



A Contextual Analysis of Health and Wellbeing of Older Persons in South Africa: Do District Conditions Matter?

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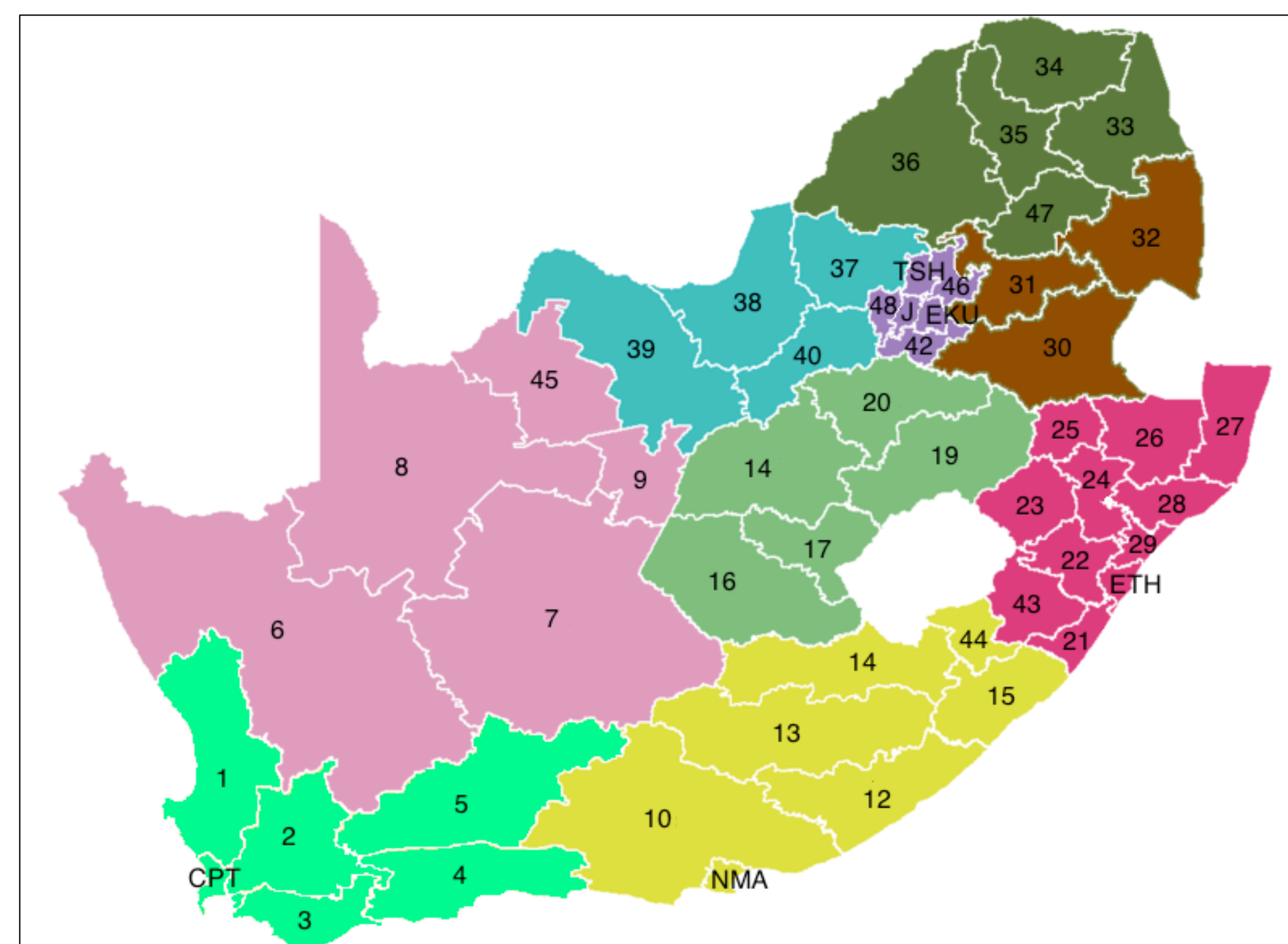
Abstract

Most research conducted on older persons' health and wellbeing in South Africa focuses on the influence of individual and household-level characteristics, but few studies focus on the effect of contextual factors. The cornerstone of post-apartheid South Africa health policy is the delivery of health care through a district health system. I combine nationally representative WHO Study of Global Ageing and Adult Health (WHO-SAGE) survey data with district level data that captures social and health system equality. I utilize multilevel logistic modeling to explore how the contextual factors of the districts, including relative deprivation, HIV prevalence, and health infrastructure quality influence older persons' quality of life and health status. I find that district deprivation may matter more for subjective wellbeing than health status. In addition health infrastructure seems to have a modest but significant impact on wellbeing.

Background

South Africa's nine provinces (equivalent to US states) are divided into 52 districts, with five designated as metropolitans. Districts are the second level of administrative division and are comparable to US counties. The Municipal Structure Amendment Act of 2000 allocated infrastructural development to districts, making them the main developmental and infrastructural operators and service providers to rural areas.¹ Districts vary in area size and population with an average population of 983,698 and a range of 64,137 to 3,336,457.

Figure 1: Map of 52 Health Districts in South Africa, 2006^{ab}



^aColors indicate the 9 provinces; ^bShapefile data from the Municipal Demarcation Board, South Africa, 2006 created by Wayne Darn

Community context shapes stress exposure, which in turn has a direct effect on health and subjective wellbeing.² The South African health care system is often characterized as dysfunctional and plagued by a legacy of discrimination and underdevelopment.³ Presently the health policy is based on community health centers with the district health system being its cornerstone. Although the South African government has made substantial progress since the apartheid era in redistributing resources between geographic areas, there are still significant differences in the quantity and quality of care at the district level.³ The health infrastructure of a district may play a role in how the elderly perceives their lives and opportunities for care and have an effect on their health. Additionally, social conditions (i.e. relative deprivation) may affect wellbeing and health through the pathway of chronic stressors.

This project examines two research questions:

- (1) Is district relative deprivation associated with poor health and wellbeing among older South Africans?
- (2) Does investment in district health services translates into better health and wellbeing for older persons?

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Data & Sample

This research utilizes data from two sources. WHO-SAGE Wave-1 provides individual health and socio-demographic information. WHO-SAGE is a study of cohorts of persons aged 50 years and older with a comparison sample of younger adults aged 18 to 49 years, implemented in six low- and middle-income countries, including South Africa. The aim of the project is to promote a better understanding of the effects of ageing on wellbeing and other health outcomes.^{4,5} Data for Wave-1 in South Africa was collected from March 2007 to September 2008. A population based representative sample of the persons aged 50 years or older was interviewed (n=3837; response rate= 78%). The WHO-SAGE sample design entailed a two-staged stratified random cluster sample that yields national and subnational estimates, stratified by province, place (urban and rural) and race.^{4,5}

District level information is drawn from the District Health Information System (DHIS) routine data reported in the District Health Barometer (DHB), first published in 2004. The DHB, reflecting data collected monthly from primary health care facilities and hospitals, has become a central component of health information for South Africa's Department of Health's District Health System. The DHB also includes population and socio-economic information drawn from Stats SA's 2007 Community Survey and the 2005 and 2006 General Household Surveys.⁶

Sample: After accounting for missing cases my resulting sample consist of 2954 respondents between the ages of 50 and 105 from 44 districts. The sample is predominately female (60%) and identifies as Black South Africans (62%). The average number of observations at level 2 is 70.3 with one district having only one observation.

Measurement

Outcomes.

1. **WHO Quality of Life (WHOQoL)** measures if the respondent had enough energy for daily life, enough money to meet needs and satisfaction with health, self, ability to perform daily activities, personal relationships, condition of living space, and overall quality of life.⁷
2. **Health Status** measures the respondent's ability for mobility, self-care, pain and discomfort, cognition, interpersonal activities, sleep/energy, affect and vision.^{8,9}

- Both outcomes were transformed into quintiles then dichotomized with 1= 40% poorest health/wellbeing.

Independent Variables.

1. **Relative Deprivation** is a composite measure derived from indicators of material and social deprivation (i.e. the

proportion of a district's population without education/employment/access to piped water). The score was created with principal component factor analysis and then divided into quintiles.⁶ The variable *high deprivation* is coded as 1 if the district fell into the lowest three quintiles, and 0 if in the top two quintiles.

2. **Cost Per Patient Day Equivalent (PDE) in District Hospitals** is the average cost per patient per day in a hospital, expressed in Rands. It indicates how efficiently the resources available are being spent and if the hospital is being optimally managed.⁶

3. **Nurse Clinical Workload** is the average daily number of patients seen by a professional nurse in primary health care facilities. It is an indicator of the quality of patient care.⁶

Analytic Strategy

Hierarchical logistic regression is used, based on the general equation, to assess the odds of reporting poor health or wellbeing and to examine the impact of district characteristics on those odds: (where is Y the indicator (0/1) of poor health or wellbeing; X the covariates, both individual-level (level 1) and district-level (level 2); β the fixed effect of X; u_j the random effect of the j^{th} district).

$$\text{logit}(P(Y = 1)) = \log\left(\frac{P(Y = 1)}{P(Y = 0)}\right) = X\beta + u_j$$

Continuous variables are grand mean centered, and dichotomous variables are uncentered in all models. Because weighting regressions often does not reduce bias, but does decrease model efficiency¹³ specifically when dealing with small cluster size in multilevel models,¹⁴ I do not weight any of the analyses. All analyses were conducted using HLM 6.06.¹⁵

I also calculated the intraclass correlation (ICC) coefficient based on Snijders and Bosker¹⁶ suggested equation:

$$\rho_1 = \frac{\tau_0^2}{\tau_0^2 + \pi^2/3}$$

ICC is useful to estimate the unexplained variation at level 2. The ICC calculated from the null models shows:

- 14 percent of the variation in *poor WHOQoL* is at the district level
- 12.6 percent of the variation in *poor health status* is at the district level

Results & Conclusion

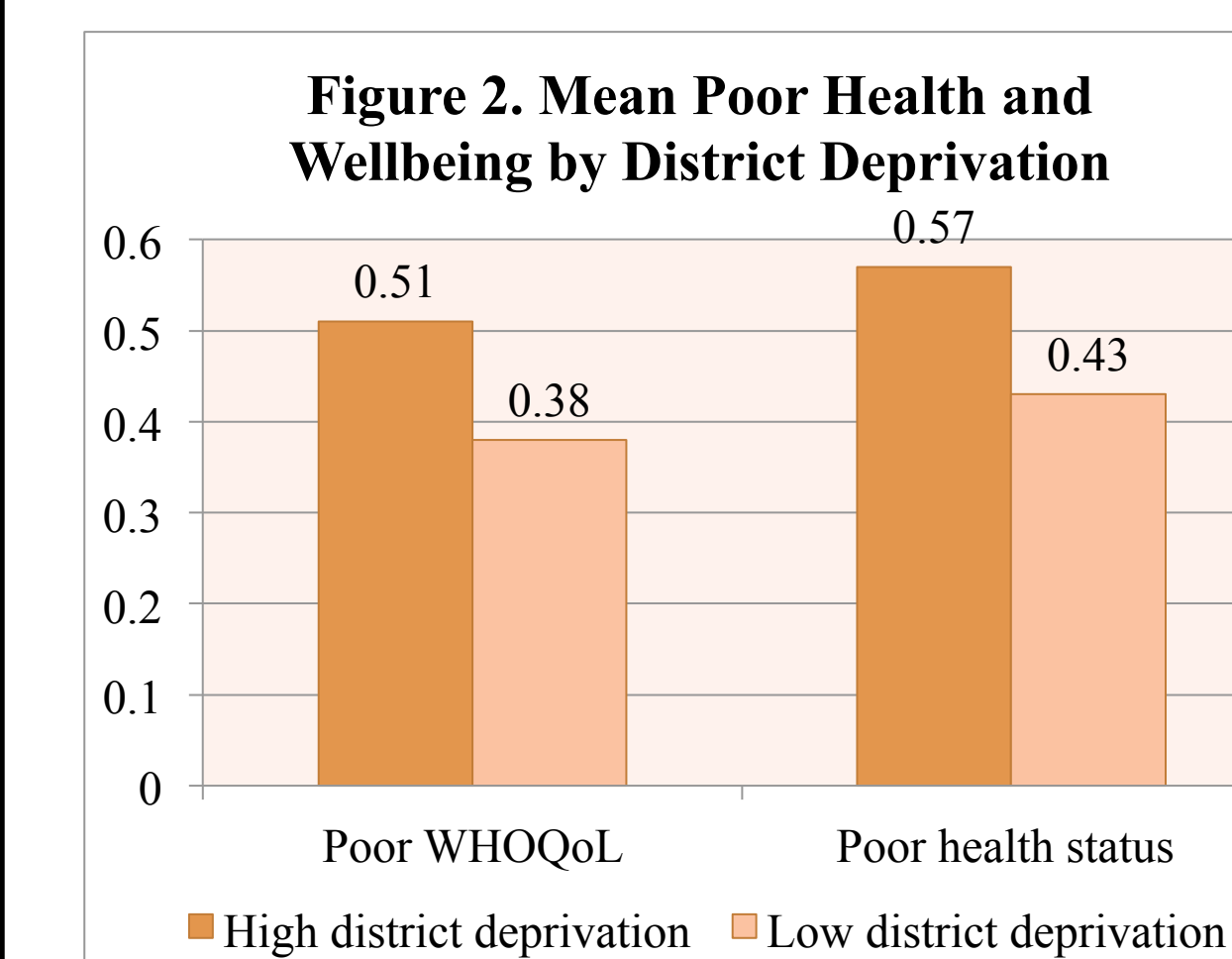


Figure 2 shows that a higher percentage of older adults report poor wellbeing and health in *high deprivation* districts compared to those living in *low deprivation* districts (difference is statistically significant at $p < .05$). For the sample nurses see an average of 26.6 patients a day with a range of 14.02 to 44.16. The average cost per PDE is R1222, but this conceals the wide range from a low of R801 to a high of R1855 in the sample.

Table 1. Odd Ratios from Hierarchical Logistic Regression Models of Poor Wellbeing on Individual and District Characteristics^{ab}

District level variables	Poor WHOQoL		
	Model 1 (Null model)	Model 2	Model 3 ^c
Population density _(logged)	1.142***	1.196***	1.196***
	(1.065, 1.224)	(1.103, 1.296)	(1.103, 1.296)
High deprivation	2.586***	1.407*	1.407*
	(1.871, 3.699)	(1.038, 1.906)	(1.038, 1.906)
High HIV prevalence	1.25	1.099	1.099
	(0.909, 1.733)	(0.851, 1.420)	(0.851, 1.420)
Cost Per PDE district hospitals _(ln)	0.998***	0.998***	0.998***
	(0.998, 0.999)	(0.998, 0.999)	(0.998, 0.999)
Nurse clinical workload		1.023**	1.016*
		(1.005, 1.042)	(1.002, 1.031)
Intercept	0.770*	0.396***	0.050***
	(0.599, 0.991)	(0.313, 0.502)	(0.027, 0.093)
Deviance (d)	10961.635	10913.276	8698.846
ICC	(.2)	(.18)	(.18)
	0.142	0.034	0.013

^a $p < .1$ * $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed)
^b95% CI in parentheses; ^c $N_{level 1} = 2954$ $N_{level 2} = 44$
^dModel 3 includes controls for established individual factors associated with health and wellbeing in this population, including age, sex, place (urban or rural), education, race, marital status, self-rated health, and employment status.^{10,11,12} I also include a dummy variable *never moved* coded one if the respondent has not moved districts in the past two years.

The relationship between older persons' health and wellbeing and district context is complex. District deprivation may matter more for wellbeing than health status, as it remained a significant predictor of *poor WHOQoL* after controlling for individual characteristics.

- The predicted probability of reporting poor wellbeing is .32 for a respondent with average sample characteristics living in a *low deprivation* district. The probability increases to .40 for a respondent living in a *high deprivation* district.

Health infrastructure has a modest but significant impact on wellbeing.

- For one patient increase in *nurse clinical workload* translates into a 1.6% increase in the odds of reporting poor wellbeing. This finding should be interpreted with caution. The way DHIS collected information on *nurse clinical workload* was not uniform. Mayosi and colleagues call for standardize way to report this information.¹⁷
- One Rand increase in spending on PDE in district hospitals translates into a 0.2% decrease in the odds of reporting poor wellbeing. The difference in average spending between low and high deprivation districts was about 15 Rand, which would result in a 3% decrease in the odds of reporting poor wellbeing.

The relationship between district context and older South Africans' health and wellbeing merits further research. There is general concern of older persons access to basic healthcare in the region.¹⁸ This is acutely alarming as the HIV epidemic continues to stress the health care system and rates of non-communicable diseases among the older population are rising. Future research will investigate appropriate models for predicting *poor health status* and will include controls for utilization and satisfaction with health care. Access to basic health services has been shown to have great implications for health and wellbeing.¹⁹