both mission and public hospitals.

Discussion

The authentic happiness theory guided the investigation of factors influencing the self-assessed pursuit of happiness among healthcare workers in public and mission hospitals in Meru County, Kenya. The results showed a statistically significant association between hospital ownership and the participants' overall happiness scores, where those working in public hospitals reporting higher mean scores compared to those in mission hospitals. Hospital ownership significantly influenced the healthcare workers' pursuit of meaning and pleasure (as shown in

Table 6. Multivariate regression of overall happiness, and demographic, work-related and, physical work environment factors in mission hospitals (n=119).

Independent variables	Slope Coefficient.	Standard Error	T value	Significance	95% confidence interval	
Sex	0.081	2.243	0.04	0.971	-4.372	4.535
Age	-0.020	0.143	-0.14	0.890	-0.305	0.264
Income	-9.031	3.136	-2.88	0.005*	-15.258	-2.804
Marital status	-2.604	2.357	-1.10	0.272	-7.284	2.076
Level of qualification	0.522	2.364	0.22	0.826	-4.173	5.216
Years of experience	-0.162	0.202	-0.80	0.424	-0.564	0.239
Healthcare workers cadre	-0.945	2.772	-0.34	0.734	-6.449	4.560
Type of employment	10.082	3.980	2.53	0.013*	2.179	17.986
In-service training	2.735	2.420	1.13	0.261	-2.071	7.541
Hours worked per week	0.125	0.097	1.28	0.204	-0.069	0.318
Household size	-0.531	0.730	-0.73	0.468	-1.980	0.917
Staff housing	-1.724	2.772	-0.62	0.536	-7.228	3.781
Consistent supply of water	0.233	3.963	-0.06	0.953	-8.102	7.637
Occurrence of water unavailability	-4.864	2.388	-2.04	0.044*	-9.605	-0.123
Safe drinking water	-8.234	4.055	-2.03	0.045*	-16.285	-0.182
Acceptable primary source of water	12.687	5.335	2.38	0.019*	2.095	23.278
Type of toiletry facility	7.152	2.719	2.63	0.010*	1.754	12.550
Risk when using toiletry facility	-0.435	2.659	-0.16	0.871	-5.713	4.844
Hospital disposal of garbage	4.669	2.521	1.85	0.067**	-0.337	9.674
Availability of water for hand washing	-11.754	5.507	-2.13	0.035*	-22.688	-0.819
Constant availability of soap	7.687	6.337	1.21	0.228	-4.895	20.268
≤5 meters of hand washing station from the toilet	3.845	4.300	0.89	0.374	-4.693	12.383
Workplace safety and health committee	-2.230	2.523	-0.88	0.379	-7.240	2.779
Overall safety of hospital working environment	1.492	0.780	1.91	0.059**	-0.057	3.040
Constant	39.791	9.236	4.31	0.000	21.453	58.130

* $p < 0.05$ indicates statistical significance at 95% confidence level. ** $p < 0.1$ indicates statistical significance at 90% confidence level.

Table 5). However, in present study, there was insufficient evidence of hospital ownership influencing the pursuit of engagement in the overall sample of healthcare workers. To date, this is the first quantitative study to investigate the association between the pursuit of happiness and hospital ownership among healthcare workers in Kenya.

The predicting factors of overall happiness among the participants differed between public and mission hospitals, with the exception of income. Income was found to be a statistically significant predictor of overall happiness among healthcare workers in both public and mission hospitals. Similarly, a qualitative

study in Kenya among senior managers in public and mission hospitals reported that both the amount of income and timely payment of salaries are important factors of healthcare workers' happiness⁵¹. This study's results are concurrent with a study carried out in Iran that reported monthly income and satisfaction with income as predictors of happiness among nurses⁵². Frey and Stutzer, explained that happiness and economics research has shown that there is a positive relationship between income and happiness and well-being, this is irrespective of the country, location, or time³¹. This finding is paramount important because both inadequate remuneration and recurrent delayed payment of salaries are among the major causes of the

Table 7. Multivariate regression of overall happiness, and demographic, work-related and, physical work environment factors in public hospitals (n=434).

Independent variables	Slope Coefficient.	Standard Error	T value	Significance	95% confidence interval	
Sex	-0.468	1.083	-0.43	0.666	-2.596	1.661
Age	-0.165	0.119	-1.39	0.166	-0.399	0.069
Income	-0.303	1.423	0.21	0.832	-2.495	3.100
Marital status	0.300	1.254	0.24	0.811	-2.166	2.766
Level of qualification	-2.180	1.159	-1.88	0.061**	-4.457	0.098
Years of experience	0.080	.128	0.62	0.536	-0.173	0.332
Healthcare workers cadre	1.444	1.168	1.24	0.217	-0.853	3.742
Type of employment	1.369	2.245	0.61	0.542	-3.045	5.783
In-service training	0.966	1.170	0.83	0.409	-1.333	3.266
Hours worked per week	0.039	0.038	1.04	0.299	-0.035	0.113
Household size	-0.110	0.322	-0.34	0.733	-0.744	0.534
Staff housing	-0.617	1.849	-0.33	0.739	-4.252	3.018
Consistent supply of water	0.435	1.624	0.27	0.789	-2.756	3.627
Occurrence of water unavailability	-0.974	1.162	-0.84	0.403	-3.258	1.311
Safe drinking water	-0.979	1.327	-0.74	0.461	-3.588	1.629
Acceptable primary source of water	1.168	1.574	0.74	0.458	-1.926	4.262
Type of toiletry facility	2.072	1.242	1.67	0.096**	0.369	4.514
Risk when using toiletry facility	-0.732	1.263	-0.58	0.563	-3.214	1.751
Hospital disposal of garbage	1.471	2.132	0.69	0.490	-2.719	5.662
Availability of water for hand washing	0.489	1.797	0.27	0.786	-3.044	4.022
Constant availability of soap	1.471	2.132	0.69	0.490	-2.719	5.662
≤5 meters of hand washing station from the toilet	-0.867	2.082	-0.42	0.677	-4.959	3.225
Workplace safety and health committee	5.375	1.205	4.46	0.000*	3.007	7.743
Overall safety of hospital working environment	0.007	0.295	0.02	0.980	-0.573	0.587
Constant	61.032	4.827	12.65	0.000	51.544	70.520

* $p < 0.05$ indicates statistical significance at 95% confidence level. ** $p < 0.1$ indicates statistical significance at 90% confidence level.

perpetual health worker strikes in Kenya⁵³. The findings in this study show the importance of health policy makers ensuring healthcare workers are adequately remunerated in a timely manner.

In public hospitals, in addition to income, the qualification or education level was a significant factor of the participants' overall happiness. The more educated the respondents were, the lower their overall happiness scores. However, a study in India reported the more qualified the dentists were the higher the levels of happiness⁵⁴. The difference between this study and the Indian study could be, the critical shortage of skilled

health workers in Kenya¹¹, which results highly skilled and qualified healthcare workers in Kenya experiencing heavier workload, thus leading to demotivation⁵⁵ and unhappiness.

In mission hospitals, aside from income, the type of employment was positively associated with the participants overall happiness. The healthcare workers who were working full-time reported higher overall happiness scores compared to those working part-time. This could be attributed to the higher sense of job security associated with being employed full-time compared to part-time. According to the WHR 2017, job security was positively associated with higher levels of happiness²².

Thus, health policy makers should consider employing more healthcare workers full-time, which will simultaneously contribute to increased happiness, and the reduction of the critical shortage and brain drain of skilled health workers, which are major problems in the Kenyan health system.

The current study portrays the significance of a clean, healthy, hygienic, and safe work environment in promoting healthcare workers' overall happiness, in both public and mission hospitals. The availability of water from an acceptable primary source, functional flush toiletry facilities, safe drinking water, availability of water for hand washing, an overall safe working environment, and the presence of a functional workplace health and safety committee significantly contributed to the overall happiness of the healthcare workers. A study in Korea similarly revealed that by improving and creating an enabling work environment significantly increased nurses happiness index⁵⁶. These results prove that the physical work environment plays significant role in the psychological attitude healthcare workers have, either positive or negative. According to the World Happiness Report, the riskier and more unsafe the work environment is, the lower the workers happiness²². It is critical for health authorities to recognize that the attitude of healthcare workers in the workplace impacts the quality of healthcare, patient outcomes, and overall safety⁵⁷. Therefore, having a healthy and safe work environment should be prioritized in health facilities to enhance healthcare workers' happiness and to facilitate higher quality of care provided to patients.

This study contributes to the authentic happiness theory by revealing the significant factors of happiness, and the order of relative importance of the orientations to happiness in a health setting. The current study revealed, living a meaningful life was the most important pursuit of happiness among the healthcare workers. Similar findings have been reported regarding career meaning contributing to happiness among physicians⁵⁸ and physiotherapists²⁵. Our findings are also congruent with the African philosophy of happiness. Happiness in the African context stems from the meaningful aspect of human existence⁵⁹. In African philosophy, the two ways the African people derive meaning and happiness are through the collectivist culture of communal bonds and believing in a higher supernatural being⁵⁹. This signifies that attaining a sense of meaning through their work and collectivist activities, aimed at contributing to something larger than oneself, is important to healthcare workers.

In the current study, the pursuit of pleasure was the second most important orientation among the respondents. The pursuit of pleasure, also known as hedonism, is the desire to attain maximum pleasure with minimal pain and instant gratification^{15,18}. Due to the short term nature of the pursuit of pleasure, it is therefore viewed as an impediment to long term happiness⁶⁰. For instance, smoking among medical students⁶¹ for pleasure has been viewed as a risk-taking behavior at the price of longevity⁶⁰. However, the negative or positive view of the pursuit of pleasure is dependent on the contextual meaning. In 2010, researchers reported that nurses derived pleasure in the workplace by working as a team to save lives, minimize the

pain of their patients, and feeling valuable through providing quality care⁶². A positive pursuit of pleasure among healthcare workers involves organizational actions for instance reduced incidence of overtime and introducing leisure activity programs to promote healthcare workers' happiness⁵⁷. This implies that the pursuit of pleasure among healthcare workers can be considered as positive through maximizing pleasure and minimizing sources of pain. For example, through facilitation of collectivistic activities such as team building exercises will increase the spirit of teamwork in health facilities⁵¹. The teamwork would help healthcare workers cope with the burden of heavy workload, by providing organizational support thus, promote healthcare workers' happiness, and enhance the quality of care⁵¹.

At work, the pursuit of engagement is also known as work engagement and is characterized by the experience of flow. According to Csikszentmihalyi, flow is attained through applying one's signature strengths to perform challenging tasks, requiring high degree skill and dedication^{15,16}. In the current study, the pursuit of engagement was the third most important orientation to happiness. Previous studies have reported positive, significant and strong associations between healthcare workers' work engagement and high productivity⁶³, high job performance⁶⁴, better teamwork⁶⁵, improved patient safety⁶³, and a better quality of health care^{63,65}. Clearly, work engagement strategies need to be developed and implemented, because the score in this pursuit was the lowest of the three orientations to happiness in the current study.

All orientations to happiness are essential in developing authentic happiness signified by a full life⁸. A full life is attained by the collective scores of all the orientations to happiness, while the opposite is true for the empty life⁸. Collectively, the healthcare workers' happiness was moderate. The present study found the overall happiness scores were slightly higher among healthcare workers employed in public hospitals than those in mission hospitals (as shown in [Table 1](#) and [Table 5](#)). In this study, as hospital ownership changes from public to mission the overall happiness scores decreased by 2.274. This could be attributed to the differences in hospital ownership, which have an impact on the health facility operations and availability of resources. The current findings show that there is an opportunity for empowering healthcare workers to achieve authentic happiness. Based on the findings of this study, healthcare workers' happiness policies and programs are important because experiencing happiness at work enables individuals to optimally function in the workplace⁹. By developing happiness policies and strategies that are sensitive and solve the healthcare workers' issues, significant progress in strengthening the health workforce and health system in Kenya can be achieved. Health systems strengthening would result in improved health workforce responsiveness, universal access to quality healthcare services, improved productivity, and better patient outcomes⁶⁶.

Implications for policy and practice

Based on these findings we believe happiness of healthcare workers should be mainstreamed into the 'Kenya Health Policy' and 'Kenya Health Sector Strategic Plan'. This suggestion

is based on the results of this study, and the United Nations General Assembly resolution advocating for happiness and well-being policies to be mainstreamed into public policies which was passed by all heads of state including Kenya⁶. The Kenyan health system stands to benefit from happier healthcare workers due to the probability of increased health system efficiency. It appears that healthcare workers' happiness could be increased by enhancing and solving challenges related to demographic, work-related, and physical work environmental factors. For example, healthcare workers' qualification significantly contributed to their overall happiness. Thus, positive education can be mainstreamed into the healthcare workers' pre-service curriculum and in-service training. Positive education would entail involving experts in the field to apply evidence-based approaches to teach healthcare workers how to be engaged, develop their signature strengths, cultivate healthy relationships, practice physical wellbeing, and achieve a sense of meaning⁶⁷. Positive education programs could empower healthcare workers to be competent enough to achieve authentic happiness.

The Government of Kenya should also consider applying a formal health care appraisal (HCA) system. According to the Global Happiness and Well-being Policy Report, a formal HCA provides an opportunity for governments to perform needs assessment, cost-benefit analysis, impact, and post-hoc analysis of regulations and interventions in health settings, to optimize the scarce healthcare resources⁶⁸. Thus, the Government of Kenya can set happiness metrics, targets, and indicators to monitor and evaluate the impact of implementing happiness policies among healthcare workers. The happiness policies and implementation of happiness interventions could boost the healthcare workers' mental health and wellbeing and the quality of care provided to patients⁶⁸. At a national level, this is likely to contribute to the improvement of health indicators in Kenya.

Happiness policies would promote the focus of developing mental health. To effectively develop and implement happiness policies, strategic plans, and programs, the World Health Organization (WHO) has published a report titled 'Mental Health Policy, Plans and Programmes'⁶⁹. In this report WHO explains the seven essential steps of developing mental health policies, the four steps of creating a mental health plan, plus how to develop a mental health program⁶⁹. Most importantly, the seven-step process of implementing the policy, plans and programs⁶⁹. Using the results from this study and guided by the WHO report⁶⁹, policy makers and implementers should seriously consider developing happiness policies, plans, and programs aimed at strengthening the health workforce and health system, by promoting mental health among healthcare workers in Kenya. Lastly, the development and implementation of happiness within the health system should involve most stakeholders such as policy makers in government, health managers, and healthcare workers in the public and private health sectors.

Limitations and areas for further research

The results from this study should be interpreted in view of the study's shortcomings. This study utilized a cross-sectional design; hence correlational evidence was reported and not

causal evidence. In future, the Government of Kenya should perform experimental design studies to assess costs and benefits of alternative healthcare workers' happiness policies, programs and interventions geared towards health systems strengthening, at the national and county levels. Secondly, this study was based on self-assessed happiness data, which presents the possibility of response and social desirability biases. To reduce the tendency of response and social desirability biases, the researchers informed the respondents that anonymity would be upheld throughout the entire research process and encouraged them to be as honest as possible.

The scope of the present study did not assess the role of job characteristics on healthcare workers' happiness. Future studies could explore the impact of job characteristics on happiness among healthcare workers. We also acknowledge that other quantitative and qualitative studies may produce different results due to contextual factors or methodological differences. Thus, more studies using different methodologies are necessary to bridge the knowledge gaps on healthcare workers' happiness in Kenya. This study was done in one of 47 counties in Kenya, thus may limit the generalizability of the results. In future, research geared towards promoting healthcare workers' happiness should be carried out in other counties, to provide evidence-based healthcare worker happiness policies nationwide. Finally, this study was done among healthcare workers who had gone through clinical training. Further studies applying similar or alternative research designs could be done among other staff such as non-clinical staff, auxiliary staff in health facilities and workers in other sectors. This would contribute to informing the formulation of happiness and well-being public policy and implementation plans nationally.

Conclusion

In Kenya, this is first quantitative study report the factors influencing the self-assessed happiness among healthcare workers in public and mission hospitals in Meru County, Kenya. The most important orientation to happiness among the participants was the pursuit of meaning, followed by the pursuits of pleasure and engagement. These results were contextually synchronized to the African philosophy of happiness, where the sense of meaning is believed to be a significant element of ultimate happiness. This means that happiness policies, strategies, and programs aimed at empowering healthcare workers to attain a sense of meaning will significantly contribute to promoting happiness. The MADM results showed that healthcare workers highly agreed that both the pursuit of engagement and meaning contributed more to their happiness than the pursuit of pleasure. These findings imply that health leaders and managers aiming to improve and effectively execute healthcare workers' happiness strategies and programs need to consider all pursuits of happiness. Based on the OTH theory, this will enable healthcare workers to achieve authentic and long-term happiness, which are attributes of a full life. In both public and mission hospitals, income and the type of toiletry facility were significant factors of overall happiness. In mission hospitals, eight additional variables were statistically significant factors of overall happiness namely type of employment, occurrence of water unavailability, safe drinking water, acceptable main source of water, type of toiletry

facility, hospital disposal of garbage, availability of water for hand washing, and overall safety of the hospital working environment. In public hospitals, qualification level, and a functional workplace safety and health committee significantly predicted the healthcare workers' overall happiness. The findings provide an understanding that demographic, work-related and physical work environment factors influence healthcare workers' overall happiness. The policy implications for the factors reported, show that an intersectoral approach in designing and implementing evidence-based happiness policies and interventions, needs to be done involving both the private and public sectors.

Data availability

Underlying data

Figshare: Data used to investigate healthcare workers' pursuit of happiness in Kenya. <https://doi.org/10.6084/m9.figshare.13655822.v1>⁴⁴.

This project contains the following underlying data:

- Dataset used to investigate healthcare workers' pursuit of happiness in Kenya RNDKM.xlsx. (The dataset

includes some demographic and work-related variables from variable 1 to 25 and, the results from the Orientations to Happiness (OTH) questionnaire (Var 26–43). The healthcare workers' overall happiness scores were calculated based on the responses from Var 26–43, which are presented in Var 44. Below the dataset on the same data spreadsheet are variable definitions. It includes the variable label e.g., Var 1, Var 2 etc.; the variable definitions and coding descriptions.)

Data are available under the terms of the [Creative Commons Attribution 4.0 International license](#) (CC BY 4.0).

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Zhuo Chen

¹ Department of Health Policy and Management, University of Georgia, Athens, GA, USA

² University of Nottingham Ningbo China, Ningbo, China

I have read through the revised manuscript and the responses and thought that they were well prepared and executed. I have no further comments. Thanks for the opportunity to review.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 19 April 2021

<https://doi.org/10.5256/f1000research.54345.r82106>

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Zhuo Chen

¹ Department of Health Policy and Management, University of Georgia, Athens, GA, USA

² University of Nottingham Ningbo China, Ningbo, China

³ Department of Health Policy and Management, University of Georgia, Athens, GA, USA

⁴ University of Nottingham Ningbo China, Ningbo, China

Wei Jiang

¹ University of Nottingham Ningbo China, Ningbo, China

² University of Nottingham Ningbo China, Ningbo, China

This manuscript investigated the difference in healthcare workers' happiness between public and mission hospitals, as well as the impact of demographic and work environment factors on self-assessed happiness. The study addressed an important topic, i.e., self-assessed happiness among healthcare workers, and provided policy implications on the strategies to strengthen workforce for the healthcare system in Kenya. We have some suggestions for authors to consider in revising the manuscript.

One of our major comments is the lack of review of the economics and social epidemiology literature on happiness. We acknowledge the disciplinary differences but this might have a consequence on the model specifications. For instance, Blanchflower and Oswald¹ presented evidence that well-being is U-shaped through life. There is also a long-lasting debate of how relative income or income inequality might affect happiness and health. The authors may want to review and discuss implications for their research.

The authors have conducted extensive analyses, which are mostly straightforward and clearly presented. We have some specific comments on the analysis below:

In the second paragraph on data collection and data source, the authors mentioned the employment type was included into demographic factors. However, the employment type in this study only contained full-time or part-time options. Job characteristics play an important role in determining both the work environment and the way to pursuit happiness.

The authors were concerned about the difference of correlations with happiness between public and mission hospitals. T-tests for the difference between public and mission hospitals would be useful to be included in Table 1. The results of ANOVA analysis indicated that healthcare workers in public hospitals were more likely to obtain a high level of overall happiness. We would suggest conducting a subgroup analysis for the multivariate regressions rather than using hospital ownership as the independent variable into the model. A subgroup analysis helps to detect the heterogeneity of factors affecting happiness in different hospitals.

The explanations of the results from Table 6 may not be sufficient. There were many variables included in the regression model but came out statistically insignificant. Some of the variables need additional explanations. For example, hospital ownership and sex categories may be labeled out. Results of those variables in the current version of Table 6 is difficult to interpret. In addition, the income variable is insignificant in this regression. However, different functional forms, logarithm, or quadratic, could be used if there is a nonlinear correlation between income and happiness, as prior literature has suggested. Some of the variables that are statistically insignificant may be dropped through stepwise regression to identify a more parsimonious specification.

An in-depth discussion on the contrast and comparison of three types of orientations of the pursuit of happiness would be very useful.

Minor comments:

1. The study setting in methods parts could be more closely linked to the background of

research and study sample. It would be useful to include, in addition to the COVID-19 pandemic, a brief description of the health system in Meru County, Kenya.

2. A descriptive summary of the variables would help readers to understand the data and the context if presented before the multivariate regression.

References

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Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Author Response 16 May 2021

Rose Nabi Deborah Karimi Muthuri

Ref: Response to review report 2

Firstly, thank you very much for reviewing our article and for all the constructive suggestions and comments. Please find below our response to your comments and suggestions. The article has been revised accordingly following your review.

Reviewers comments and Authors Response

1. **Reviewers' comment:** "One of our major comments is the lack of review of the

economics and social epidemiology literature on happiness. We acknowledge the disciplinary differences, but this might have a consequence on the model specifications. For instance, Blanchflower and Oswald¹ presented evidence that well-being is U-shaped through life. There is also a long-lasting debate of how relative income or income inequality might affect happiness and health. The authors may want to review and discuss implications for their research."

Authors response: Thank you for your constructive suggestions. In the revised version of this article, we have reviewed literature regarding happiness research and income. Thank you for the reference you provided, we incorporated the relevant literature as per the aim of our study (please see the introduction section, paragraph 7). In the discussion section, based on our updated results related to income and happiness, we also included literature on the same (please the discussion, paragraph 2). The social aspects of happiness are also presented in the discussion section, where collectivistic activities such as team building, and the pursuit of pleasure and meaning are associated with social aspects of life (please see paragraph 6).

2. Reviewers' comment: "In the second paragraph on data collection and data source, the authors mentioned the employment type was included into demographic factors. However, the employment type in this study only contained full-time or part-time options. Job characteristics play an important role in determining both the work environment and the way to pursuit happiness."

Authors response: Thank you for this constructive review. In the revised version, we have included that the role of job characteristics in healthcare workers' happiness, was beyond the scope of this study and is a possible area of study in future. Please see in the discussion section titled 'Limitations and areas for further research' section paragraph 2.

3. Reviewers' comment: "T-tests for the difference between public and mission hospitals would be useful to be included in Table 1. The results of ANOVA analysis indicated that healthcare workers in public hospitals were more likely to obtain a high level of overall happiness. We would suggest conducting a subgroup analysis for the multivariate regressions rather than using hospital ownership as the independent variable into the model. A subgroup analysis helps to detect the heterogeneity of factors affecting happiness in different hospitals."

Authors response: In the revised version of the article, as advised, in addition to the ANOVA analysis, a two-sample Welch's T-test was performed and results presented in the results section titled, "Orientations to happiness and hospital ownership". As you suggested, a sub-group multivariate regression analysis was performed for public and mission hospitals separately and presented in Table 6 and 7. Therefore, we excluded hospital ownership as an independent variable, because a statistically significant difference was found between mission and public hospitals and overall happiness.

4. Reviewers' comment: "In addition, the income variable is insignificant in this regression. However, different functional forms, logarithm, or quadratic, could be used if there is a nonlinear correlation between income and happiness, as prior literature has suggested. Some of the variables that are statistically insignificant may be dropped through stepwise regression to identify a more parsimonious specification."

Authors response: Thank you for this suggestion. In the revised version, in the methods section we explain that we used a double-log regression model in which the constants are elastic and allow for indifferent curves (please see the section titled "Statistical analysis" in paragraphs 9 and 10). As advised, the double-log regression results of income and happiness are presented in the section titled "Regression analyses results". However, we chose to present all the other independent variables in the Tables 6 and 7 and not perform stepwise regression. This will allow readers to be able to see all variables that were assessed and possibly compare results in future. Therefore, following your recommendation, the previously collective Table 6 with results of all participants (n=553) was separated into Table 6 and 7 and the statistically significant variables marked with asterisks (*= $p<0.05$ and ** $p<0.1$).

5. Reviewers' comment: "An in-depth discussion on the contrast and comparison of three types of orientations of the pursuit of happiness would be very useful."

Authors response: Thank you for this suggestion. The details regarding the Orientations to happiness are presented in the introduction section (paragraphs 3-4). In the discussion section, our results regarding the orientations to happiness in relation to other relevant studies are incorporated where appropriate in paragraphs 6-9.

6. Reviewers' comment: "The study setting in methods parts could be more closely linked to the background of research and study sample. It would be useful to include, in addition to the COVID-19 pandemic, a brief description of the health system in Meru County, Kenya."

Authors response: Thank you for your beneficial suggestions. In the revised version, specifically the methods section, information regarding the five-level health system of Meru County in Kenya has been included. Furthermore, information regarding the COVID-19 pandemic in Kenya and its impact globally has been included in the revised version. Please see the methods section titled, "Study setting".

7. Reviewers' comment: "A descriptive summary of the variables would help readers to understand the data and the context if presented before the multivariate regression."

Authors response: Thank you for this suggestion. In the revised version, as advised, a descriptive summary of all the variables assessed are presented in the Methods section titled, "Statistical analysis" in paragraphs 5-6, before the multivariate regression. Citations are also included in this section because the data used in this study is from a published dataset in the FigShare repository.

8. Reviewers' comment: "Is the work clearly and accurately presented and does it cite the current literature? Partly."

Authors response: Thank you for your review. In the revised version, we have modified the introduction and discussion sections and included current literature within the scope of our study. Furthermore, to increase the clarity, we re-arranged the introduction section.

We thank you both for your constructive advice, comments, and review.

Competing Interests: Authors declare no competing interests.

Reviewer Report 01 April 2021

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Ian Couper

¹ Ukwanda Centre for Rural Health, Stellenbosch, South Africa

² Ukwanda Centre for Rural Health, Stellenbosch, South Africa

A cross-sectional study on the pursuit of happiness among healthcare workers in the context of health systems strengthening: The case of Meru County, Kenya.

This study, which sought to measure health workers happiness in public and mission hospitals in a county in Kenya, sets out a very interesting proposition, and, mostly, I enjoyed reading it. I found the notion that happiness can be formulated as a policy to be an interesting one, in terms of which I am still left somewhat in doubt, but that does not mean it should not be indexed.

I think the article could be significantly improved by further work and some suggestions below:

In the introduction, a number of broad statements are made, without clear justification, especially in the first two paragraphs. It was unclear to me whose happiness or what happiness is being referred to every time happiness is mentioned. Does happiness at work related to the health workers rather than patients, to all staff or just healthcare workers, to healthcare professionals or all healthcare workers, etc..? The article notes that researchers often use the terms "*healthcare workers*" and "*healthcare professionals*" interchangeably, but then does not explain whether that is the case in this article or what is the definition being used. A definition of happiness is given, which is specifically linked to purpose, but then the article states that the authentic happiness theory is used, which in fact includes three orientations and not just one towards purpose. This should be clarified.

I found the logic of the paragraph starting "*the multiple acts of service that healthcare workers perform*" difficult to follow.

In terms of the aims of the study, I was not clear on the difference between the second and third aim. Also the fourth aim ("*to explore*") implies a qualitative approach which is not mentioned in the article.

In the methods section, it is not clear what is meant by "*medically trained health care workers*". In referring to the study sample, it is stated that a list of health care workers is used, but how this is

defined is not clear.

I do not have the expertise to comment on the statistical analysis.

In the results section, there are two citations after to the comment about 50% or more missing data; it is not clear to me what these are referring to.

The subsection on the demographic factors has too much detail for the text - a table would be better with only the key issues being highlighted in the text.

The subsection "*Factors of healthcare workers' overall happiness*" tends to repeat what is in the tables - it should only provide the highlights of those, where the information is readily accessible in the tables.

I think the discussion section needs focus. I found it difficult to sustain my interest in reading it.

The discussion states that health care workers overall happiness was slightly higher in public hospitals than in mission hospitals, but I could not see that in the tables; there is no reference to which table it might be in.

A problem that occurs almost throughout the discussion is that the last sentence in each paragraph seems to refer to the subsequent paragraph, but should in fact be part of that next paragraph. I'm happy to provide a marked-up copy of the article to demonstrate this.

The subsection on implications for policy and practice contains quite ambitious recommendations that are made on the basis of the study despite the acknowledged limitations of the research. These need to be clearly justified. In addition, specifically, the recommendation on research geared towards promoting happiness being carried out across the whole country is surely something that is dependent on higher quality studies being done in a limited number of locations first.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

I cannot comment. A qualified statistician is required.

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Rural health; human resources for health; health professions education; health service management.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 16 May 2021

Rose Nabi Deborah Karimi Muthuri

Ref: Response to review report 1

Firstly, thank you very much for reviewing our article and for all the constructive suggestions and comments. Please find below our response to the comments and suggestions. The article has been revised accordingly following your review.

Reviewer comments and Authors Response

1. Reviewers' comment: "I found the notion that happiness can be formulated as a policy to be an interesting one, in terms of which I am still left somewhat in doubt, but that does not mean it should not be indexed."

Authors response: Thank you for your comment. The idea of happiness being formulated in policy stems from the decision made by all 193 heads of state (presidents) in the United Nations General Assembly, who passed the resolution on happiness and believe that it should be incorporated into public policy. Following this decision since 2012, the World Happiness Report is published annually on 20th March on the International Day of Happiness. Therefore, this study contributes to literature on happiness among healthcare workers to inform policy in the context of the health system in Kenya.

The references of the resolution and first World Happiness Report are:

- United Nations General Assembly. Happiness: Towards a holistic approach to development. New York; 2011 19 July 2011. Contract No.: Resolution A/RES/65/309.
- Helliwell J, Layard R, Sachs J, (Eds). World happiness report. Columbia University: The Earth Institute; 2012.

2. Reviewers' comment: "In the introduction, a number of broad statements are made, without clear justification, especially in the first two paragraphs. It was unclear to me whose happiness or what happiness is been referred to every time happiness is mentioned. Does happiness at work related to the health workers rather than patients, to all staff or just healthcare workers, to healthcare professionals or all healthcare workers, etc.? The article notes that researchers often use the term "healthcare workers" and "healthcare professionals" interchangeably, but then does not explain whether that is the case in this article or what is the definition being used. A definition of happiness is given, which is specifically linked to purpose, but then the article states that the authentic happiness theory

is used, which in fact includes three orientations and not just one towards purpose. This should be clarified."

Authors response: Thank you for this constructive review and questions. In the revised version of the article, the first two paragraphs have been reorganized and slightly modified to enhance clarity. In the revised version, it has been clarified that this study focuses on healthcare workers happiness and includes operational definitions of healthcare workers and happiness. In addition, justification of the significance of studies aimed at promoting happiness and well-being was made in the introduction, by stating the problem of the rising reports of psychopathological symptoms among healthcare workers depicted in various research cited in this article. In paragraph 1, the definition of happiness was also modified to include all three orientations to happiness and to be in synchrony with the authentic happiness theory applied in this study. This study focused on healthcare workers' happiness and not patients. However, studies have revealed that when healthcare workers are happier it has a positive impact on quality of patient care, and this is referred to in the introduction and discussion sections. Regarding the happiness of the other staff, we have included in the limitations sub-section, that further research should be done among other staff such as auxiliary and non-clinical staff and possibly workers in other sectors. This would contribute to informing the formulation of public policy in Kenya, following the resolution passed by the United Nations General Assembly.

3. Reviewers' comment: "I found the logic of the paragraph starting "the multiple acts of service that healthcare workers perform" difficult to follow."

Authors response: In the revised version of the article, as advised to enhance logical flow, this paragraph was modified, and the information moved to other parts of the introduction. For example, the second sentence was modified and moved to paragraph one of the introduction section. And sentence 3-5 of the same paragraph were moved to second last paragraph of the introduction.

4. Reviewers' comment: "In terms of the aims of the study, I was not clear on the difference between the second and third aim. Also the fourth aim ("to explore") implies a qualitative a qualitative approach which is not mentioned in the article."

Authors response: Thank you for this comment. Following your advice, in the revised version of the article, the term "to explore" has been changed to "to identify" because this is a quantitative study. The second aim was about the differences in healthcare workers overall happiness between public and mission hospitals. The third aim was about the differences in the orientations to happiness among healthcare workers in public and mission hospital. In the revised version, following your suggestion, a modification has been made of merging the two objectives because they are both about differences in healthcare workers happiness in public and mission hospitals.

5. Reviewers' comment: "In the methods section, it is not clear what is meant by "medically trained health care workers". In referring to the study sample, it is stated that a list of health care workers is used, but how this is defined is not clear."

Authors response: Thank you for this suggestion. In the revised version, a slight modification of terminology has been made for clarification from "medically trained"

to “clinically trained”. The reason being this suits’ the definition of healthcare workers in this article which is in the paragraph 1 of the introduction section.

6. Reviewers’ comment: “In the results section, there are two citations after to the comment about 50% or more missing data; it is not clear to me what these are referring to.”

Authors response: The citations are examples of studies that have used a similar criterion of exclusion due to missing data. In the revised version, clarification has been made explaining that 50% missing data meant that the questionnaires were 50% incomplete thus were excluded from analysis.

7. Reviewers’ comment: “The subsection “Factors of healthcare workers’ overall happiness” tends to repeat what is in the tables- it should only provide the highlights of those, where the information is readily accessible in the tables.”

Authors response: Following your recommendation, in this sub-section on “Factors of healthcare workers’ overall happiness”, in the revised version, the paragraphs highlight the key points such as the statistically significant factors shown in Table 4-7. However, details on the slope coefficients, standard error, t-value etc, are not highlighted in the text because the information is in the tables.

8. Reviewers’ comment: “The discussion states that health care workers overall happiness was slightly higher in public hospitals than in mission hospitals, but I could not see that in the tables; there is no reference to which table it might be in.”

Authors response: In the discussion section in the revised version of the article, in paragraph 1 a reference to Table 5 has been presented. In paragraph 7, reference to Tables 1 and 5 have been made in the discussion.

9. Reviewers’ comment: “A problem that occurs almost throughout the discussion is that the last sentence in each paragraph seems to refer to the subsequent paragraph but should in fact be part of that next paragraph.”

Authors response: Thank you for your beneficial suggestion. In the revised article, as advised, this problem has been corrected in the discussion section in paragraphs 3,4, and 5.

10. Reviewers’ comment: “The subsection on implications for policy and practice contains quite ambitious recommendations that are made on the basis of the study despite the acknowledged limitations of the research. These need to be clearly justified. In addition, specifically the recommendation on research geared towards promoting happiness being carried out across the whole country is dependent on higher quality studies being done in a limited number of locations first.”

Authors response: Thank you for your comment. In the revised version of the article modification of the specified recommendation has been made by stating that the Government of Kenya use other study designs such as experimental design to assess healthcare workers happiness, can be applied in other locations. The implications and conclusion presented in this study are based on our results. To justify the implications (recommendations) in addition to the present results, references of some documented policies where possible have been included. For example, the recommendation of positive education being included in the pre-service clinical curricula and in-service

training because level of qualification (education) was significant in this study. Finally, our recommendations may be ambitious, but the COVID-19 pandemic has revealed the importance of healthcare workers happiness and well-being, to provide patients with the quality health care.

11. Reviewers' comment: "Are the conclusions drawn adequately supported by the results? No."

Authors response: In the revised version, the conclusion has been modified following the additional analysis. In the conclusion, results detailing the factors of overall happiness in public and mission hospitals separately have been presented in the conclusion of the article.

We thank you for your constructive advice, comments, and review.

Competing Interests: Authors declare no competing interests.

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