Osteoporosis and Health-Related Quality of Life among Older Women

Ashley Wilson[1]*, Gina Maiocco[2], Usha Sambamoorthi[3]
[1]*West Virginia University School of Nursing, USA*
[2]*University of Phoenix, USA*
[3]*West Virginia University School of Pharmacy, USA*
Corresponding author: wilsonash@hsc.wvu.edu

ABSTRACT
Background: Osteoporosis, a systemic skeletal disease characterized by low bone mass, poses a significant disease burden for older women. Often assessed using Health-Related Quality of Life (HRQoL) scale, the association between osteoporosis and HRQoL is scarce, with the majority of quality of life studies focused on osteoporotic women post fracture.
Purpose: The study's primary objectives were to examine if differences exist in HRQoL among women greater than 50 years of age who have and/or do not have osteoporosis and to gain insight into the relationship of HRQoL and osteoporosis.
Methods: A retrospective cross-sectional design involving data extraction on women aged 50 years or older from 2014 Medical Expenditure Panel Survey (MEPS) was used (N = 4,661). HRQoL was measured by the generic Short-Form-12 Version 2 Physical (PCS) and Mental Health (MCS) component summary scores. The differences between osteoporosis and PCS and MCS were examined using t-tests and multivariable ordinary least squares regression.
Results: Overall, 4.1% women aged 50 and older had osteoporosis. In both bivariate and multivariable analyses, no statistically significant differences were observed in HRQoL measures between women with and/or without osteoporosis.
Conclusion: No group differences in HRQoL by osteoporosis status suggest the need for additional research using other research methodologies to flush out nuances in QOL changes. Clinician actions focused on insured and uninsured women with osteoporosis must include early and ongoing QOL assessment, with a focus on physical changes overtime.

Keywords: Osteoporosis, Quality of Life, Health-Related Quality of Life.

BACKGROUND

Osteoporosis is a chronic multifactorial systemic skeletal disease characterized by low bone mass and micro-architectural deterioration of bone tissue (Nuti, Caffarelli, Giuseppe, Gennari, & Stafano, 2014, p. 2255). This condition impacts an estimated 10. 2 million (10.3%) adults aged 50 or older in the United States (U.S.) with the overwhelming majority (80.3%) being women (8.2 million) (Wright et al, 2014). Current statistics reveal non-Hispanic women greater than 50 years of age have a 7% increase in probability of hip fracture in 10 years versus a 72% probability of hip fracture for those greater than 80 (Looker, Isfahani, Fan, & Shepherd, 2017). Therefore, as the general population ages, the rate of osteoporosis will likely increase and may negatively impact a woman's physical and psychological health. Older women may suffer a decline in physical functioning due to age-related biological changes. From 2002 to 2013, Avis et al (2018) used the physical and mental components of the SF-36 to assess midlife predictors of HRQoL in 2,614 older women. Study results showed as women aged a decline in physical components (51.6 to 47.1) occurred but the mental component slightly elevated (49.2 to 53.1). Predictors of lower physical scores included aging, higher body mass index, smoking, two or more medical conditions, sleep problems, and urinary incontinence. Although not singled out in this study as an influential medical condition to HRQoL, the role osteoporosis may play on physical and mental function warrants further appraisal.

Trepidation toward osteoporosis is due to the burden it can pose on those who develop the condition. Burden relates to quality of life (QOL) which for woman with osteoporosis can mean decreased physical function, pain, decreased social function, and decreased feelings of wellbeing. To assess this burden, the Health-Related Quality of Life (HRQoL) subjective outcome measure can be used. Results of this tool describe the perceived health status of an individual (Salaffi et al., 2007, Adachi et al., 2010) and benefits of interventions related to patient centered care (Luo et al, 2015). HRQoL is measured using generic or disease specific instruments, like the Short Form -36 (SF 36), with overall results used to provide direction in the care of adults with chronic conditions (Hand, 2016).

Before talking about QOL in women with osteoporosis, a brief mention of QOL in women at midlife (47-69) requires mentioning. From 2002 to 2013, Avis et al (2018) used the physical and mental components of the SF-36 to assess midlife predictors of HRQoL in 2,614 older women. Study results showed as women aged a decline in physical components (51.6 to 47.1) occurred but the mental component slightly elevated (49.2 to 53.1). Predictors of lower physical scores included aging, higher body mass index, smoking, two or more medical conditions, sleep problems, and urinary incontinence. Although not singled out in this study as an influential medical condition to HRQoL, the role osteoporosis may play on physical and mental function warrants further appraisal.

Quality of life in women with osteoporosis has been examined quantitatively and qualitatively. Quantitative QOL studies concentrated on adults with multiple chronic conditions or osteoporotic fractures. For instance, Salaffi et al. (2007) examined the burden of prevalent fractures on HRQoL in postmenopausal women with primary osteoporosis using the mini-Osteoporosis Quality of Life Questionnaire (mini-OQLQ), the Medical Outcomes Study SF-36, and the EuroQuol-5D (EQ-5D). The results of this cross-sectional study indicated that vertebral fractures related to osteoporosis, the number of fractures, the presence of comorbid conditions, and age were associated with lower HRQoL (Salaffi et al., 2007).

Concerning presence of co-morbidities, the Global Longitudinal Study of Osteoporosis in Women (2010) compared several dimensions of HRQoL in postmenopausal women with prior fractures with HRQOL of women who had other chronic conditions like

diabetes, arthritis, and lung disease. Women in this study came from 10 countries in Europe, North America, and Australia and completed the SF-36 subscales on physical function, vitality, and self-reported general health status to determine HRQoL. This study revealed the HRQoL for women with multiple fractures or fractures of the spine, hip or upper leg were similar or worse than HRQoL scores of women with chronic conditions.

Qualitative research has looked at woman's experiences of living with osteoporosis. Based on the QOL premise that being diagnosed with osteoporosis may lead to psychological and physical consequences, women who had not experienced osteoporotic fracture found adjusting to the condition was a multifaceted process highly influenced by medical treatment and daily life (Hansen et al, 2017). How to move beyond the diagnosis of a chronic illness was a major factor for women in this study.

The work by Hansen and colleagues (2017) highlight an important void in research. The majority of woman with osteoporosis have not had a fracture but little inquiry into their quality of life has occurred. In the National Health Statistics Report for Osteoporosis (2017), 65.8% of women greater than 40 years old (1107 of 1581) did not have bone breakage prior to diagnosis. This is important detail because clinicians could be inefficiently addressing the needs of this patient population.

In lieu of research inconsistencies and the requisite to address the needs of the greater population, one must take a closer look to see if there are differences in HRQoL for women without osteoporosis versus those women with osteoporosis without fracture. Such a comparison is important so health care teams can gain a better understanding of the impact of the osteoporotic disease process on HRQoL. Results of such a study may be used by clinicians to stimulate increase frequency of QOL assessments of osteoporotic women to prevent fracture and to promote self- management of their complex condition.

OBJECTIVE
The primary objectives of this study were to examine if differences exist in HRQoL among women greater than 50 years of age who have and/or do not have osteoporosis and to gain insight into the relationship of HRQoL and osteoporosis. Using data from the Medical Expenditure Panel Survey (MEPS) on female participants aged 50 and older, we hypothesize that HRQoL will be lower in women with osteoporosis compared to women without osteoporosis.

METHODS
Study Design
The study used a retrospective cross-sectional design with survey data obtained from the 2014 Medical Expenditure Panel Survey (MEPS). MEPS is a set of large-scale household surveys that collects data from the noninstitutionalized civilian population (Agency for Healthcare Research and Quality, 2019). These annual surveys look at specific health services used and the quality of health insurance available/held by workers in the United States (Agency for Healthcare Research and Quality, 2019). For our study, we used the medical conditions file and the household consolidated file. The household consolidated file contains information on demographic and socioeconomic characteristics of participants, their health conditions, employment status, access to care, and health care satisfaction (Meraya, Raval, & Sambamoorthi, 2015). The medical conditions file provides information on medical conditions recorded verbatim and coded using the International Classification of Diseases, 9th Edition, Clinical Modification (ICD-9-CM). (Agency for Healthcare Research and Quality, 2019). MEPS investigators grouped these codes into conditions using the clinical classification software (CCS).

Study Sample

The study sample included 4,461 participants and consisted of women with and without osteoporosis, who were aged 50 and older, who were alive during the calendar year, and who did not have any missing values in the HRQoL measures. We excluded women without health insurance coverage (N = 381) because insurance coverage may affect HRQoL among women with and without osteoporosis.

Note: Based on 4,461 adult participants aged 50 years or older with insurance coverage, who were alive during the calendar year and did not have missing values in health-related quality life measures. Due to missing data in variables (obesity, smoking status and physical activity) the number may not add to 4,461. GERD: Gastroesophageal Reflux Disease; HS: High School; LT: Less than; Rx: Prescription Drug; Cov: Coverage; Wt.: Weighted

Dependent Variable: HRQoL Measures

In this study, HRQoL measures were derived from by the Short Form Survey-12 Version 2 (SF12-V2). The SF12-V2 is a 12-item multi-purpose survey used to evaluate HRQoL components, specifically physical and mental health functioning of individuals (Ware, Kosinski, & Keller, 1996). It includes eight domains (role physical, role emotional, physical function, social function, mental health, vitality, pain, and general health) and is operationalized into physical component summary (PCS) and mental component summary (MCS) scores. Both PCS and MCS range from 0 to 100, with 0 representing the lowest level of health and 100 the highest. In the MEPS, HRQoL is administered as a mail-in-survey.

Key Independent Variable: Osteoporosis (Yes/No)

The presence or absence of osteoporosis was derived from the Medical Conditions file by using the CCS code 206. The CCS code of 206 represents the following ICD-9-CM codes specific to osteoporosis: 73300, 73301, 73302, 73303, and 73309. The initial capturing of osteoporosis data in MEPS included specifically asking respondents to identify (1) a physical or mental health conditions regardless of whether they sought medical care or experienced disability during the interview period; (2) if they sought care for osteoporosis either in an inpatient or outpatient setting, emergency room or during a home health visit; (3) if they reported a medical condition (example: osteoporosis) as bothersome during the interview; and (4) if they had disability days due to the condition (Machlin, 2019)

Other Explanatory Variables:

The selection of other explanatory variables that have been found to influence HRQoL was guided by the Andersen Behavioral Model (Andreson, 1995). According to this model, HRQoL can be affected by predisposing variables, enabling factors, needs factors, personal health practices, and the external environment. For this study, we identified predisposing factors as age (50-64 & 64 and older) and race/ethnicity (white & non-white). Enabling factors, the financial or organizational factors that enable health service utilization (Babitsch et al, 2012) included marital status (married/not married); education (less than high school, high school, and above); employment (employed/non-employed), poverty level (Poor/Near Poor, Middle Income, High Income), health insurance (private, public), and prescription coverage (yes/no). The needs factors which represent the perceived and evaluative need for health services included the following variables: asthma (yes, no), arthritis (yes, no), cancer (yes, no), diabetes (yes, no), GERD (yes, no), thyroid disease (yes, no), cardiovascular disease (yes, no), depression (yes, no), and anxiety (yes, no). Personal health practices that are linked to osteoporosis included smoking status (current smoker,

other), moderate or vigorous physical activity 5 or more times/week (yes/no), and obesity (yes/no) External environment was represented by participants' region of residence (northeast, Midwest, south, west).

Statistical Analysis

Group differences in osteoporosis status were analyzed using the Rao-Scott chi-square tests. The unadjusted relationships between osteoporosis and HRQoL measures were analyzed using independent t-tests. A multivariable ordinary least square regression (OLS) was used to assess the adjusted relationships between osteoporosis and HRQoL measures. The multivariable OLS regressions not only controlled for osteoporosis, but also the predisposing, enabling, need factors, personal health practices, and external environment. All analyses accounted for the multistage clustered sampling of the MEPS with survey procedures in SAS 9.4.

RESULTS

Description of the Study Sample

The study sample consisted of 4,461 participants, with the majority being non-Hispanic white women (73.4%). Age distribution showed that 53.2% of women were aged 50 to 64 and 46.8% were aged 65 and older. Most participants had at least a high school education (87.8%) and private insurance (69.2%). It was also found that 9.3% had asthma, 19.3% had diabetes, and 19.7% had cardiovascular disease (Table1).

Table 1. Characteristics of the Study Sample
Older Women (age $\geq$ 50 years)
Medical Expenditure Panel Survey, 2014

	N	Wt. %
ALL	**4,461**	**100.0**
Race		
White	2,238	73.4
Non-White	2,223	26.6
Age		
50-64 years	2,463	53.2
65, or Older	1,998	46.8
Married		
Married	2,090	54.6
Not Married	2,371	45.4
Education		
LT HS	839	12.2
HS & above	3,590	87.8
Employment Status		
Employed	1,929	45.2
Not Employed	2,532	54.8
Poverty Status		
Low Income	1,701	28.8
Middle Income	1,281	26.6
High Income	1,479	44.6
Health Insurance		
Private	2,722	69.2

Table 1. Characteristics of the Study Sample
Older Women (age $\geq$ 50 years)
Medical Expenditure Panel Survey, 2014

	N	Wt. %
ALL	**4,461**	**100.0**
Public	1,739	30.8
Rx. Coverage		
Yes	2,211	56.0
No	2,250	44.0
Asthma		
Asthma	456	9.3
No Asthma	4,005	90.7
Arthritis		
Arthritis	2,174	47.7
No Arthritis	2,287	52.3
Cancer		
Cancer	536	14.3
No Cancer	3,925	85.7
Diabetes		
Diabetes	1,029	19.3
No Diabetes	3,432	80.7
(Continued)		
GERD		
GERD	673	15.4
No GERD	3,788	84.6
Thyroid		
Thyroid	729	18.7
No Thyroid	3,732	81.3
Heart Disease		
Yes	884	19.7
No	3,577	80.3
Depression		
Depression	817	19.2
No Depression	3,644	80.8
Anxiety		
Anxiety	661	16.5
No Anxiety	3,800	83.5
Obesity		
Obese	1,612	33.0
Not Obese	2,777	65.2
Smoking		
Current Smoker	518	11.1
Other	3,852	87.1
Exercise		
5 times/week	1,848	43.7
Other	2,590	55.9

Table 1. Characteristics of the Study Sample
Older Women (age $\geq$ 50 years)
Medical Expenditure Panel Survey, 2014

	N	Wt. %
ALL	**4,461**	**100.0**
Region		
Northeast	780	19.2
Midwest	833	22.2
South	1,698	36.9
West	1,150	21.8

Note: Based on 4,461 adult participants aged 50 years or older with insurance coverage, who were alive during the calendar year and did not have missing values in health-related quality life measures. Due to missing data in variables (obesity, smoking status and physical activity) the number may not add to 4,461. GERD: Gastroesophageal Reflux Disease; HS: High School; LT: Less than; Rx: Prescription Drug; Cov: Coverage; Wt.: Weighted

Description of the Study Sample by Osteoporosis

Overall 4.1 % of participants had osteoporosis (Table 2). Significant group differences in osteoporosis were observed by race, age, employment, type of health insurance, prescription drug coverage, co-occurring conditions (cardiovascular disease, GERD, obesity, etc), nicotine use, amount of physical activity per week, report of pain and region. For example, a higher percentage of women aged 65 years or older reported osteoporosis compared to women in the age group 50-64 (6.7% versus 1.8%; $p < 0.001$). An increased rate of osteoporosis was reported in unemployed women without prescription coverage when compared to employed women (5.6% versus 2.3%; $p < 0.001$) with prescription coverage (5.7% versus 2.9%; $p < 0.001$).

Table 2. Characteristics of the Study Sample by Osteoporosis Status
Older Women (age $\geq$ 50 years)
Medical Expenditure Panel Survey, 2014

	Osteoporosis		No Osteoporosis		Chisq-val	P-value
	N	Wt. %	N	Wt. %		
ALL	**168**	**4.1**	**4,293**	**95.9**		
Race						
White	84	4.1	2,154	95.9	0.009	0.923
Non-White	84	4.1	2,139	95.9		
Age						
50-64 years	44	1.8	2,419	98.2	45.200	< 0.001
65, or Older	124	6.7	1,874	93.3		
Married						
Married	78	4.0	2,012	96.0	0.031	0.861
Not Married	90	4.2	2,281	95.8		
Education						
LT HS	40	5.5	799	94.5	2.053	0.152
HS & above	127	3.9	3,463	96.1		
Employment Status						

Table 2. Characteristics of the Study Sample by Osteoporosis Status
Older Women (age $\geq$ 50 years)
Medical Expenditure Panel Survey, 2014

	Osteoporosis		No Osteoporosis		Chisq-val	P-value
	N	Wt. %	N	Wt. %		
ALL	**168**	**4.1**	**4,293**	**95.9**		
Employed	41	2.3	1,888	97.7	18.096	< 0.001
Not Employed	127	5.6	2,405	94.4		
Poverty Status						
Low Income	77	5.0	1,624	95.0	3.483	0.175
Middle Income	48	4.6	1,233	95.4		
High Income	43	3.2	1,436	96.8		
Health Insurance						
Private	81	3.3	2,641	96.7	9.133	0.003
Public	87	6.0	1,652	94.0		
Rx. Coverage						
Yes	56	2.9	2,155	97.1	11.756	< 0.001
No	112	5.7	2,138	94.3		
Asthma						
Asthma	19	3.1	437	96.9	0.988	0.320
No Asthma	149	4.2	3,856	95.8		
Arthritis						
Arthritis	90	4.4	2,084	95.6	0.417	0.518
No Arthritis	78	3.9	2,209	96.1		
Cancer						
Cancer	22	5.5	514	94.5	1.376	0.241
No Cancer	146	3.9	3,779	96.1		
Diabetes						
Diabetes	39	4.8	990	95.2	0.658	0.417
No Diabetes	129	4.0	3,303	96.0		
(Continued)						
GERD						
GERD	42	5.8	631	94.2	4.440	0.035
No GERD	126	3.8	3,662	96.2		
Thyroid						
Thyroid	35	4.5	694	95.5	0.306	0.580
No Thyroid	133	4.0	3,599	96.0		
Heart Disease						
Yes	39	5.8	845	94.2	3.884	0.049
No	129	3.7	3,448	96.3		
Depression						
Depression	39	5.4	778	94.6	2.509	0.113
No Depression	129	3.8	3,515	96.2		
Anxiety						
Anxiety	28	5.1	633	94.9	1.003	0.317
No Anxiety	140	3.9	3,660	96.1		

Table 2. Characteristics of the Study Sample by Osteoporosis Status
Older Women (age ≥ 50 years)
Medical Expenditure Panel Survey, 2014

	Osteoporosis		No Osteoporosis		Chisq-val	P-value
	N	Wt. %	N	Wt. %		
ALL	**168**	**4.1**	**4,293**	**95.9**		
Obesity						
Obese	33	2.4	1,579	97.6	10.310	0.001
Not Obese	134	5.1	2,643	94.9		
Smoking						
Current Smoker	15	3.4	503	96.6	4.025	0.134
Other	146	4.1	3,706	95.9		
Exercise						
5 times/week	72	3.9	1,776	96.1	0.245	0.621
Other	96	4.3	2,494	95.7		
Region						
Northeast	34	3.9	746	96.1	0.589	0.899
Midwest	32	4.7	801	95.3		
South	55	4.0	1,643	96.0		
West	47	3.9	1,103	96.1		

Note: Based on 4,461 women aged 50 years or older with insurance coverage, who were alive during the calendar year and did not have missing values in health-related quality of life measures. Due to missing data in variables (obesity, smoking status and physical activity) the number may not add to 4,461. Significant group differences by osteoporosis were tested with Rao-Scott chi-square statistics. GERD: Gastroesophageal Reflux Disease; HS: High School; LT: Less than; Rx: Prescription Drug; Cov: Coverage; Wt.: Weighted

Unadjusted and Adjusted Associations between Osteoporosis and HRQoL Measures

Table 3 displays the parameter estimates, standard errors and 95% confidence intervals of HRQoL scores by osteoporosis status. Even after controlling for pre-disposing variables, enabling factors, needs factors, personal health practices, and external environment characteristics, we did not observe statistically significant associations between osteoporosis and HRQoL measures. Women with osteoporosis had slightly lower MCS and PCS scores but they were not statistically significant when compared to women without osteoporosis.

Table 3. Weighted Averages and Standard Errors (SE)
Parameter Estimates from Multivariable Ordinary Least Squares Regressions
on Health-Related Quality of Life Measures
Older Women (Age ≥ 50 Years)
Medical Expenditure Panel Survey, 2014

Mental Component Summary Scores					
	n	mean	SE	ci_95	p-value
Osteoporosis					
Yes	168	50.16	1.09	[48.00, 52.32]	0.2286

No	4293	51.50	0.19	[51.14, 51.87]	

Physical Component Summary Scores

Osteoporosis					
Yes	168	43.02	1.18	[40.69, 45.35]	0.1074
No	4293	44.97	0.23	[44.51, 45.42]	

Parameter Estimates from Multivariable Ordinary Least Squares Regressions
Mental Component Summary Scores

	beta	SE	p-value
Osteoporosis			
Yes	-1.017	0.917	0.2689
No			
Intercept	54.386	0.675	< 0.001

Physical Component Summary Scores

Osteoporosis			
Yes	-0.039	0.947	0.9672
No			
Intercept	59.200	0.674	< 0.001

Note: Based on 4,461 adult participants aged 50 years or older with insurance coverage, who were alive during the calendar year and did not have missing values in health-related quality of life measures. The adjusted ordinary least squares regressions adjusted for age, race, marital status, education, poverty, health insurance coverage, prescription drug coverage, number of chronic conditions, depression, anxiety, obesity, smoking, and physical activity.

DISCUSSION

In this study, we looked to see if there were differences in HRQoL between women with osteoporosis and those without osteoporosis. We found no statistical significance in HRQoL measures between the groups. These results can be interpreted two ways. First, this study may truly represent what is occurring in this population. As a reminder, Avis and colleagues (2018) found women aged 47-69 without osteoporosis had declines in physical but not mental health HRQoL factors. Likewise, Hopman and colleagues (2019), showed women with Dexa-confirmed osteoporosis without fracture had large declines in HRQoL scores over a 10-year period primarily in the physical oriented domains of the SF-36. The mental domains displayed no significant differences. Therefore, our study and these two previous studies, show the groups as similar with the key QOL change involving physical function.

On the other hand, not all QOL studies on women with osteoporosis have the same results. In a study comparing QOL of women with varied bone mineral density (BMD) without fracture, QOL for osteopenic and osteoporotic women were lower than women with normal BMD in regards to pain, social function, health perception, and mental function (Baczyk, Samborski, & Jaracz, 2016). Our study findings may be different because only 4.1% of women within our sample size of 4461 reported osteoporosis. This occurrence is lower than previously published estimates. Additionally, the difference in rates could be due to the identification method employed by the MEPS or differences in study population. As

a reminder, the MEPS interviews only captures treated prevalence and not the overall prevalence of a medical condition. Therefore, those with asymptomatic osteoporosis who have not sought treatment may not have been included in the original data. Lastly, the use of the MEPS database may have also led to a lower rate of women with osteoporosis due to the exclusion of women who may be in nursing homes.

One element that did stand out in our study was the increased rate of osteoporosis reported by unemployed women without insurance coverage versus those employed and insured. It has been largely documented in the literature that insurance disparities can impact health outcomes, especially for those at risk for osteoporotic fracture (DeShields et al, 2017). Reasons for this increased prevalence can be attributed to increased prevalence of Vitamin D deficiency among the uninsured (Kakarala et al, 2007) and lack of continuity of care (Farley & Blalock, 2009). Future research into efficacy of community outreach to uninsured women with osteoporosis without fracture can provide insight into a potentially growing situation.

Overall, because of continued inconsistencies in research on HRQoL and women with osteoporosis without fracture, clinicians may need to do the following. First, health care personnel working with older women need to be more engaged in research. Quantitative studies like ours may miss nuances women are experiencing as the disease progresses. Closed answer questions leave little room for elaboration. Increased use of qualitative methodologies to identify early clues in changes to QOL in aging women may be crucial to the eventual delivery of relevant interventions. Also, use of repetitive QOL assessments as women age, especially with a focus on physical changes, may be the key to preventing unnecessary fracture. Lastly, outreach to the noninsured population by health professionals is warranted to make sure all persons with osteoporosis receive proper treatment.

Strengths and limitations

Strengths of our study include sample size, use of reliable/valid measures to assess HRQoL, and application of a theoretical framework to guide selection of explanatory variables. All data was obtained from a nationally representative sample of civilian, non-institutionalized household members. The SF12-v2 is a validated and widely used generic instrument to measure HRQoL. A comprehensive list of variables applicable to the osteoporotic disease process were used in adjusted models.

Limitations of our study include the following. First, this is an observational study. Use of a cross sectional approach allows for measurement of outcomes. This type of design offers a one-time measurement making causal relationships difficult to derive and makes interpretation of associations, the direction of associations and disease trends problematic. (Setia, Maninder Singh. "Methodology Series Module 3: Cross-sectional Studies." Indian journal of dermatology vol. 61, 3 (2016): 261-4. doi:10.4103/0019-5154.182410). Additionally, only a small percentage of women (4.1%) in our study reported a diagnosis of osteoporosis which could account for why no group differences in HRQoL were seen. Finally, the absence of a longitudinal study design prohibited us from observing a potential decline in HRQoL over time.

CONCLUSION

Inconsistencies persist concerning understanding the QOL of women with osteoporosis without fracture. Many women may be unaware of the changes they are experiencing are related to osteoporosis and not just the physical effects of aging. The quantitative measures used to assess HRQoL may not be sensitive enough to pick up on the subtle changes. On the other hand, when identified, the rate of uninsured women with

osteoporosis were higher bring to light the issue of consistent medical follow-up. Clinician focus should be on both the insured and uninsured. Preventative programs, early recognition, and treatment to help decrease the likelihood of fracture is the priority. Further research to identify early subtle changes to QOL before fracture is stressed.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to report.

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