Investigating the Proximal Determinants of Self-Rated Health in Three African Peri-urban Communities

OlaOlorun FM[1]; Seme A[2]; Makumbi F[3]; Yar D[4]; Tsui AT[1].

[1] Department of Population, Family & Reproductive Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
[2] Reproductive Health and Health Services Management Department, Addis Ababa University, Ethiopia
[3] Department of Epidemiology and Biostatistics, Makerere University School of Public Health, Uganda
[4] Community Health Department, School of Medical Sciences, Kwame Nkrumah University of Science and Technology, Ghana

Research Significance

Self-rated health (SRH) is a unique and very useful measure of health status which has consistently been associated with health outcomes like mortality, [1-4] disability and morbidity[5]. As an indicator, it offers a glimpse into an individual's perception of their health and is believed to summarize overall physical health;[6, 7] reflect physical health problems (acute and chronic conditions and limitations; physical functioning); reflect health behaviors (physician and hospital utilization); and point to mental health problems.[8, 9]

An individual's perception of his/her health status is influenced by a variety of factors. Some of these include their past health status and their perception of what their health will be in the future. Hypothesized proximal determinants of perceived health include existing disease (including severity); total net worth or wealth; [10-12] as well as the social groups the individual belongs to.[8] Clinical, objective measures such as systolic blood pressure, cholesterol, body mass index are also known to predict an individual's perception of their health. While SRH is widely considered as a useful risk-screening tool for disease and mortality,[13-15] its variation across individuals is still poorly understood.[16] However, these studies and what we know about self-rated health are largely derived from studies in the developed world. Communicable diseases, non-communicable diseases (NCDs), and socio-behavioral illness have been described as the triple burden of disease faced by the poorest in the developing world. NCDs are expected to account for seven out of every ten deaths in the developing world by 2020, due to demographic and epidemiologic transitions. Adults with a NCD in sub-Saharan Africa (SSA) today faces a higher probability of death from the disease than their age counterparts in established market economies.[17] In their review of available studies on NCDs in SSA, Dalal and colleagues reported that the prevalence of NCDs (stroke, hypertension, diabetes, obesity) ranged from 0% for diabetes in a rural community in Sierra Leone to 48% for hypertension in Seychelles.[18]

There are important sociocultural differences in the perception of health and disease,[19] and this presents an important consideration in the interpretation of measures of SRH across racial, ethnic and other cultural divides.[20] The usefulness of SRH as an indicator of general health and well-being in reproductive age populations living in settings characterized by limited access to health care and skilled health providers has received little attention. This study uses data collected in peri-urban communities in three sub-Saharan African countries. It is important to understand the proximal determinants of SRH

because an individual's perception of their health in turn influences the health choices such an individual makes, such as whether or not to seek health care and health information, including reproductive health services. An understanding of proximal determinants of perceived health in these peri-urban communities will be able to provide evidence-based information to local governments on how best to spend their limited resources to improve the health of men and women in the communities they serve.

Many people have been skeptical about the usefulness of a subjective measure like SRH. What does it really measure? How can the answer to a simple question predict an individual's overall health? For the settings from which these data were collected, we attempt to identify proximal determinants of SRH and estimate the predicted probabilities of membership in each category of SRH based on self-report of selected non-communicable diseases.

Data and Methods

Data for these analyses come from the baseline surveys of the Family Health and Wealth Study (FHWS), conducted in 2009/2010. This ongoing multi-site longitudinal study examines individual- and family-level health and economic consequences of childbearing patterns. The study is an open cohort sample where each site selected between 500 and 1000 families in six peri-urban areas in five sub-Saharan African countries: Ethiopia, Ghana, Malawi, Nigeria (2 sites) and Uganda. These families have been interviewed twice. A census of the selected peri-urban areas was followed by the selection of a probability sample of couples in each site. Systematic random sampling was used to select couples and their households, with the sampling fraction used varying by site. If a selected household did not have an eligible woman aged 15-44 years and an eligible male partner aged 20-59 years, or the eligible couple did not consent to participate in the study, the protocol allowed the team to select another eligible couple in the same household, or in an adjacent household. Women who were single, widowed, or who did not live with their partners were not eligible to be enrolled.

In the present analysis, women and men are analyzed separately. The outcome of interest is self-rated health based on individual responses to the question: "Tell me, please, how would you evaluate your health? Is it very good, good, average, bad or very bad?" Due to the distribution of responses where most provided a positive health assessment, this variable was regrouped into three categories: very good, good and less-than-good.

We are able to consider three proximal determinants of self-rated health in this analysis: systolic blood pressure (measured as a continuous variable); the presence of non-communicable disease (none versus one or more); and the presence of health problems (none, 1, 2, 3 or more). Blood pressure was measured on respondents in a sitting position at rest, using digital sphygmomanometers (Welch Allyn OSz5 and OMRON MX2 BASIC). The latter two proximal determinants were based on a simple count of NCDs or current health problems. Specifically, individuals were asked, "Have you ever been told by a doctor that you have…" The NCDs listed were hypertension (high blood pressure); heart disease; stroke; chronic pulmonary disease; and diabetes. Regarding health problems, respondents were asked, "Do you have any of the following health problems?" The respondents were expected to answer "yes" or "no" to the following list of health conditions: pain or other unpleasant feeling in the chest; difficulty in

breathing; abdominal pain; back pain; restrictions in using your arms; restrictions in walking; problems with vision; problems with hearing; problems speaking; psychological problems; headache or migraine; toothache; sexual dysfunction; any vaginal or urethral discharge; or skin problems.

Control variables included in the analysis included age in years; level of education (no formal/primary; secondary and tertiary education); duration of marriage in years (as reported by the individual); pregnancy status for women (pregnant or not) and a wealth score which was generated based on household assets using principal component analysis (PCA).

For the present analysis, individuals who had missing or out-of-range observations for any of the variables of interest were dropped. The effective analytic sample was as follows: Ethiopia (943 women; 959 men); Ghana (791 women; 747 men); and Uganda (463 women; 442 men); representing 91-99% of the total sample.

Data were explored to observe patterns and generate frequencies. Ordinal logistic regression was used to determine the proximal determinants of self-rated health. All analyses were conducted using Stata 12 (Stata Corporation, TX) and the user-written "omodel" and "brant" commands were used to test the proportional odds assumption of ordinal logistic regression.

Results

Men and women from the Ugandan site were the most educated while participants from the Ghanaian site were the least educated. Ugandan women were the youngest and had the highest proportion of pregnant women. Details of the socio-demographic profile of respondents can be found in Table 1.

Of the three peri-urban communities, Ugandans perceived their health to be the worst, with 17.9% and 14.9% of Ugandan men and women respectively reporting less-than-good self-rated health. On the other hand, Ethiopian men and Ghanaian women perceived their health to be the best, with only 5.1% and 6.7% reporting less-than-good health respectively. The report of a NCD diagnosed by a doctor was lowest among Ghanaian men and women with a prevalence of 6.8% and 7.0% respectively. While the prevalence of health problems was higher in women than in men in Ethiopia and Ghana, the reverse was the case in Uganda (Table 1).

Following estimation of ordinal logistic regressions, the presence of one or more health problems was the only proximal determinant that remained significantly associated with SRH in both men and women across the three sites. Report of one or more NCDs was significantly associated with perceived health among men and women in Ethiopia and Ghana, but not in Uganda. Systolic blood pressure was not significantly associated with self-rated health in any of the sites (see Table 2).

Predicted probabilities of SRH class membership based on the presence or absence of one or more NCDs provided interesting comparisons across sites. Some respondents perceived their health to be "very good", even in the presence of NCDs. The predicted probability of this occurring ranged from 0.13-0.23 among women and 0.14-0.35 among men across the three sites (See Figure 1).

Discussion

While the distribution of reported diagnoses of NCDs depends on the availability of and access to health services, as well as the health-seeking behavior of the individual, these peri-urban settings are probably representative of other peri-urban settings in the respective countries. The findings of the prevalence of NCDs in the present analysis are consistent with those from similar community-based studies in SSA in various reviews. [18, 21] The lack of a significant association between the report of one or more NCDs and SRH in the Ugandan community may be explained by the fact that this cohort was younger and more educated than the cohorts from the other two sites. Education and young age are both likely to increase the expectation of health of these individuals, which makes them very different from their less educated and older counterparts. Their higher level of education may have made them more informed and better able to access health information.

Although some respondents perceived their health to be "very good", even in the presence of NCDs, the predicted probability of this occurring was low. This suggests an optimistic view of health, or on the other hand, a low expectation of health. While the predicted probability of reporting less-than-good SRH in the presence of non-communicable disease was somewhat similar across sites for women, it was quite varied for men. This may reflect an innate ability of women to better handle health stressors in light of their multiple roles in their households and communities. Men, on the other hand, who are traditionally the bread-winners may not recognize or willingly report declining health. It is also likely that men underreport chronic or more acute health problems.

The lack of any association between systolic blood pressure and self-rated health may be because over 90% of those who reported they had been told they were hypertensive were currently on anti-hypertensive medication (results not shown). It is also possible that systolic blood pressure is not a reliable proximal determinant of self-rated health.

Our findings suggest that both women and men in our study who perceived their health as being less-than-good (and thus had the highest values of the outcome variable, SRH) merit special attention because they are likely to have biologic markers of disease,[1] which if tested for and managed well can improve their quality of life, and potentially prolong their lifespan. Health care providers in primary care settings in these peri-urban communities can use information from this simple screening question, in addition to their clinical findings, to determine which individuals require more detailed clinical and laboratory investigations in order to avoid potentially unnecessary tests in these and similar settings which are already resource-constrained. As these study cohorts are being followed over time, we expect that future findings will more fully inform the influence of proximal determinants on self-rated health.

References

1. Lima-Costa MF, Cesar CC, Chor D, Proietti FA. Self-rated Health Compared With Objectively Measured Health Status as a Tool for Mortality Risk Screening in Older Adults: 10-Year Follow-up of the Bambuí Cohort Study of Aging. *American Journal of Epidemiology.* 2012;175(3):228-235.
2. DeSalvo KB, Bloser N, Reynolds K, Jiang H, Muntner P. CLINICAL REVIEW: Mortality Prediction with a Single General Self-Rated Health Question. *JGIM: Journal of General Internal Medicine.* 2006;21(3):267-275.
3. Lyyra T-M, Heikkinen E, Lyyra A-L, Jylhä M. Self-rated health and mortality: Could clinical and performance-based measures of health and functioning explain the association? *Archives of Gerontology and Geriatrics.* 2006;42(3):277-288.
4. Idler EL, Benyamini Y. Self-Rated Health and Mortality: A Review of Twenty-Seven Community Studies. *Journal of Health and Social Behavior.* 1997;38(1):21-37.
5. Idler EL, Kasl SV. Self-Ratings of Health: Do they also Predict change in Functional Ability? *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences.* 1995;50B(6):S344-S353.
6. Frankenberg E, Jones NR. Self-Rated Health and Mortality: Does the Relationship Extend to a Low Income Setting? *Journal of Health and Social Behavior.* 2004;45(4):441-452.
7. Jylhä M, Volpato S, Guralnik JM. Self-rated health showed a graded association with frequently used biomarkers in a large population sample. *Journal of Clinical Epidemiology.* 2006;59(5):465-471.
8. Krause NM, Jay GM. What Do Global Self-Rated Health Items Measure? *Medical Care.* 1994;32(9):930-942.
9. Cott CA, Gignac MAM, Badley EM. Determinants of Self Rated Health for Canadians with Chronic Disease and Disability. *Journal of Epidemiology and Community Health.* 1999;53(11):731-736.
10. Hajat A, Kaufman JS, Rose KM, Siddiqi A, Thomas JC. Do the wealthy have a health advantage? Cardiovascular disease risk factors and wealth. *Social Science & Medicine.* 2010;71(11):1935-1942.
11. Hajat A, Kaufman JS, Rose KM, Siddiqi A, Thomas JC. Long-Term Effects of Wealth on Mortality and Self-rated Health Status. *American Journal of Epidemiology.* 2011;173(2):192-200.
12. Aittomäki A, Martikainen P, Laaksonen M, Lahelma E, Rahkonen O. The associations of household wealth and income with self-rated health – A study on economic advantage in middle-aged Finnish men and women. *Social Science & Medicine.* 2010;71(5):1018-1026.
13. Rohrer JE, Arif A, Denison A, Young R, Adamson S. Overall self-rated health as an outcome indicator in primary care. *Journal of Evaluation in Clinical Practice.* 2007;13(6):882-888.
14. DeSalvo KB, Fan VS, McDonell MB, Fihn SD. Predicting Mortality and Healthcare Utilization with a Single Question. *Health Services Research.* 2005;40(4):1234-1246.
15. Emmelin M, Weinehall L, Stegmayr B, Dahlgren L, Stenlund H, Wall S. Self-rated ill-health strengthens the effect of biomedical risk factors in predicting stroke, especially for men -- an incident case referent study. *J Hypertens.* 2003;21(5):887-896.
16. Jylhä M. What is self-rated health and why does it predict mortality? Towards a unified conceptual model. *Social Science & Medicine.* 2009;69(3):307-316.
17. World Health Organization. Health Transition. Available at: http://www.who.int/trade/glossary/story050/en/index.html. Accessed September 21, 2012.
18. Dalal S, Beunza JJ, Volmink J, et al. Non-communicable diseases in sub-Saharan Africa: what we know now. *International Journal of Epidemiology.* 2011;40(4):885-901.
19. Verbrugge LM, Ascione FJ. Exploring the iceberg. Common symptoms and how people care for them. *Med Care.* 1987;25(6):539-569.

20. Jylhä M, Guralnik JM, Ferrucci L, Jokela J, Heikkinen E. Is self-rated health comparable across cultures and genders? *J Gerontol B Psychol Sci Soc Sci.* 1998;53(3):S144-152.
21. Addo J, Smeeth L, Leon DA. Hypertension In Sub-Saharan Africa. *Hypertension.* 2007;50(6):1012-1018.

Table 1: Characteristics of Married Women and Men in Peri-urban Communities of Ethiopia, Ghana and Uganda

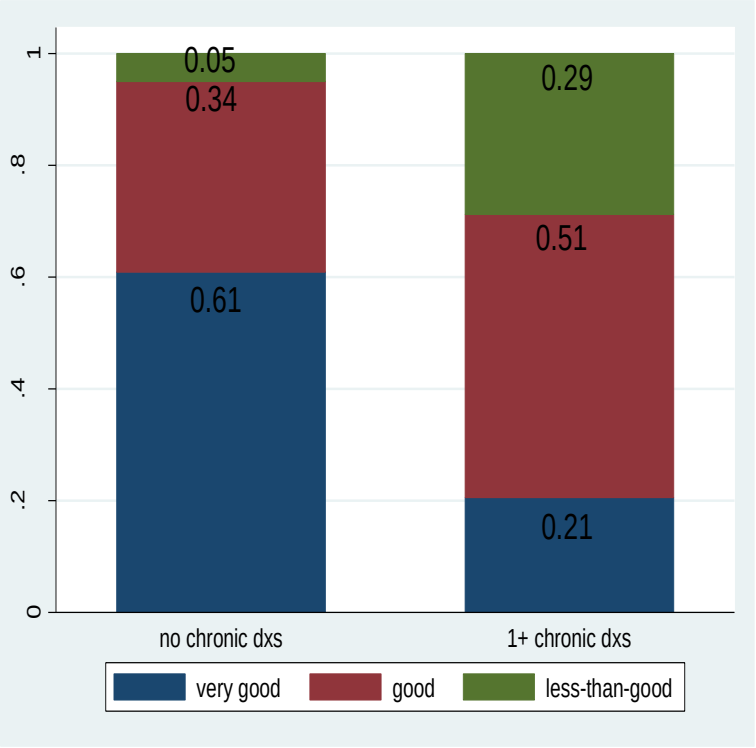
	ETHIOPIA				GHANA				UGANDA			
	WOMEN (n=943)		MEN (n=959)		WOMEN (n=791)		MEN (n=747)		WOMEN (n=463)		MEN (n=442)	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Self-rated health												
Very good	466	49.4	630	65.7	460	58.2	342	45.8	133	28.7	128	29.0
Good	400	42.4	280	29.2	278	35.1	303	40.6	261	56.4	235	53.2
Less-than-good	77	8.2	49	5.1	53	6.7	102	13.7	69	14.9	79	17.9
Presence of chronic disease												
None	844	89.5	847	88.3	736	93.0	696	93.2	412	89.0	400	90.5
1+	99	10.5	112	11.7	55	7.0	51	6.8	51	11.0	42	9.5
Presence of health problems												
None	440	46.7	555	57.9	509	64.3	513	68.7	251	54.2	220	49.8
1	254	26.9	242	25.2	133	16.8	135	18.1	115	24.8	115	26.0
2	121	12.8	93	9.7	69	8.7	58	7.8	54	11.7	57	12.9
3+	128	13.6	69	7.2	80	10.1	41	5.5	43	9.3	50	11.3
Age group (years)												
<25y	263	27.9	66	6.9	66	8.3	2	0.3	195	42.1	45	10.2
25-29y	296	31.4	190	19.8	168	21.2	42	5.6	115	24.8	94	21.3
30-34y	174	18.5	201	21.0	198	25.0	126	16.9	88	19.0	109	24.7
35-39y	153	16.2	210	21.9	185	23.4	168	22.5	36	7.8	87	19.7
40-44y	57	6.0	157	16.4	174	22.0	150	20.1	29	6.3	61	13.8
45+y	--	--	135	14.1	--	--	259	34.7	--	--	46	10.4
Educational level												
No formal/Primary	405	42.9	289	30.1	479	60.6	287	38.4	147	31.7	87	19.7
Secondary	149	15.8	146	15.2	289	36.5	405	54.2	267	57.7	249	56.3
Post-secondary	389	41.3	524	54.6	23	2.9	55	7.4	49	10.6	71	16.1
Unknown											35	7.9
Duration of relationship												
0-4y	276	29.3	305	31.8	157	19.8	150	20.1	195	42.1	182	41.2
5-9y	277	29.4	246	25.7	182	23.0	172	23.0	135	29.2	122	27.6
10+y	390	41.4	408	42.5	411	52.0	425	56.9	133	28.7	138	31.2
Unknown					41	5.2						
Pregnant in month of interview												
No	851	90.2	--	--	714	90.3	--	--	382	82.5	--	--
Yes	92	9.8	--	--	77	9.7	--	--	81	17.5	--	--

Table 2: Ordinal Logistic Regressions of Proximal Determinants of Self-Rated Health among Women and Men in Peri-Urban Ethiopia, Ghana and Uganda

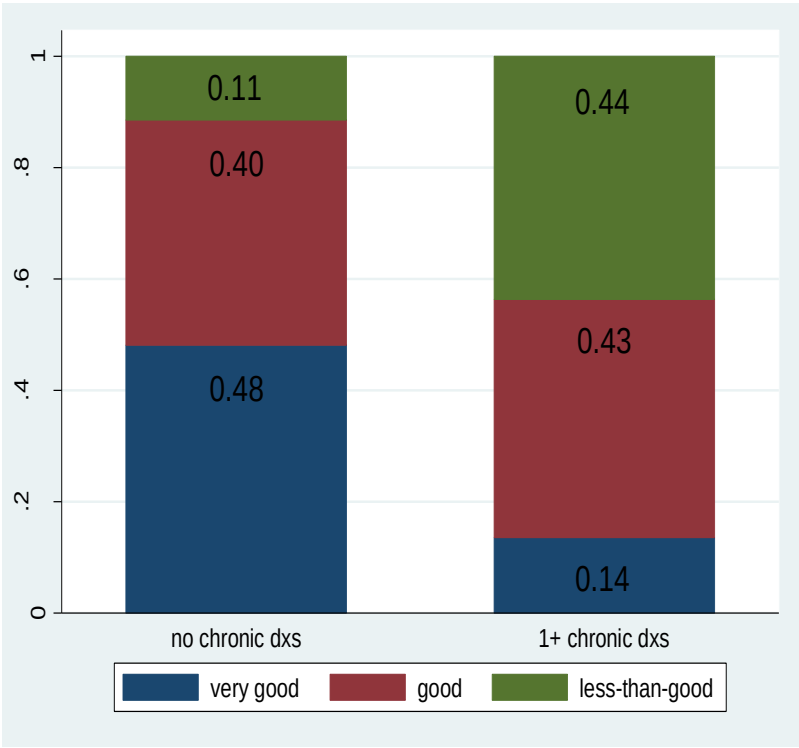
	ETHIOPIA		GHANA		UGANDA	
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Systolic BP	1.00 (0.99, 1.01)	0.99(0.98, 1.00)	1.00 (1.00, 1.01)	1.00 (1.00, 1.01)	0.99(0.98, 1.01)	1.01 (0.99, 1.02)
NCD						
None	1.00	1.00	1.00	1.00	1.00	1.00
1+	2.16 (1.38, 3.39)**	3.73 (2.40, 5.81)***	4.03 (2.23, 7.29)***	4.01 (2.24, 7.18)***	1.68 (0.90, 3.15)	1.47 (0.77, 2.81)
Health problem	1.00	1.00	1.00	1.00	1.00	1.00
1	3.27 (2.36, 4.52)***	3.18 (2.29, 4.43)***	3.33 (2.22, 4.99)***	2.49 (1.71, 3.63)***	2.17 (1.37, 3.43)**	3.19 (1.99, 5.10)***
2	10.27 (6.58, 16.04)***	5.44 (3.46, 8.57)***	4.98 (2.92, 8.49)***	3.66 (2.12, 6.33)***	4.51 (2.42, 8.41)***	4.59 (2.51, 8.39)***
3+	12.85 (8.09, 20.40)***	7.65 (4.39, 13.35)***	10.98 (6.52, 18.48)***	7.65 (4.05, 14.43)***	6.53 (3.23, 13.23)***	7.20 (3.82, 13.54)***
Age (years)	1.03 (1.00, 1.06)*	1.03 (1.01, 1.06)*	1.04 (1.01, 1.07)*	1.02 (1.00, 1.05)*	1.00 (0.96, 1.04)	1.00 (0.98, 1.03)
Level of education						
No formal	1.00	1.00	1.00	1.00	1.00	1.00
Secondary	1.44 (0.97, 2.15)	1.07 (0.69, 1.66)	0.57 (0.41, 0.80)***	1.32 (0.97, 1.80)	0.72 (0.48, 1.08)	0.96 (0.58, 1.56)
Post-secondary	1.33 (0.95, 1.87)	0.88 (0.62, 1.26)	0.57 (0.22, 1.51)	1.07 (0.59, 1.94)	0.71 (0.37, 1.36)	0.61 (0.32, 1.14)
						0.75 (0.35, 1.62)
Duration of marriage						
0-4y	1.00	1.00	1.00	1.00	1.00	1.00
5-9y	1.25 (0.86, 1.80)	0.67 (0.45, 1.00)*	0.94 (0.57, 1.53)	0.82 (0.53, 1.28)	1.00 (0.64, 1.58)	1.20 (0.76, 1.90)
10+y	1.48 (0.97, 2.25)	0.63 (0.42, 0.94)*	0.90 (0.54, 1.48)	1.16 (0.75, 1.78)	1.57 (0.84, 2.92)	1.47 (0.88, 2.45)
Unknown	--	--	0.74 (0.34, 1.64)	--	--	--
Pregnancy status						
Not pregnant	1.00	1.00	1.00	1.00	1.00	1.00
Pregnant	1.27 (0.80, 2.00)		0.48 (0.26, 0.88)*		0.94 (0.58, 1.52)	
Wealth score	0.92 (0.85, 0.98)*	0.95 (0.89, 1.03)	1.01 (0.93, 1.10)	0.93 (0.85, 1.00)	0.96 (0.91, 1.02)	0.97 (0.91, 1.03)
/cut1	2.48	1.35	2.52	1.74	-1.49	0.61
/cut2	5.58	3.99	5.46	4.09	1.52	3.41

Figure 1 (a-f): Predicted probabilities for reporting very good, good or less-than-good health by presence or absence of NCD by country and gender

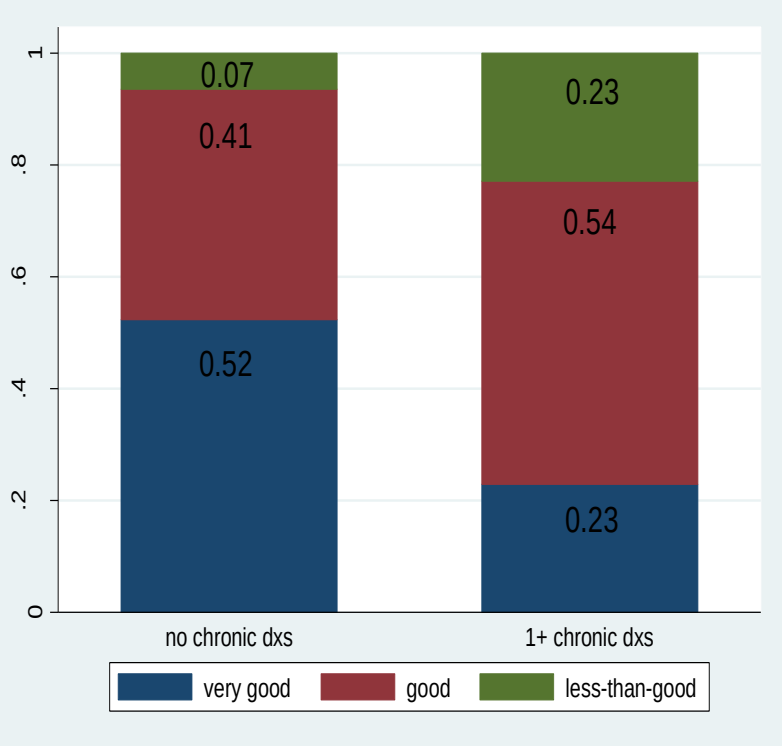
(a) GHANA (Women)



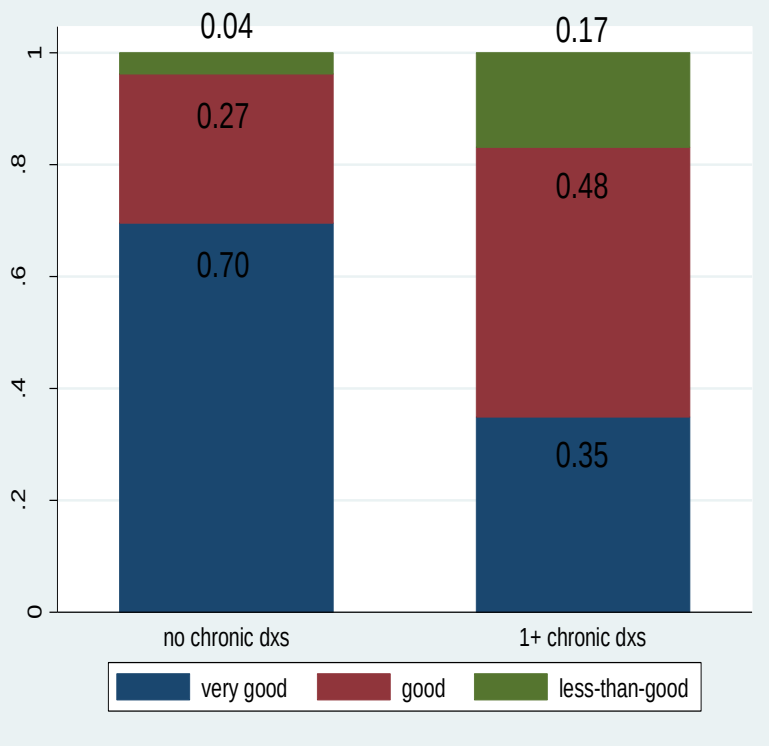
(b) GHANA (Men)



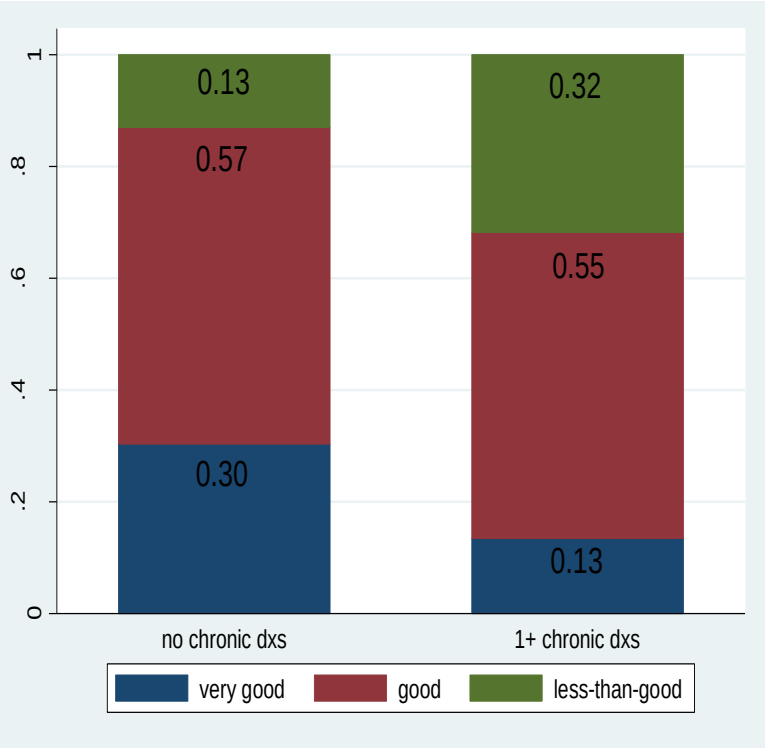
(c) Ethiopia (Women)



(d) Ethiopia (Men)



(e) Uganda (Women)



(f) Uganda (Men)