



## Physical activity in rural South Africa – are current surveillance instruments yielding valid results?

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**To the Editor:** A recent important study<sup>1</sup> addressing the prevalence of cardiovascular risk factors in a rural African population, reports that ‘... most participants followed a physically inactive lifestyle’. The validity of their findings is difficult to evaluate as the study provides little information regarding the physical activity questionnaire that was used. Questionnaire validity is relevant because rural women can carry a heavy work burden, particularly with regard to household and yard work, and aspects of farming.<sup>2</sup> Since few – if any – females in the Dikgale site participate in sport or exercise, the physical activity questionnaire could display a ‘floor’ effect, i.e. below a certain threshold, important health-contributing physical activity behaviours are not probed.

Between 2004 and 2005, objective physical activity data (unpublished) have been collected over periods of 6 - 7 days, using uni-axial accelerometers (MTI Actigraph AM-7164-2.2) and electronic pedometers (Yamax Digiwalker SW-401), on females from Dikgale. Physical activity volumes and patterns were extracted<sup>3</sup> (Table I). For comparison, data are provided from rural African females working in forestry plantations,<sup>4</sup> urban African females (Polokwane municipality),<sup>4</sup> and females

from a developed country.<sup>3</sup> Compared with urban samples, Dikgale women accumulated large amounts of activity, particularly within the moderate-1 domain. Even within the forestry sample, the moderate-2 and vigorous activity levels were low compared with the moderate-1 levels. Considering that the total activity counts for the Dikgale sample were ~1.5 times higher than urban samples and the compliance with physical activity public health guidelines<sup>5</sup> were ~5 times higher than urban samples, the Dikgale sample cannot be described as inactive. An active lifestyle is generally defined as participating in  $\geq 150$  minutes per week of *any* moderate to vigorous intensity activity, accumulated in bouts of  $\geq 10$  minutes’ activity.<sup>5</sup> Importantly, the required level of physical activity does not demand participation in vigorous activity.<sup>5</sup> Similarly, compared with an urban sample,<sup>6</sup> Dikgale females accumulated nearly double the amount of daily steps and were far more likely to be classified as active than sedentary (Table II).

Taken together, these findings suggest that rural females in the Dikgale region are not inactive but accumulate relatively large amounts of physical activity by participating in activities such as housework, yard work, and farming activities. Furthermore, since few of these females have motor vehicles within their households, much transport is by walking which is generally not performed at intensities associated with walking for exercise, of the kind usually done in urban settings. Physical activity questionnaires, such as the one used by Alberts *et al.*,<sup>1</sup> provide crude estimates of physical activity levels and should be interpreted with caution because

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**Table I. Uni-axial accelerometer output for rural Dikgale females and three comparative female samples**

Descriptive characteristics	Residence			
	Rural (SA)		Urban (SA)	Urban (USA)
	Dikgale (N=160)	Forestry (N=11)	Polokwane (N=16)	South Carolina (N=50)
Age (yrs)	34 (11)	38 (10)	30 (7)	45 (16)**
Body mass index (kg/m <sup>2</sup> )	26.6 (6.2)	25.1 (4.1)	28.5 (6.0)	24.7 (4.4)
Total counts (cts/day)	408 669 (20 634)	552 004 (155 498)**	269 029 (82 582)**	270 189 (119 648)**
Moderate-1 (min/day)				
Accumulated in bouts $\geq 1$ min	224 (64)	260 (65)	117 (36)**	120 (48)**
Accumulated in bouts $\geq 10$ min	43 (29)	55 (23)	9 (8)**	-
Moderate-2 + vigorous (min/day)				
Accumulated in bouts $\geq 1$ min	23 (14)	36 (16)*	18 (8)	28 (24)
Accumulated in bouts $\geq 10$ min	5 (6)	5 (5)	4 (3)	-
Public health compliance (%)	86	91	18**	-

Unless indicated otherwise, data reported as mean (SD).

Significant differences between Dikgale group and other groups: \* $p < 0.01$ ; \*\* $p < 0.001$ .

SA = South Africa; USA = United States of America.

cts = counts; Moderate-1 (house work, yard work, slow walking): 500 - 1 951 cts/min; Moderate-2 + vigorous (ambulation, i.e. brisk walking, running):  $> 1 951$  cts/min.



**Table II. Pedometer output for rural Dikgale females and a comparative female sample**

Descriptive characteristics	Residence	
	Rural (SA) Dikgale (N=121)	Urban (USA) (N=133)
Age (yrs)	33 (11)	47 (18)*
Body mass index (kg/m <sup>2</sup> )	26.0 (5.9)	26.9 (5.7)
Average steps per day	9 085 (4 014)	5 210 (3 518)*
Public health indices (%)		
Sedentary (<5 000 steps/day)	13.2	44.0*
Active to highly active (≥10 000 steps/day)	39.7	13.9*

Unless indicated otherwise, data reported as mean (SD).  
Significant differences between Dikgale group and other group: \**p*<0.0001.  
SA = South Africa; USA = United States of America.

the questionnaire might not capture a significant amount of physical activity accumulated by rural African women in the Dikgale field site. Moreover, it was not designed to probe physical activity performed at low to moderate intensities over extended periods of time.

Authors should provide details about the method(s) used for probing physical activity. The development and use of valid and reliable physical activity questionnaires must be rigorously pursued. This is probably even more important in communities undergoing rapid changes in health behaviours, which require sensitive and reliable instruments.

Work is under way in the Dikgale site to measure physical activity objectively in a random sample of approximately 800 individuals, and will allow a more conclusive evaluation as to whether rural residents are indeed generally inactive. Present female data indicate that only 11.9% are sedentary (<5 000 steps/day), and the average daily step count is 10 594 steps.

**References**

1. Alberts M, Urdal P, Steyn K, *et al.* Prevalence of cardiovascular diseases and associated risk factors in a rural black population of South Africa. *Eur J Cardiovasc Prev Rehabil* 2005; 12: 347-354.
2. Levine JA, Weisell R, Chevassus S, Martinez CD, Burlingame B, Coward WA. The work burden of women. *Science* 2001; 294: 812.
3. Matthews CE, Ainsworth BE, Thompson RW, Bassett DR. Sources of variance in daily physical activity levels as measured by an accelerometer. *Med Sci Sports Exerc* 2002; 34: 1376-1381.
4. Cook I, Lambert EV. Validity and reliability of the International Physical Activity Questionnaire in Northern Sotho-speaking Africans. *Journal of Endocrinology, Metabolism and Diabetes of South Africa* 2002; 7: 36.
5. Pate RR, Pratt M, Blair SN, *et al.* Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995; 273: 402-407.
6. Tudor-Locke C, Ham SA, Macera CA, *et al.* Descriptive epidemiology of pedometer-determined physical activity. *Med Sci Sports Exerc* 2004; 36: 1567-1573.

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