

Poor health reporting:

*Do poor South Africans underestimate **their**
health needs?*

Laura Rossouw (Stellenbosch Uni.) . Eddy van Doorslaer (Tinbergen Institute).

6 August, 2014



Context: Differences in health outcomes by wealth status

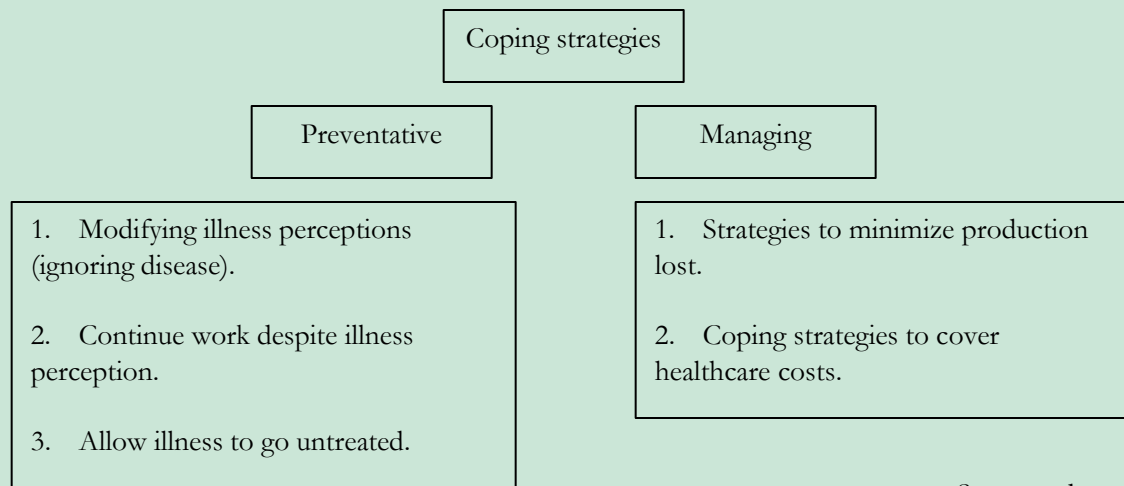
- Wealth and income is distributed unequally in South Africa.
- There are differences in the health outcomes of the affluent and the poor (Ataguba, Akazili & McIntyre, 2011; Zere & McIntyre, 2003; Myer *et al.* 2008, Ataguba & McIntyre, 2013; Cockburn *et al.*, 2012; Ataguba, 2013).
 - 16% of the population is covered by medical schemes.
 - Membership is concentrated amongst the affluent (Burger *et al.*, 2013).
- The poorer population has to rely on public healthcare, which is of worse quality.
 - Financial strain: because of the poor quality and long waiting times, the less well-off often pay for private health care out of pocket.
 - A fifth of healthcare utilization by the persons in the poorest quintile is from private providers (Burger *et al.*, 2013).
- Since 1994: Public health spending has become significantly more pro-poor. Despite the improved access to healthcare, the quality of public healthcare remains inadequate (Burger *et al.*, 2013).
- Measure health using self reported health.

Motivation (1) Reporting behaviour of vulnerable sub-groups

- **Self-reported** vs. Objective health
 - Reporting heterogeneity
 - E.g. Aboriginals in Australia (Mathers & Douglas, 1998)
 - Self-reported chronic conditions?
- Vulnerable sub-groups **underreport** their ill-health.
 - Previous papers have found that the vulnerable subgroups tend to underreport their own health:
 - Ren Mu (China), **poor province**; Etile & Milcent (France), D'Uva, Van Doorslaer *et al.* (Indonesia, India & China), **low income groups**; Lunde & Locken (Norway); Bago d'Uva, O'Donnel & Van Doorslaer (EU) **low education levels**

Motivation (1) Reporting behaviour of vulnerable sub-groups

- Vulnerable sub-groups **underreport** their ill-health continued...
 - Different comparison groups (Harris *et al.*, 2011; Boyce & Harris, 2008)
 - Inability to cope with the economic costs involved with being ill.
 - Burkina Faso (Sauerborn *et al.*, 1996).



Source: adapted from Sauerborn *et al.* (1996)

Motivation (1) Reporting behaviour of vulnerable sub-groups

| Per capita household expenditure quintile | Prevalence of reported illness and injury over the last month (%) | | | Proportion of those ill/injured who reported consulting a health worker over the last month (%) | | |
|---|---|------|------|---|------|------|
| | 1993 | 1995 | 2003 | 1993 | 1995 | 2003 |
| Poorest 20% | 10.8 | 7.2 | 8.2 | 71.09 | 78.3 | 83.3 |
| Quintile 2 | 13.5 | 8.5 | 9 | 77.8 | 80.4 | 83.3 |
| Quintile 3 | 16.7 | 9.3 | 11.4 | 83.3 | 82.1 | 82.5 |
| Quintile 4 | 18.9 | 11.4 | 13.5 | 85.6 | 86.5 | 82.7 |
| Most affluent 20% | 24.2 | 12.1 | 13.8 | 84 | 87.9 | 86.4 |
| Total | 16.8 | 9.7 | 11.2 | 80.5 | 83 | 83.6 |

Sources 1993 PSL SD, 1995 IES/ OHS and 2003 GHS

Source: Burger *et al.* (2012)

The implications for health disparities

- If vulnerable sub-groups underreport their ill-health
—————→ Underestimate health disparities.
 - Bago d’Uva *et al.* (2008), Bonfrer *et al.* (2013), Dowd and Todd (2011).
- Focus on reporting behaviour according to wealth status.
- Steps:
 - Is wealth reporting heterogeneity present amongst South Africans? (are the poor and the non-poor reporting their health differently)
 - In what direction is this bias? (if yes, are the poor over-reporting or under-reporting their ill-health relative to the non-poor).

Methodology – The anchoring vignettes approach

- Data: WHO's study on global ageing and adult health (SAGE)
 - 2008; 3200 observations; >50 years of age
- Data contains:
 - Asked to rate their own health for a range of health domains. These include mobility, appearance, anxiety, pain/discomfort, cognitive abilities, interpersonal relationships, sleeping/resting ability and vision.

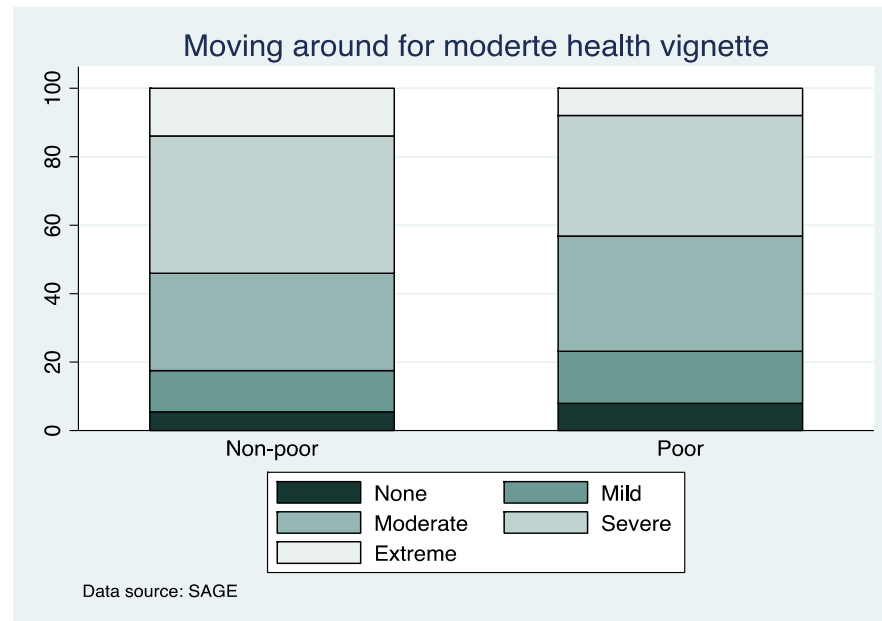
| Overall in the last 30 days, how much difficulty did you have ... | | NONE | MILD | MODERATE | SEVERE | EXTREME / CANNOT DO |
|---|---------------------------------|------|------|----------|--------|---------------------------|
| Q2002 | ... with <u>moving around</u> ? | 1 | 2 | 3 | 4 | 5 |

- Asked to rate vignettes in these health domains.

Table 3: Summary of covariates

| | | Non poor | Poor | Diff. |
|---------------------------|--------------|----------|------|---------|
| Proportion female | | .55 | .55 | -.0 |
| Age in years | | 62.61 | 62.3 | .33 |
| Never married | | .11 | .18 | .04*** |
| Married | | .54 | .36 | .18*** |
| Widowed | | .27 | .28 | -.01 |
| Years of education | | 8.53 | 6.2 | 2.32*** |
| Race | Black | .50 | .81 | -.31*** |
| | Coloured | .23 | .17 | .06*** |
| | Asian/Indian | .14 | .01 | .13*** |
| | White | 0.13 | 0.01 | .12*** |

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.



Estimation

- *HOPIT model* (King *et al.* (2004))
Code provided by Jones *et al.* (2007)
- Assumptions:
Response consistency; Vignette equivalence; Previous studies have tested the validity of these assumptions (Salomon, Tandon & Murray, 2004; Bago d'Uva *et al.*, 2011)
- *Reporting behaviour equation*

$$H_{Tij}^v = \alpha_j + \varepsilon_{ij} \quad \dots(1)$$

$$AH_{ij}^v = m \text{ if } s_i^{m-1} \leq H_{Tij}^v \leq s_i^m$$

$$\text{for } s_i^0 = -\infty, s_i^5 = \infty \text{ \& } m = 1, \dots, 5$$

$$\text{And } s_i^1 < s_i^2 < s_i^3 < s_i^4 < s_i^5 \quad \dots(2)$$

$$AH_{ij}^v = m \text{ if } X_i' \beta^{m-1} + \text{Poor } \beta^{m-1} \leq H_{Tij}^v \leq X_i' \beta^m + \text{Poor } \beta^m \quad \dots(3)$$

- *Health equation:*
 - Allow vignettes to drive the cut-point estimation
 - Similar to interval regression: an ordered probit with known cut-points

$$H_{Ti}^S = \beta_i X_i + \varepsilon_2 \quad \dots(4)$$

$$SAH_i^S = m \text{ if } s_i^{m-1} \leq H_{Ti}^S \leq s_i^m \quad \dots(5)$$

Tandon *et al.*, 2003; Rice *et al.*, 2012

- Cut-points are dependent on wealth status + other individual characteristics.
 - SAH is purged of differences in reporting behaviour.
- Test for reporting heterogeneity between poor and non-poor respondents:
 - a test for significance for the poor/non-poor variable in all cut-points. Namely, (Jones *et al.*, 2013).

$$\beta_P^1 = \beta_P^2 = \beta_P^3 = \beta_P^4 = 0$$

Results. Test 1: Test for reporting heterogeneity

Table 4: Test for reporting heterogeneity and parallel cut-point shift in vignettes severity ratings— *p*-values

| <i>Health Domain</i> | <i>p-values</i> | <i>Status</i> |
|----------------------|-----------------|---------------|
| Moving around | 0.0101 | Reject |
| Vigorous activity | 0.0249 | Reject |
| Depressed | 0.0274 | Reject |
| Body pains | 0.0372 | Reject |
| Farsighted | 0.0601 | Reject |
| Nearsighted | 0.0084 | Reject |
| Grooming | 0.0029 | Reject |
| Appearance | 0.0001 | Reject |

Homogeneity rejected at a 10% significance level

Test 2: Direction of bias

Table 5: Coefficients of poor variable from ordered probit and HOPIT

| | Ordered probit | HOPIT | Difference |
|--------------------------|-----------------------|---------------------|------------|
| Moving around | -0.0324 (0.0542) | 0.0924 (0.0822) | 0.1248 |
| Vigorous activity | -0.112** (0.0492) | -0.0366 (0.0886) | 0.0754 |
| Depressed | -0.127*** (0.0492) | 0.00213 (0.0762) | 0.12913 |
| Body pains | -0.0428 (0.0467) | 0.0505 (0.0761) | 0.0933 |
| Farsighted | -0.0273 (0.0481) | 0.0907 (0.0631) | 0.118 |
| Nearsighted | -0.0500 (0.0485) | 0.0920 (0.0649) | 0.142 |
| Grooming | 0.0284 (0.0664) | 0.235** (0.110) | 0.2016 |
| Appearance | 0.0634 (0.0668) | 0.262** (0.113) | 0.1986 |

Discussion: Health perceptions and need for care

- Indications that using SRH indicators to calculate health inequalities across income groups, the results may be biased and underestimated.
 - Includes self-reported chronic conditions.
 - Policy initiatives that aim to remove barriers to access on the supply side will help to realize unmet health needs.
- Costing model for NHI should include anticipation of increased health demand.
 - Social solidarity: health services should be distributed within a country by healthcare need, as opposed to their ability to pay (Wagstaff & Van Doorslaer, 1993; McIntyre & Ataguba, 2011).

References

- Ataguba, J. E. 2013. Inequalities in multimorbidity in South Africa. *Int J Equity Health*, 12, 64.
- Ataguba, J. E., Akazili, J., McIntyre, D. 2011. Socioeconomic-related health inequality in South Africa: evidence from General Household Surveys. *International journal for equity in health*, 10(1), 48.
- Ataguba, J., McIntyre, D. 2009. Financing and benefit incidence in the South African health system: Preliminary results. *Health Economics Unit, University of Cape Town Working Paper* 09-1.
- Ataguba, J. E., McIntyre, D. 2012. Paying for and receiving benefits from health services in South Africa: is the health system equitable?. *Health policy and planning*, 27(suppl 1), i35-i45.
- Ataguba, J. E. O., McIntyre, D. 2013. Who benefits from health services in South Africa?. *Health Economics, Policy and Law*, 8(01), 21-46.
- Bago d'Uva, T. B., O'Donnell, O., Van Doorslaer, E. 2008a. Differential health reporting by education level and its impact on the measurement of health inequalities among older Europeans. *International Journal of Epidemiology*, 37(6), 1375-1383.
- Bago d'Uva, T., Van Doorslaer, E., Lindeboom, M., O'Donnell, O. 2008b. Does reporting heterogeneity bias the measurement of health disparities? *Health economics*, 17(3), 351-375.
- Bago d'Uva, T. B., Lindeboom, M., O'Donnell, O., Van Doorslaer, E. 2011. Slipping anchor? Testing the vignettes approach to identification and correction of reporting heterogeneity. *Journal of Human Resources*, 46(4), 875-906.
- Beegle, K., Himelein, K., Ravallion, M. 2012. Frame-of-reference bias in subjective welfare. *Journal of Economic Behavior & Organization*, 81(2), 556-570.
- Bonfrer, I., Van de Poel, E., Grimm, M., Van Doorslaer, E. 2013. Does the distribution of healthcare utilization match needs in Africa?. *Health policy and planning*, cz074.
- Boyce, G., Harris, G. 2011. A closer look at racial differences in the reporting of self-assessed health status and related concepts in South Africa. *Health SA Gesondheid*, 16(1).

- Burgard, S. A., Chen, P. V. 2014. Challenges of health measurement in studies of health disparities. *Social Science & Medicine*, 106, 143-150.
- Burger, R., Bredenkamp, C., Grobler, C., Van der Berg, S. 2012. Have public health spending and access in South Africa become more equitable since the end of apartheid?. *Development Southern Africa*, 29(5), 681-703.
- Cockburn, N., Steven, D., Lecuona, K., Joubert, F., Rogers, G., Cook, C., Polack, S. 2012. Prevalence, causes and socio-economic determinants of vision loss in Cape Town, South Africa. *PLoS one*, 7(2), e30718.
- Dowd, J. B., Todd, M. 2011. Does self-reported health bias the measurement of health inequalities in US adults? Evidence using anchoring vignettes from the Health and Retirement Study. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 66(4), 478-489.
- Econex. 2009a. Key Features of the Current NHI Proposal. *Econex NHI note 1*, September 2009.
- Econex. 2009b. What does the demand for healthcare look like in SA?. *Econex NHI note 3*, October 2009.
- Etile, F., Milcent, C. 2006. Income-related reporting heterogeneity in self-assessed health: evidence from France. *Health Economics*, 15: 965-981.
- Guindon, G. E., Boyle, M. H. 2012. Using anchoring vignettes to assess the comparability of self-rated feelings of sadness, lowness or depression in France and Vietnam. *International Journal of Methods in Psychiatric Research*, 21(1), 29-40.
- Harris, B., Goudge, J., Ataguba, J. E., McIntyre, D., Nxumalo, N., Jikwana, S., & Chersich, M. 2011. Inequities in access to healthcare in South Africa. *Journal of public health policy*, S102-S123.
- Havemann, R., Van der Berg, S. 2003. The demand for healthcare in South Africa. *JOURNAL FOR STUDIES IN ECONOMIC AND ECONOMETRICS*, 27(3), 1-27.
- Hernandez-Quevedo, C., Jones, A.M., Rice, N. 2005. Reporting bias and heterogeneity in self-assessed health. Evidence from the British Households Panel Survey. *HEDG Working Paper* 05/04.
- Hirve, S., Gómez-Olivé, X., Oti, S., Debpuur, C., Juvekar, S., Tollman, S., Blomstedt, Y., Wall, S., Ng, N 2013. Use of anchoring vignettes to evaluate health reporting behavior amongst adults aged 50 years and above in Africa and Asia - testing assumptions
Glob Health Action 2013, 6.
- Humphries, K. H., Van Doorslaer, E. 2000. Income-related health inequality in Canada. *Social science & medicine*, 50(5), 663-671.
- Jones A, Rice N, Bago d'Uva T, Balia S. 2007. *Applied Health Economics*. London: Routledge.
- Kapteyn, A., Smith, J. P., Van Soest, A. 2007. Vignettes and self-reports of work disability in the United States and the Netherlands. *The American Economic Review*, 461-473.
- King, G., Murray, C.J.L., Salomon, J.A., Tandon, A. 2004. Enhancing the validity and cross-cultural comparability of measurement in Survey Research. *American Political Science Review*, 98(1).
- King, G., Wand, J. 2007. Comparing incomparable survey responses: Evaluating and selecting anchoring vignettes. *Political Analysis* 15(1): 46-66.
- Koedoot, C. G., De Haes, J. C. J. M., Heisterkamp, S. H., Bakker, P. J. M., De Graeff, A., De Haan, R. J. 2002. Palliative chemotherapy or watchful waiting? A vignettes study among oncologists. *Journal of clinical oncology*, 20(17), 3658-3664.

- Lindeboom, M., Van Doorslaer, E. 2004. Cut-Point Shift and Index Shift in Self-Reported Health. *IZA discussion paper* No. 1286
- Litvack, J. I., Bodart, C. 1993. User fees plus quality equals improved access to healthcare: results of a field experiment in Cameroon. *Social science & medicine*, 37(3), 369-383.
- Lunde, L., Løken, K. V. 2011. "HOW ARE YOU FEELING"? ASSESSING REPORTING BIAS IN A SUBJECTIVE MEASURE OF HEALTH BY QUANTILE REGRESSION. *University of Bergen, Economics working paper*, No. 08/11.
- Manning, W. G., Newhouse, J. P., Duan, N., Keeler, E. B., Leibowitz, A. 1987. Health insurance and the demand for medical care: evidence from a randomized experiment. *The American economic review*, 251-277.
- Marten, R., McIntyre, D., Travassos, C., Shishkin, S., Longde, W., Reddy, S., Vega, J. 2014. An assessment of progress towards universal health coverage in Brazil, Russia, India, China, and South Africa (BRICS). *The Lancet*.
- Mathers, C.D., Douglas, R.M. 1998. Measuring progress in population health and well-being. (Eds.) Eckersley, R. *In Measuring Progress: Is life getting better?* CSIRO Publishing: Collingwood.
- McIntyre, D., Ataguba, J. E. 2011. How to do (or not to do)... a benefit incidence analysis. *Health policy and planning*, 26(2), 174-182.
- Mills, A., Ataguba, J. E., Akazili, J., Borghi, J., Garshong, B., Makawia, S., ... & McIntyre, D. 2012. Equity in financing and use of healthcare in Ghana, South Africa, and Tanzania: implications for paths to universal coverage. *The Lancet*, 380(9837), 126-133.
- Mu, R. 2014. Regional disparities in self-reported health: evidence from Chinese Older adults. *Health Economics*, 23(5)
- Myer L, Stein D, Grimsrud A, Seedat S, Williams D. 2008. Social determinants of psychological distress in a nationally-representative sample of South African adults. *Social Science & Medicine* 2008, 66:1828-1840.
- Peracchi, F., Rossetti, C. 2008. Gender and regional differences in self-rated health in Europe. *Manuscript, Tor Vergata University*.
- Rice, N., Robone, S., Smith, P. C. 2011. Vignettes and health systems responsiveness in cross-country comparative analyses. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 175(2), 337-369.
- Tandon, A., Murray, C. J., Salomon, J. A., King, G. 2003. Statistical models for enhancing cross-population comparability. *Health systems performance assessment: debates, methods and empiricism*, 727-46.
- Vera-Hernandez, M. 2003. Structural estimation of a principal-agent model: moral hazard in medical insurance. *RAND Journal of Economics*, 670-693.
- Wagstaff A, Van Doorslaer E. 1993. *Equity in the finance and delivery of healthcare: concepts and definitions*. In: Van Doorslaer E, Wagstaff A, Rutten F (eds). *Equity in the Finance and Delivery of Healthcare: An International Perspective*. New York: Oxford University Press.
- Salomon, J. A., Tandon, A., Murray, C. J. 2004. Comparability of self rated health: cross sectional multi-country survey using anchoring vignettes. *Bmj*, 328(7434), 258.
- Sauerborn, R., Adams, A., Hien, M. 1996a Household strategies to cope with the economic costs of illness. *Social Science and Medicine* 43(3): 291-301.
- Sauerborn, R., Nougara, A., Hien, M., Diesfeld, H. J. 1996b. Seasonal variations of household costs of illness in Burkina Faso. *Social Science & Medicine*, 43(3), 281-290.
- Statistics South Africa. 2014. Poverty trends in South Africa. An examination of absolute poverty between 2006 and 2011. *Statistics South Africa Report No. 03-10-06*.
- Zere, E., McIntyre, D. 2003. Inequities in under-five child malnutrition in South Africa. *International Journal for Equity in Health* 2003, 2:e7.