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Gender Differences in Vulnerability to Socioeconomic Status on Self-Rated Health in 15 Countries

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Abstract

Objectives: This study compared 15 countries for multiplicative effects of gender by education and by income on self-rated health of individuals with chronic medical conditions.

Methods: We analyzed data from the Research on Early Life and Aging Trends and Effects (RELATE) Study. Participants were sampled from 15 countries including Argentina, Barbados, Brazil, Chile, Cuba, Costa Rica, China, India, Ghana, Russia, Puerto Rico, South Africa, Mexico, Uruguay, and the United States. The analytical sample was limited to individuals with at least one chronic medical condition. The main outcome of interest was self-rated health (SRH). Country-specific logistic regressions were used for data analysis. We ran separate models with gender × education and gender × income interactions.

Results: In Ghana, Uruguay, and India, gender moderated the effects of socioeconomic status (SES) on SRH. In Ghana and Uruguay, education and in Mexico and India, income had a stronger effect on SRH for women than men.

Conclusions: Countries vary in gender differences in vulnerability to SES indicators on SRH of patients with chronic medical conditions. Women are more vulnerable than men to the effect of low SES on SRH in Ghana, Uruguay, Mexico, and India.

Keywords: Gender, Socio-Demographics, Self-Rated Health, Cross Country Study

1. Background

Although women live longer than men (1, 2), they consistently report poorer self-rated health (SRH) compared to men (3). At least in part, some of this gender gap is due to lower socio-economic status (SES) of women than men (4, 5). Countries, however, may vary in the mechanisms by which gender affects health status of the populations. To investigate such hypothesis, there is a need to conduct cross-country studies that investigate the gender gap in SRH as well as gender differences in vulnerability to SES indicators.

The Research on Early Life and Aging Trends and Effects (RELATE) Study has provided a unique opportunity to compare countries for additive and multiplicative effects of gender, SES, and medical conditions on SRH. RELATE is composed of multiple national surveys conducted in 15 countries located in Asia, Africa, North America, and South America (6, 7). RELATE is composed of low income (Ghana), lower middle income (China and India), upper middle income (Argentina, Cuba, Uruguay, Chile, Costa Rica, Brazil, Mexico, and Russia), and high income (Barbados, Puerto Rico and the United States) countries (7).

Gender influences SRH and well-being in multiple ways (8). In addition to the main effect of gender on SRH (9), gender may moderate the effect of SES and other risk and protective factors on health and well-being (10-17). Among patients with heart disease, income and education had a stronger protective effect on well-being for women than men (10, 11). This means among individuals with a heart disease, women are more vulnerable to the detrimental effect of low education and income compared to men (10, 11). A cross-country comparison of the effects of gender and SES on SRH showed that men require a higher income than women to achieve comparable SRH (18). In another study, number of chronic medical conditions explained gender disparities in subjective health in Costa Rica, Argentina, Barbados, Cuba, and Uruguay. In the United States, however, number of chronic medical conditions explained the effect of income on subjective health, and in Puerto Rico, number of chronic medical conditions explained the effect of marital status on subjective health (19). These studies suggest that countries differ in how gender and SES indicators protect the health of people.

Cross-country differences in objective and subjective measures of health and well-being are well-documented (20-25). Eurobarometer, European Values Study, Latinobarometer, and World Values Survey have all shown cross-country variation in SRH, physical health, life expectancy, and mortality patterns (26-29). While gender (9) and SES

both influence well-being (30), it is yet unknown whether these effects are additive or multiplicative (30). Our understanding is especially limited about cross-country differences in the interactions between gender and SES indicators on the health of populations.

Using RELATE data, and among individuals with chronic medical conditions, this study investigated cross-country differences in gender differences in the effects of SES (i.e. income and education) on SRH.

2. Methods

2.1. Study Design and Participants

With a cross-sectional design, the current analysis included 44,530 individuals. Data came from the RELATE Study, which was composed of surveys from Argentina, Barbados, Brazil, Chile, Cuba, Costa Rica, China, India, Ghana, Russia, Puerto Rico, South Africa, Mexico, Uruguay, and the United States.

RELATE was composed of the following national surveys: 1) Chinese Longitudinal Healthy Longevity Survey (CLHLS), 2) China Health and Nutrition Study (CHNS), 3) Costa Rican Study of Longevity and Healthy Aging (CRELES), 4) WHO Study on Global Ageing and Adult Health (SAGE), 5) Wisconsin Longitudinal Study (WLS), 6) Puerto Rican Elderly: Health Conditions (PREHCO), and 7) Study of Aging Survey on Health and Well Being of Elders (SABE) (6, 7).

2.2. Measures

2.2.1. Demographic Characteristics

Age (continuous variable) and gender (dichotomous variable) were measured.

2.2.2. Socio-economic Characteristics

We measured education level (years of schooling) and income (purchasing power parity (PPP)) as our SES indicators. Both variables were operationalized as continuous variables.

2.2.3. Number of Medical Conditions

Based on self-report of physician diagnosis of chronic medical conditions, we measured number of medical conditions. The following seven chronic medical conditions were evaluated: hypertension, cancer, pulmonary disease, heart disease, diabetes, stroke, and arthritis. The score potentially ranged from 0 to 7, and a higher score was indicative of multi-morbidity. High level of agreement between self-reported and physician diagnosis of medical conditions has been found (kappa up to 0.92) (31).

2.2.4. Main Outcome

SRH was measured using a single item using a five category Likert scale (i.e. very bad, bad, moderate, good, very good). Responses were collapsed to a dichotomous outcome, poor health (very bad health, bad health) versus good health (moderate health, good health, very good health). Single items have been frequently used to measure SRH (32-40). Test-retest reliability for single items range from 0.7 to 0.8. 35 validation studies have documented strong correlations between single-item SRH indicators and multi-item standard scales (36). Single item SRH measures strongly predict mortality, net of other risk factors (41).

2.3. Data Analysis

We used SPSS 20.0 for Windows (SPSS Inc., Chicago, IL) for data analysis. We used two country specific logistic regressions to determine if associations between gender, socioeconomic status, chronic conditions and perceived health vary across countries. In model 1, in addition to the main effects, we entered an interaction between gender and education. In model 2, we entered an interaction between gender and income. We did not apply sampling weights as they were not applicable to data from the United States (Wisconsin) and China (CHNS). Odds Ratios (OR), their 95% CI, and p values were reported.

All surveys were fully in compliance with the Helsinki declaration on ethical principles for medical research involving humans. Different institutional review boards approved participating surveys.

3. Results

Table 1 shows mean age, education, and income across countries. Age, education, and income were significantly different between countries.

Based on the first model, female gender was associated with worse SRH in Ghana, South Africa, and Uruguay. Gender was not associated with SRH in other countries. High age was associated with better SRH in Argentina, Brazil, China, Costa Rica, and Puerto Rico. High age was associated with poor SRH in India, Russia, Ghana, and South Africa. Age was not associated with SRH in other countries (Tables 2 and 3).

In the US, Mexico, Barbados, Brazil, Uruguay, Ghana, South Africa, and Russia, education was not associated with SRH. Education was associated with better SRH in other countries (Tables 2 and 3).

Income was not associated with poor SRH in Argentina, Chile, Cuba, India, Ghana, and South Africa. Income was associated with better SRH in other countries (Tables 2 and 3).

Table 1. Comparison of Participants in 15 Countries Participating in Research on Early Life and Aging Trends and Effects (RELATE)

	China	Costa Rica	Puerto Rico	US	Mexico	Argentina	Barbados	Brazil	Chile	Cuba	Uruguay	India	Ghana	South Africa	Russia	F	df	P Value
Age	82.99 (11.74)	78.94 (9.11)	76.25 (7.72)	66.15 (0.52)	74.78 (6.83)	73.96 (6.01)	75.54 (7.01)	76.63 (6.77)	74.84 (6.81)	75.99 (7.5)	73.96 (6.15)	73.39 (6.12)	75.05 (7.22)	73.81 (6.52)	74.325 (0.98)	637.544	14	< 0.001
Educatio	1.55 (0.86)	1.94 (0.75)	2.55 (0.93)	0.78 (2.06)	1.83 (0.98)	2.53 (0.76)	2.15 (0.63)	1.749 (0.75)	2.05(1.00	2.34(0.73)	2.3 (0.92)	1.48(1.15)	1.31 (1.10)	1.59 (1.46)	2.990 (0.72)	705.415	14	< 0.001)
Income	5.02 (9.07)	0.5 (1.25)	5.96 (9.34)	24.54 (35.92)	12.02 (32.9)	3.13 (5.35)	9.49 (32.48)	3.83 (7.68)	280.04 (261.74)	1.48 (5.71)	44.07 (74.19)	16.37 (43.11)	148.51 (259.31)	11.96 (38.87)	67.91 (51.78)	1594.973	14	< 0.001

As Model 1 shows, in Ghana and Uruguay, the effect of education on SRH was larger among women. There was no interaction between education and gender in other countries (Table 2)

As Model 2 shows, in Mexico and India, the effect of income on SRH was larger among women. There was no interaction between income and gender in other countries (Table 3).

4. Discussion

Our study documented considerable cross-country differences in the multiplicative effects of gender and SES on SRH of individuals with chronic medical conditions. In Ghana and Uruguay, the effect of education on SRH was larger among women. In Mexico and India, the effect of income on SRH was larger among women.

Female gender is believed to be associated with higher number of self-reported chronic conditions and poorer self-reported health (42). Pinquart and Sorensen listed four reasons for gender differences in SRH (30). Women may have lower material resources due to gender inequities and gendered social power. As the labor market is gendered, women may experience lower stable employment (30, 43). Even if employed, women's pensions are lower than men's (44). Women more frequently live in poverty than men (45). Older women are more likely to be widowed than older men (45). Due to gender difference in longevity, a larger part of women's life is spent with illness and disabilities (45). In the United States, nearly four times as many older women than men live alone (46). Women may have less access to health resources while requiring more care in later life than men (46).

The gender gap in health and well-being is well known (42). Women tend to report a higher number of chronic conditions and poorer health (42), but live longer (1, 2). Among patients with chronic medical conditions, only in Uruguay, Ghana, and South Africa was female gender associated with worse SRH. Among the general population, female gender was associated with worse SRH in six countries (i.e. China, Costa Rica, Puerto Rico, Barbados, Cuba and Uruguay) (47). This means that in China, Costa Rica, Puerto Rico, Uruguay, Barbados, and Cuba, females in general have a worse perceived health; however, females with chronic medical conditions do not have a worse perceived health than their male counterparts.

In Ghana, Uruguay, Mexico, and India, women were more vulnerable to the effect of SES on self-rated health. This finding can be explained by the Theory of Gender and Power, developed by Connell in 1987. Based on this theory, sex- and gender-based division of labor, social power, and the structure of cathexis are the main social structures that result in considerable gender differences in education, employment, and income. Such gender differences in turn result in power imbalance (subordination of women) in the society. All these social inequalities have an impact on women's health and well-being (48).

Although some of the gender differences in perceived health may be due to education and income (43-45), other SES factors such as marital status, employment, and wealth are also important (45, 46). Further research should test if gender also interacts with other SES factors on perceived health. RELATE has shown cross-country variation in the effect of marital status on health. Although being currently married was associated with better SRH in Mexico, it was linked to worse SRH in Costa Rica, Puerto Rico, and Brazil, and not associated with SRH in eleven countries (19). A remaining question is if men and women differently benefit from being married and if the effect of marital status on social support as the main gradient of marital status varies for men and women (49, 50).

Although high social status protects against poor health, gender interacts with the effect of SES on perceived health of patients with chronic medical conditions. Better health among individuals with high SES is in part due to a better access to financial, material, and human resources (51). Most previous knowledge about the association between gender, SES, and well-being is limited to single countries (8, 52).

Our study also showed cross-country differences in the effect of number of chronic diseases on SRH of patients with chronic medical conditions. A study suggested cross-country differences in the effect of multi-morbidity on the association between socio-demographic factors and per-

ceived health among individuals. In the US, chronic conditions explained the association between income and SRH while in Puerto Rico, conditions explained the association between marital status and SRH. In Costa Rica, Argentina, Barbados, Cuba, and Uruguay, chronic conditions explained the association between gender and SRH. Only in China, Russia, India, Chile, Mexico, Brazil, Ghana and South Africa, number of chronic medical conditions did not explain the association between SES and SRH (19). These findings may help us better understand how burden of chronic conditions may vary among countries.

Although some studies have reported a positive net effect of age on well-being among elderly (53, 54), our study showed country differences in this regard. In a study using RELATE data, age and subjective health were differently linked across countries. In Argentina, China, and Costa Rica, high age was associated with better SRH, while in Russia, India, Barbados, and South Africa, high age was associated with worse SRH. In Brazil, Chile, Cuba, Uruguay, Puerto Rico, Mexico, and the United States, age was not associated with SRH (19).

Among the general population, education has been shown to be associated with better SRH in most countries. Interestingly, in the United States, Ghana and South Africa, education was not linked to SRH (19). Using RELATE data, a study showed that in nine countries including the United States, high income was associated with better SRH; however, the association was reversed in Ghana (19).

While education has a protective effect on health (55), some of this protective effect may be due to income (56). We showed that in some countries, education and income have independent effects, and that in some other countries education, but not income, has independent effects. We also showed that in other countries income, but not education, predicts SRH. Our study suggested that the effect of income and education on SRH may be stronger among women in some countries.

4.1. Limitations

The current study is not free of limitations. Due to cross sectional design, findings should not be interpreted as causal associations. The outcome was a single item, and chronic medical conditions were self-reported. Cross-country differences in the validity of measures used in the current study are also not known (47, 57). SRH does not reflect the same health problems across genders (58-61). Even inside one country, population differences exist in the protective effects of education and income on health (62-64). Finally, the study also did not include type of chronic condition. Despite these limitations, cross-country studies on multiplicative effects of gender and SES on health are scarce.

4.2. Conclusions

To conclude, countries differ in how gender and SES indicators interact on SRH of patients with chronic medical conditions. Women are more vulnerable to the effect of SES on SRH in Ghana, Uruguay, and Mexico, Ghana, Uruguay, Mexico, and India.

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Footnotes

Authors' Contribution: Shervin Assari designed the study and conducted data analysis, Maryam Moghani Lankarani and Sureel Shah conducted the literature review and drafted the manuscript. All authors read and approved the final manuscript.

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Table 2. Summary of Model 1 with Gender by Education Interaction on Self-Rated Health of Individuals with Chronic Medical Conditions

	OR	95%CI		P Value
China				
Age	0.986	0.981	0.99	< 0.001
Gender (Women)	1.236	0.972	1.57	0.083
Education	0.838	0.765	0.918	< 0.001
Income	1.000	1.000	1.000	< 0.001
Chronic Conditions	0.953	0.925	0.983	0.002
Gender × Education	0.941	0.829	1.069	0.351
Costa Rica				
Age	0.98	0.967	0.993	0.003
Gender (Women)	1.007	0.477	2.123	0.986
Education	0.626	0.472	0.83	0.001
Income	1.000	1.000	1.000	0.373
Chronic Conditions	1.485	1.24	1.778	< 0.001
Gender × Education	1.002	0.699	1.435	0.993
Puerto Rico				
Age	0.979	0.964	0.995	0.008
Gender (Women)	2.067	0.918	4.656	0.080
Education	0.616	0.493	0.77	< 0.001
Income	1.000	1.000	1.000	0.001
Chronic Conditions	1.964	1.648	2.34	< 0.001
Gender × Education	0.868	0.657	1.147	0.320
U.S.				
Age	0.881	0.592	1.31	0.531
Gender (Women)	0.521	0.036	7.448	0.631
Education	0.636	0.363	1.112	0.113
Income	1.000	1.000	1.000	0.080
Chronic Conditions	2.715	2.271	3.245	< 0.001
Gender × Education	1.178	0.513	2.703	0.700
Mexico				
Age	0.994	0.976	1.012	0.496
Gender (Women)	1.603	0.775	3.316	0.203
Education	0.864	0.655	1.138	0.297
Income	1.000	1.000	1.000	0.057
Chronic Conditions	1.28	1.073	1.528	0.006
Gender × Education	0.811	0.578	1.138	0.226
Argentina				
Age	0.955	0.925	0.987	0.005
Gender (Women)	0.898	0.18	4.481	0.896
Education	0.505	0.296	0.862	0.012
Income	1.000	1.000	1.000	0.467
Chronic Conditions	2.193	1.649	2.917	< 0.001
Gender × Education	1.201	0.654	2.205	0.554
Barbados				
Age	1.024	1	1.048	0.053
Gender (Women)	1.049	0.291	3.789	0.941
Education	0.793	0.509	1.237	0.307
Income	1.000	1.000	1.000	0.055
Chronic Conditions	2.126	1.602	2.822	< 0.001
Gender × Education	1.019	0.571	1.817	0.950
Brazil				
Age	0.977	0.959	0.996	0.016
Gender (Women)	0.914	0.455	1.834	0.799

Education	0.889	0.681	1.161	0.389
Income	1.000	1.000	1.000	< 0.001
Chronic Conditions	1.72	1.42	2.082	< 0.001
Gender × Education	0.975	0.681	1.397	0.891
Chile				
Age	1.000	0.974	1.026	0.978
Gender (Women)	0.759	0.282	2.043	0.585
Education	0.652	0.473	0.899	0.009
Income	1.000	1.000	1.000	0.837
Chronic Conditions	1.959	1.482	2.59	< 0.001
Gender × Education	1.136	0.759	1.701	0.534
Cuba				
Age	0.98	0.959	1.002	0.073
Gender (Women)	0.502	0.151	1.674	0.262
Education	0.576	0.397	0.837	0.004
Income	1.000	1.000	1.000	0.858
Chronic Conditions	2.23	1.759	2.827	<0.001
Gender × Education	1.436	0.907	2.273	0.123
Uruguay				
Age	1.009	0.984	1.035	0.476
Gender (Women)	3.157	1.223	8.15	0.018
Education	0.874	0.653	1.169	0.363
Income	1.000	1.000	1.000	0.038
Chronic Conditions	2.718	2.115	3.493	<0.001
Gender × Education	0.604	0.409	0.892	0.011
India				
Age	1.03	1.009	1.051	0.006
Gender (Women)	1.113	0.593	2.088	0.739
Education	0.671	0.551	0.816	< 0.001
Income	1.000	1.000	1.000	0.591
Chronic Conditions	1.298	1.085	1.552	0.004
Gender × Education	0.831	0.579	1.191	0.313
Ghana				
Age	1.043	1.017	1.07	0.001
Gender (Women)	2.452	1.081	5.561	0.032
Education	1.248	0.94	1.657	0.126
Income	1.000	1.000	1.000	0.133
Chronic Conditions	1.027	0.751	1.405	0.867
Gender × Education	0.646	0.419	0.998	0.049
South Africa				
Age	1.044	1.015	1.073	0.003
Gender (Women)	2.007	1.077	3.741	0.028
Education	1.088	0.868	1.363	0.466
Income	1.000	1.000	1.000	0.150
Chronic Conditions	1.35	1.059	1.721	0.016
Gender × Education	0.825	0.623	1.092	0.179
Russia				
Age	1.066	1.042	1.09	< 0.001
Gender (Women)	1.253	0.366	4.29	0.719
Education	0.768	0.548	1.076	0.125
Income	1.000	1.000	1.000	0.001
Chronic Conditions	1.801	1.585	2.047	< 0.001
Gender × Education	0.953	0.642	1.415	0.812

Table 3. Summary of Model 2 with Gender by Income Interaction on Self-Rated Health of Individuals with Chronic Medical Conditions

	OR	95%CI		P Value
China				
Age	0.986	0.981	0.991	< 0.001
Gender (Women)	1.175	1.022	1.350	0.0230
Education	0.815	0.760	0.874	< 0.001
Income	1.000	1.000	1.000	< 0.001
Chronic Conditions	0.953	0.925	0.983	0.002
Gender × Income	1.000	1.000	1.000	0.246
Costa Rica				
Age	0.980	0.967	0.993	0.003
Gender (Women)	0.969	0.740	1.270	0.822
Education	.635	0.527	0.766	< 0.001
Income	1.000	1.000	1.000	0.305
Chronic Conditions	1.486	1.241	1.779	< 0.001
Gender × Income	1.000	1.000	1.000	0.485
Puerto Rico				
Age	0.978	0.963	0.994	0.007
Gender (Women)	1.499	1.097	2.047	0.011
Education	0.567	0.490	0.657	< 0.001
Income	1.000	1.000	1.000	0.034
Chronic Conditions	1.967	1.651	2.344	< 0.001
Gender × Income	1.000	1.000	1.000	0.492
U.S.				
Age	0.882	0.594	1.311	0.535
Gender (Women)	0.847	0.549	1.309	0.455
Education	0.684	0.448	1.044	0.078
Income	1.000	1.000	1.000	0.152
Chronic Conditions	2.713	2.269	3.242	< 0.001
Gender × Income	1.000	1.000	1.000	0.820
Mexico				
Age	0.995	.977	1.013	0.571
Gender (Women)	1.219	.909	1.633	0.186
Education	0.746	.632	.881	0.001
Income	1.000	1.000	1.000	0.928
Chronic Conditions	1.287	1.078	1.536	0.005
Gender × Income	1.001	1.001	1.001	0.045
Argentina				
Age	0.954	0.924	0.986	0.005
Gender (Women)	1.289	0.764	2.175	0.342
Education	0.582	0.447	0.760	< 0.001
Income	1.000	1.000	1.000	0.292
Chronic Conditions	2.181	1.641	2.898	< 0.001
Gender × Income	1.000	1.000	1.000	0.488
Barbados				
Age	1.024	1.000	1.048	0.053
Gender (Women)	1.112	0.762	1.623	0.583
Education	0.803	0.601	1.072	0.136
Income	1.000	1.000	1.000	0.324
Chronic Conditions	2.128	1.603	2.826	< 0.001
Gender × Income	1.000	1.000	1.000	0.775
Brazil				
Age	0.977	0.959	0.996	0.016
Gender (Women)	0.875	0.640	1.195	0.400

Education	0.878	0.724	1.064	0.184
Income	1.000	1.000	1.000	0.008
Chronic Conditions	1.721	1.421	2.083	< 0.001
Gender × Income	1.000	1.000	1.000	0.988
Chile				
Age	0.999	0.974	1.025	0.950
Gender (Women)	0.946	0.604	1.481	0.807
Education	0.705	0.580	0.857	< 0.001
Income	1.000	1.000	1.000	0.561
Chronic Conditions	1.967	1.486	2.602	0.000
Gender × Income	1.000	1.000	1.000	0.566
Cuba				
Age	0.980	0.959	1.002	0.071
Gender (Women)	1.175	0.822	1.680	0.376
Education	0.727	0.583	0.908	0.005
Income	1.000	1.000	1.000	0.482
Chronic Conditions	2.219	1.751	2.812	< 0.001
Gender × Income	1.000	1.000	1.000	0.451
Uruguay				
Age	1.008	0.983	1.034	0.529
Gender (Women)	1.210	0.816	1.793	0.342
Education	0.641	0.527	0.780	< 0.001
Income	1.000	1.000	1.000	0.712
Chronic Conditions	2.773	2.157	3.566	< 0.001
Gender × Income	1.001	1.000	1.001	0.061
India				
Age	1.031	1.010	1.052	0.004
Gender (Women)	0.716	0.524	0.979	0.036
Education	0.678	0.570	.806	< 0.001
Income	0.999	0.999	.999	0.029
Chronic Conditions	1.297	1.083	1.553	0.005
Gender × Income	1.001	1.001	1.001	0.025
Ghana				
Age	1.041	1.015	1.068	0.002
Gender (Women)	1.356	0.834	2.205	0.219
Education	1.037	0.832	1.292	0.748
Income	1.000	1.000	1.000	0.452
Chronic Conditions	1.038	0.759	1.421	0.814
Gender × Income	1.000	1.000	1.000	0.373
South Africa				
Age	1.043	1.014	1.072	0.003
Gender (Women)	1.716	1.074	2.741	0.024
Education	0.965	0.842	1.106	0.608
Income	1.000	1.000	1.000	0.629
Chronic Conditions	1.343	1.053	1.711	0.017
Gender × Income	1.000	1.000	1.000	0.191
Russia				
Age	1.066	1.042	1.090	< 0.001
Gender (Women)	1.092	0.635	1.880	0.750
Education	0.742	0.616	0.894	0.002
Income	0.999	0.999	0.999	0.084
Chronic Conditions	1.800	1.584	2.045	< 0.001
Gender × Income	1.000	1.000	1.000	0.974