



Bowel Habits of Urban and Rural Populations on the Jos Plateau, Nigeria

Habitudes Intestinales De Populations Urbaines Et Rurales Sur Le Plateau De Jos, Au Nigeria

C. A. Daniyam*, A. O. Malu, E. N. Okeke, E. I. Agaba

ABSTRACT

BACKGROUND: Constipation and diarrhoea are frequent complaints amongst patients attending Gastroenterology Clinics. The normal bowel habits may vary among populations.

OBJECTIVE: To characterise and compare the bowel habits of rural and urban dwellers in a Nigerian population.

METHODS: Questionnaires were administered to 1236 adults aged 16 years and above recruited from two communities (rural and urban) using a two stage cluster sampling scheme based on existing administrative set up in a cross-sectional study. Information sought included socio-demographics, alcohol consumption, bowel habits and level of physical activity.

RESULTS: Adequate data for analysis were available in 1017 subjects giving a response rate of 509 (93.1%) and 508 (87.7%) for rural and urban populations respectively. The mean weekly bowel frequencies for the rural and urban populations were 10.8 ± 5.1 and 9.7 ± 4.9 ($p=0.09$) respectively. Four hundred and ninety-four (97%) subjects from the rural community and 493 (97%) from the urban opened their bowels between three times per day to three times per week. Constipation as identified by the passage of three or less motions per week was present in 14 (2.8%) of urban dwellers compared to 4 (0.8%) of the rural ($p = 0.01$). Bowel motions were more frequent in males than in females.

CONCLUSION: Bowel opening appears slightly more frequent among rural plateaus inhabitants than in urban dwellers. Constipation is more common in the urban than in the rural area. *WAJM 2011; 30(3): 182–187.*

Keywords: Bowel habits, Constipation, Diarrhoea, Rural, Urban.

RÉSUMÉ

CONTEXTE: La constipation et la diarrhée sont des plaintes fréquentes parmi les patients fréquentant les dispensaires gastroentérologie. Les habitudes intestinales normales peuvent varier entre les populations.

OBJECTIF: Caractériser et de comparer les habitudes intestinales des habitants des zones rurales et urbaines dans une population nigériane.

MÉTHODES: Des questionnaires ont été administrés à 1236 adultes âgés de 16 ans et plus recrutés dans deux communautés (rurales et urbaines) en utilisant un schéma en deux étapes d'échantillonnage en grappes basée sur administratifs existants mis en place dans une étude transversale. L'information recherchée notamment socio-démographiques, la consommation d'alcool, les habitudes intestinales et du niveau d'activité physique.

RÉSULTATS: Des données adéquates pour l'analyse étaient disponibles en 1017 sujets, soit un taux de réponse de 509 (93.1%) et 508 (87.7%) pour les populations rurales et urbaines respectivement. Les fréquences moyennes hebdomadaires du côlon pour les populations rurales et urbaines étaient de $10,8 \pm 5,1$ et $9,7 \pm 4,9$ ($p = 0,09$) respectivement. Quatre cent quatre-vingt-quatre (97%) des sujets de la communauté rurale et 493 (97%) de la ville ont ouvert leurs entrailles entre trois fois par jour à trois fois par semaine. Constipation identifiés par le passage de trois ou moins par semaine était de mouvements présents dans 14 cas (2.8%) des habitants des villes, comparativement à 4 (0.8%) de la population rurale ($p = 0.01$). Selles étaient plus fréquents chez les hommes que chez les femmes. **CONCLUSION:** l'ouverture du côlon apparaît légèrement plus fréquentes chez les habitants des plateaux rurales que dans les citadins. La constipation est plus fréquente dans les zones urbaines que dans les zones rurales. *WAJM 2011; 30(3): 182–187.*

Mots-clés: les habitudes de défécation, constipation, diarrhée, ruraux, urbains.

INTRODUCTION

Concerns about bowel movement are common and constitute a major complaint in Gastroenterology Clinic. It is often assumed that a healthy person has at least one bowel movement each day and there is the suggestion that a daily bowel habit (movement) is not only natural but necessary.^{1,2} Maimonides in the twelfth century stated that "at every period of life it should be one's care to secure free action of the bowels approximately to a relaxed condition."³ Bowel movement, even though a universal bodily function has received very little systematic investigation.^{4,6}

One of the advances in Gastroenterology is the debunking of the importance of bowel movement and symptoms related to it and a corresponding change in attitude of patients, making the theories of autointoxication obsolete. Except in circumstances of underlying bowel obstruction, reduction in bowel frequency is compatible with continued good health. The body's physiological processes are rarely disturbed by long delay in the evacuation of the bowel.^{7,8}

Stool weight, frequency and volume vary widely among individuals and there is considerable day to day variability in the same individual.⁹ Many factors are known to affect stool characteristics. These include diet, gender, race, exercise, stress and alcohol use.⁴

Constipation and diarrhoea are frequent complaints amongst patients attending the Gastroenterology clinic of the Jos University Teaching Hospital. These terms, constipation and diarrhoea are highly subjective and mean different things to different people.⁴ To understand disorders of bowel activity the reference range for the population needs to be defined.^{4,10}

Little is known about bowel habits among Nigerians.¹¹ This study, therefore, was undertaken to determine the bowel habit and factors that influence it in urban and rural communities and to compare and determine the impact of urbanization on bowel habits.

SUBJECTS, MATERIALS, AND METHODS

Subjects

This was a cross-sectional study of two adult populations (an urban and a rural) living on the Jos, Plateau, located in central Nigeria. A two stage cluster sampling technique was used to identify the communities to be studied. We divided Jos and its environs into wards (based on existing administrative setup) and Nabor and Turu wards were selected to represent urban and rural communities respectively. Nabor is located in Jos, a cosmopolitan capital city with wide ranging social strata, from high income to low income earners while Turu, located 30 kilometres from Jos, is made up of mainly indigenous people with a fairly homogenous social stratum whose main occupation is subsistence farming.

Subjects aged 16 years and above who were members of households in the communities were studied. A minimum sample size using a standard formula for a two-sample situation¹² of 479 for each of the population was required. The permission of the ward heads in each of the locations was obtained and only consenting subjects were enrolled in the study. The study was approved by the Ethics Committee of the Jos University Teaching Hospital.

The following groups of persons were excluded from the study: those with known gastrointestinal disease, previous major abdominal surgery, and presence of diseases that are known to alter gastrointestinal function such as diabetes mellitus, thyroid disorders, Addison's disease and pregnancy and the use of such drugs as iron tablets and antacids within 3 weeks preceding the study. The exclusion was based on the presence of history and physical findings suggestive of such illnesses.

Data Collection

A pre-tested questionnaire was used by a team of 13 trained interviewers (10 clinical medical students and three doctors) trained by the researchers. They interviewed the subjects in English and the local languages the respondents were fluent in. The data collection lasted for a period of 10 weeks. Information sought included socio-demographic

characteristics, personal habits including cigarette smoking, alcohol consumption, and recall of a typical 24 hour diet including ingestion of milk and coffee. Information on bowel habits, perception of diarrhea and constipation and use of laxatives were also obtained. Significant alcohol consumption was taken as the consumption of >21 units/week for males and >14 units/week for females or the consumption of >two large or three medium sized calabashes of local brew.¹⁴ Physical activity was assessed using the report of the Non-Communicable Disease Survey.¹⁵ This graded physical activity into three groups; low (not active), intermediate (moderately active) and high (active) based on work related physical and leisure activities. Low physical activity was taken to mean office work, unemployed and house bound; intermediate physical activity included house work, trade work, nursing, gardening, walking and sports on one to two days per week; while high physical activity meant labouring and sports on three or more days per week.

Statistical Analysis

Data were kept secured and made available to investigators and data analyst only. Data were entered into a computer and analyzed using the SPSS statistical package version 16.0 program. Results are expressed as mean (\pm SD) for continuous variables and proportions for qualitative data. The Chi-Squared (χ^2) test was used in determining the significance of observed differences and the student "t" test to compare group means. The Fisher's exact was used to compare proportions when cells had numbers less than five. A p value of < 0.05 was considered significant.

RESULTS

A total of 1236 (547 from rural and 579 from the urban) subjects were recruited for the study, of which 1017 (509 and 508 from rural and urban communities respectively) completed the questionnaire giving a response rate of 93.1% and 87.7% respectively.

Socio-demographic Characteristics of the Subjects

The mean age of the rural popula-

tion was 36.8 ± 14.9 years and that of the urban population was 27.2 ± 10.1 years, $p < 0.001$ (Table 1). The sex distribution was not significantly different between the rural and urban population, with a male: female sex ratio of 1:1.6 and 1.3:1 for rural and urban population respectively. A large proportion 342 (67.2%) of the rural population were farmers while 277 (54.6%) of the urban

population were unemployed. Four hundred and sixty-two subjects (90.9%) of the urban population had at least a basic primary school education while 236 (46.4%) of the rural community did not have any formal education. Significant alcohol consumption was present in 203 (39.9%) of the rural dwellers compared to 36 (7.1%) of the urban. The daily diet in both the rural and urban communities

consisted of one to three bulky carbohydrate diets with vegetable soup and occasional meat or fish. "Westernised" diets (refined foods such as pasta, pastries and bread) were eaten in addition to this traditional food in the urban population.

Perception of Constipation and Diarrhea

In both the rural and urban population the perception of what constipation or diarrhoea meant varied among the subjects. Diarrhoea was perceived as watery/loose motions by 341 (67%) of the rural dwellers compared to 244 (48.0%) of the urban; $\chi^2 = 72.0$, $p < 0.0001$. Other interpretation of diarrhoea included frequent stools, abdominal discomfort, and urgency of defaecation (Fig. 1). Similarly, constipation was perceived as infrequent stools by 66 (12.9%) and 43 (8.4%) of the rural and urban dwellers respectively; $\chi^2 = 39.6$, $p < 0.0001$. Other meanings of constipation included abdominal discomfort, straining to defecate and hard stools (Fig. 2).

Bowel Habits

The mean \pm SD stool frequency in the rural subjects was 10.8 ± 5.1 per week while in the urban subjects it was 9.7 ± 4.9 per week, $p = 0.9$. Four hundred and ninety-four (97%) subjects from the rural community and 493 (97%) from the urban opened their bowels between three times per day to three times per week as shown in Table 1. Constipation as identified by the passage of three or less motions per week was present in 14 (2.8%) of urban dwellers compared to 4 (0.8%) of the rural ($p = 0.01$). Seven (1.4%) and five (1.0%) of the subjects in rural and urban communities respectively had more than three motions per day ($p = 0.56$).

Stool Consistency

The stool consistency in both the rural and urban subjects was similar. The majority i.e. 366(72%) and 367(72.1%) of urban and rural dwellers, $\chi^2 = 1.81$, $p = 0.61$ passed formed stools. Stools were hard in 87(17.1%) and 76(14.9%) rural and urban dwellers; loose/watery stools in 51(10%) and 63(12.3%) rural and urban dwellers and pellet form in four each of rural and four urban dwellers.

Table 1: Socio-Demographic Characteristics and Bowel Frequency of Study Subjects in Rural and Urban Communities on the Jos Plateau

Characteristic	Rural	Urban	p value
Number (M/F)	197/312	287/221	
Age, years	37 ± 15	27 ± 10	<0.0001
Education			
No formal	273 (53.6)	46 (9.1)	
Primary	132 (25.9)	99 (19.5)	<0.0001
Secondary	83 (16.3)	181 (35.6)	
Tertiary	21 (4.2)	182 (35.8)	
Occupation			
Unemployed/students	93 (18.2)	278 (54.6)	
Unskilled labor	59 (11.6)	45 (8.9)	<0.0001
Farming/artisans	342 (67.2)	89 (17.5)	
Civil servants/professionals	15 (3.0)	96 (19.0)	
Alcohol ingestion			
Never	221 (43.4)	404 (79.5)	
Insignificant	85 (16.7)	68 (13.4)	<0.0001
Significant	203 (39.9)	36 (7.1)	
Bowel frequency/week			
< 3	4 (0.8)	14 (2.8)	0.01
3 – 7	278 (54.)	313 (61.6)	0.02
8 – 14	176 (34.6)	144 (28.3)	0.03
15 – 21	43 (8.4)	32 (6.3)	0.18
> 21	7 (1.4)	5 (1.0)	0.56

Results are N (%) except for age with means and SD

Table 2: Comparison of Bowel Frequency by Sex and Locations on the Jos Plateau

Frequency	Rural			Urban		
	Male	Female	Total	Male	Female	Total
<3	1	3	4	3	11	14
3 – 5	2	8	10	14	12	26
6 – 8	77	192	269	153	134	287
9 – 11	2	2	4	0	1	1
12 – 14	88	89	172	93	50	143
15 – 17	0	0	0	0	0	0
18 – 20	3	1	4	2	0	2
21 – 23	25	14	39	20	10	30
24+	4	3	7	1	4	5

$\chi^2 = 33.95$, $P < 0.01$

$\chi^2 = 18.736$, $P < 0.01$

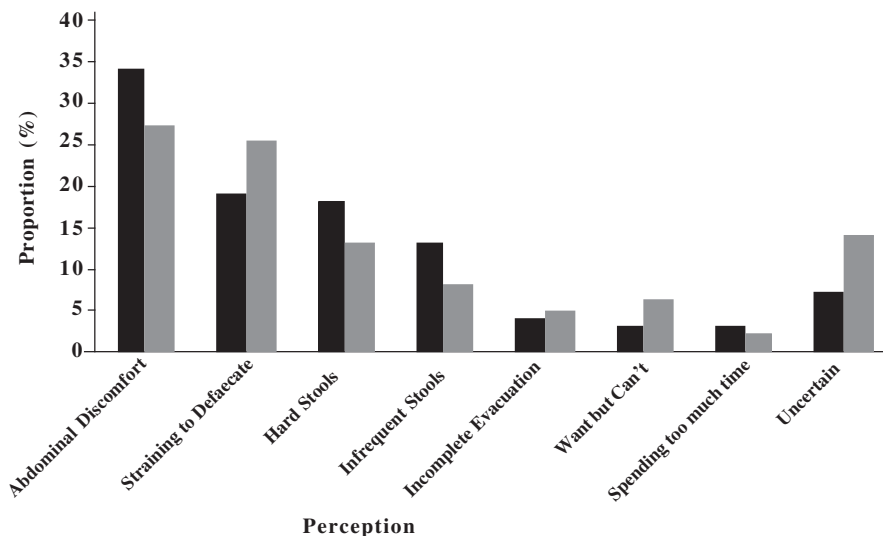


Fig. 1: Perception of Constipation by Study Subjects ■ Rural dwellers and ■ Urban dwellers.

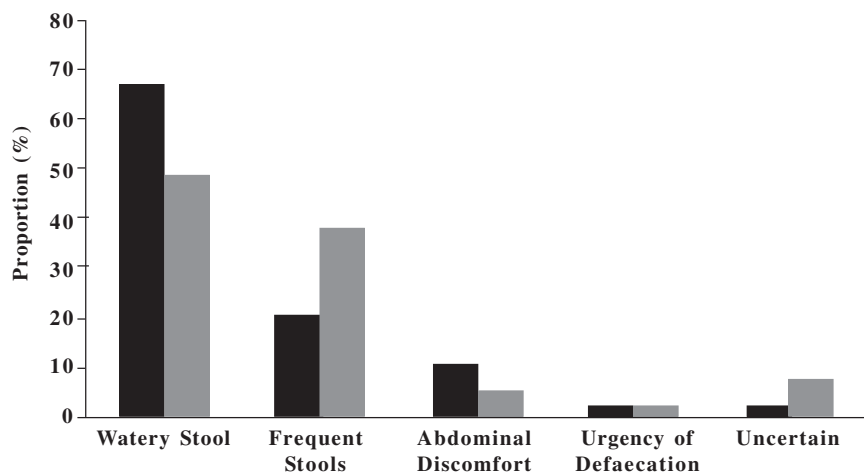


Fig. 2: Perception of Diarrhoea by Rural and Urban Dwellers on the Jos Plateau ■ Rural dwellers and ■ Urban dwellers.

Factors Related to Bowel Frequency

In both the rural and urban populations, the males had higher defaecation frequencies than females, $p < 0.001$ (Table 2). While males in the rural community had higher bowel frequencies, there was no significant difference between the females in urban and rural community. Subjects who took alcohol in significant quantities had fewer bowel frequencies, $\chi^2 = 39.6$, $p < 0.0001$ (Table 3). On the converse, increased physical activity was associated with increased bowel frequencies (Table 4).

DISCUSSION

The main finding of this study was

that vast majority (97%) of rural and urban Nigerians living on the Jos Plateau have bowel habits within the range of three times per week to three times per day. Additionally, constipation was commoner among urban dwellers compared to the rural. The bowel frequency in our study, three times per week to three times per day compares well with the 94.2% to 99% reported from the western world and other African countries.^{1,9-11}

Our findings however vary remarkably from the findings of Fakunle and co-workers¹¹ in Zaria, Nigeria where almost a quarter of subjects had less than one bowel action per day. The reason for this disparity however, is not very clear.

A major determinant of bowel habits is the dietary fiber content. Even though the bulk of the African diet is carbohydrate, it is possible that the fiber content varies from one region to another depending on the source.

Another finding of this study was that the terms diarrhoea and constipation mean different things to different people. Rural dwellers perceived these terms more accurately than their urban counterparts. Other definitions of these terms abound in both communities hence the use of these terms by subjects cannot be relied upon. As has been noted by others,¹¹ both the educated and the illiterate have differing opinion as to what these terminologies mean. Therefore the physician needs to seek out what exactly his patient means when he complains of diarrhoea or constipation. This observation is true of various population groups either in America, Israel or Europe.^{4,5}

The general notion is that the African passes soft mushy stools. The consistency of stools in this study deviated far from that, as 72% of the population reported passing stools that were well formed, similar to findings from Zaria,¹¹ Our finding however, is at variance with finding from Uganda when 38.8% of rural Ugandans passed loose stools.⁹

Bowel frequencies in males (whether resident in rural or urban setting) were significantly higher than those of females. This agrees with the findings of Sandler *et al.*¹⁶ However, studies from Uganda and South Africa did not report any gender disparity in bowel frequency.^{9,17} The association of gender with frequency of bowel activity may be due to differences in amount of food consumed by males compared to women or hormonal differences.

Another factor that affected bowel frequencies from our study was physical activity. Subjects with increased physical activity had higher bowel frequencies. Bowel habits survey of Israelis also showed that high physical activity significantly affected bowel frequency.⁴ In that study, it was observed that those who were physically more active were less likely to take laxative. As has been noted by Everhart and colleagues,⁵ greater physical activities strongly

Table 3: Bowel Frequency and Alcohol Ingestion in Rural and Urban Communities on the Jos Plateau

Bowel Frequency per week	Alcohol Ingestion, N(%)		
	Nil/Insignificant	Significant	
<3	16 (2.0)	2 (0.8)	18(1.7)
3 – 5	34(4.4)	2 (0.8)	36(3.5)
6 – 8	454 (58.3)	102 (43.0)	556(54.7)
9 – 11	3 (0.4)	2 (0.8)	5(0.5)
12 – 14	217 (27.8)	98 (41.3)	315(31.0)
15 – 17	0	0	0(0.0)
18 – 20	2 (0.3)	4 (1.6)	6(0.6)
21 – 23	44(5.6)	25 (10.5)	69(6.8)
24+	9(1.2)	3 (1.2)	12(1.2)
Total	779	238	1017(100.0)

$$\chi^2 = 39.6, p < 0.001$$

Table 4: Relationship between Bowel Frequency and Physical Activity in Rural and Urban Communities on the Jos Plateau

Bowel Frequency per week	Physical Activity (Number)		Total
	Low	Moderate/High	
<3	7	11	18
3 – 5	11	25	36
5 – 8	100	456	556
9 – 11	0	5	5
12 – 14	50	265	315
15 – 17	0	0	0
18 – 20	0	6	6
21 – 23	3	66	69
24+	4	8	12
Total	175	842	1017

$$\div^2 = 24.00, p < 0.001$$

reduce the odds of impaired bowel function. How physical exercise promotes defecation remains conjectural. Exercise is known to decrease jejunal absorption of water and electrolytes by 50% and also reduce intestinal transit time.¹⁸ However; the amount of the excess fluid reaching the colon that remains unabsorbed is unknown. The relationship of physical activity to bowel habit is made more difficult to understand because to study the intact colon objectively and quantitatively is technically difficult. It is possible that higher physical activity leads to increased food and water intake and subsequently bowel output. There is no information from this study

or in the literature to prove this.

Significant alcohol ingestion was found to decrease bowel frequency in our study. This finding is against popular belief. Acute ethanol ingestion is known to increase small bowel motility and reduce water and electrolyte absorption thereby causing diarrhea.¹⁹ Chronic ethanol ingestion may cause diarrhoea as a result of chronic pancreatitis leading to malabsorption. It is however uncertain from this study at which stage alcohol ingestion alters bowel habits. The effects of coffee, milk and cigarette smoking were not addressed in this study because the proportion of those who used any of these was very low.

This study was not without limitations. Firstly, we relied heavily on recall of bowel habits and this bias could have affected our findings. However, Manning and colleagues²⁰ and Ekwueme⁹ have observed that in over 80% of cases, there is close correlation between recalled and recorded histories of bowel habits. The second limitation encountered in our study was the use of a two-stage cluster sampling from already defined administrative set up. The ultimate goal for a population survey is to use simple random sampling technique. This was not possible because of the large population involved and financial constraints. Selection bias may therefore have been introduced.

Conclusion

This study has demonstrated that constipation is commoner among urban dwellers while more of the rural dwellers are likely to open their bowels twice per day. The majority of subjects passed well formed stools. Increased physical activity tended to increase bowel habits. The terms diarrhoea and constipation mean different things to different people and efforts should be made to understand what exactly a patient is trying to communicate.

ACKNOWLEDGEMENTS

We wish to thank the medical students of the University of Jos for serving as interviewers and the participants from the two communities.

DUALITY OF INTEREST

None.

REFERENCES

1. Connel AM, Hilton C, Irvine G, Lennard-Jones JE, Misiewicz JJ. Variation of Bowel habits in two population samples. *Brit Med J.* 1965; **2**: 1095–1099.
2. Ruben BD. Public perception of digestive health and disease. Survey findings and communications implications. *Pract Gastroenterol* 1986; **10**: 35–42.
3. Maimonides. The book of knowledge. Hyamson M. (eds). Boys Town Jerusalem publishers, Oxford. 1962:51.
4. Levy N, Stermer E, Stermer Z, et al. Bowel habits in Israel: a cohort study: *J Clin Gastroenterol* 1993; **16**: 295–

- 299.
5. Everhart JE, Go VLW, Johannes RS, Fitzsimmons SC, Roth HP, White LR. A longitudinal survey of self reported bowel habits in the United States. *Dig Dis Sci* 1989; **34**: 1153–1162.
 6. Regulation of Gastrointestinal function in Ganong WF (ed), *Review of Medical Physiology* 13th Edition 1987. Appleton and Lange: 448–477.
 7. Symptoms of disease in: Elias E, Hawkins C. (eds) *Lecture notes on Gastroenterology*. John Wright and Sons limited Bristol 1974; 2nd Edition 366–376.
 8. Naish JN, Read AE. (eds) Some Symptoms in: *Basic Gastroenterology* John Wright and Sons Limited Bristol 1974; 2nd Edition 366–376.
 9. Ekwueme O. Bowel habits in Ugandan Villagers. *Trop Geogr Med* 1978; **30**: 247–251.
 10. Drossman DA, Sandler RS, Mckee DC, Lovita AJ. Bowel patterns among subjects not seeking health care. *Gastroenterology* 1982; **83**: 529–534.
 11. Fakunle YM, Ajagbonna O, Ani OEO, Awesojo. Diarrhoea, constipation and intestinal transit in a northern Nigerian population. *J Trop med Hyg*. 1978; **81**: 137–138.
 12. Smoller SW. How to calculate sample size for the difference between two proportions. In: Smoller SW. ed. *Biostatistics and Epidemiology: A primer for health professionals*. New York; Springer Verlag. 1990, p100–101.
 13. Rees WDW, Rhodes J. Altered bowel habits and menstruation. *Lancet* 1976; **2**: 476.
 14. Okeke EN, Malu AO, Obafunwa JO, Nwana EJ. Aetiological significance of alcohol in liver cirrhosis on the Jos Plateau. *West Afr J Med*. 2002; **2**: 12–14.
 15. Akinkugbe OO (ed). Manual of Non-communicable disease in Nigeria 1992. Series 1 Federal Ministry of Health and Human Service.
 16. Sandler RS, Douglas DA. Bowel habits in young subjects not seeking health care. *Digestive Diseases and Sciences* 1987; **32**: 841–845.
 17. Walker ARP, Warker BF, Bhamfee D, Walker EJ, Ncongwane J, Segal I. Defaecation of frequencies in Black, Indian, coloured and white populations. What do they signify? *South Africa Med J* 1982; **62**: 196–199.
 18. Barclay GR, Turber LA. Effect of moderate exercise on salt and water transport in the human jejunum. *Gut* 1988; **29**: 816–820
 19. Schuckit MA in: Harrison's principles of internal medicine Wilson JD, Braunwald E, Isserlbacher KJ *et al*, 12th Edition, Published by McGraw Hill Inc New York, 1991; 2146–2151.
 20. Manning AP, Wyman JB, Heaton KW. How trustworthy are bowel histories? Comparison of recalled and recorded information. *Br Med J* 1976; **2**: 213–214.