Br. J. clin. Pharmac. (1989), **27**, 741–747

Self-medication in urban and rural Zimbabwean communities

C. M. STEIN, N. P. GORA & B. M. MACHEKA
Department of Clinical Pharmacology, University of Zimbabwe, P.O. Box A178, Avondale, Harare, Zimbabwe

1 A questionnaire examining the use of, and knowledge about over-the-counter (OTC) drugs was administered verbally to representatives from 200 urban and 200 rural households. Self-medication was common in both groups but there were more drugs present in rural (336 items) than urban homes (231 items) with the differences largely due to the more frequent presence of traditional medicines in rural homes.
2 Analgesics were the commonest items in the homes of both groups. A positive urine screening test for aspirin, chloroquine, or antibiotics was found in 25% of urban and 27% of rural samples tested. Respondents who elected to use an OTC drug for a particular symptom usually chose an appropriate drug.
3 Rural respondents were more likely to use traditional medicines particularly for the treatment of cough, abdominal pain, and diarrhoea.
4 Knowledge about dosages, the possibility of adverse reactions, and the seriousness of potential poisoning with OTC drugs was inadequate and needs to be corrected for more efficient self-medication.

Keywords over-the-counter drugs self-prescribing drug utilization

Introduction

Self-medication is common, both in developed and developing countries (Buchanan, 1979; Peach, 1983; Joubert *et al.*, 1984). Raynal (1985) found that even in isolated rural Zimbabwean communities with access to free medical care at local rural health centres, stores in the area sold over-the-counter (OTC) drugs in an amount equivalent to 52% of that dispensed at the health centres. Previous studies in developing communities have quantified the types of drugs used but have not examined knowledge about self-medication (Buchanan, 1979; Joubert *et al.*, 1984). Since inappropriate or dangerous self-medication is more likely to occur with usage by poorly informed people, the extent of inappropriate as well as appropriate self-medication, and the depth of knowledge in a community need to be assessed. We therefore studied these aspects of self-medication in two urban and two rural Zimbabwean communities.

Methods

A questionnaire (available from C.M.S. on request) was drawn up which detailed: demographic data about each respondent and household; the medications (orthodox and traditional) present in the home; the source of these medications; the interviewee's response to common symptoms; and responses to simple questions which examined knowledge about self-medication. The questionnaire was tested and modified prior to use.

Two typical high density suburbs in Harare (Mbare and Highfields) were studied. A map of the area was divided into squares sized approximately 500 square metres. Two squares in each suburb were selected using a table of random numbers and households visited in sequence starting at the bottom left hand corner of each square and progressing in a clockwise direction until 50 households had been interviewed. Two rural areas (Chibi and Urungwe) were studied

Correspondence: Dr C. M. Stein, Department of Clinical Pharmacology, University of Zimbabwe, P.O. Box A 178, Avondale, Harare, Zimbabwe

similarly. An ordinance survey map of the area was divided into squares sized approximately 1 square kilometre and households selected as in the urban area. Interviewers did not miss any households. The person answering the door, if older than 12 years, was interviewed. If a child answered the door the adult called by the child was interviewed. For the purposes of this study an urban respondent was defined as someone who had lived in a town or city for at least 9 months of the year for the previous 3 years, and a rural respondent was defined as a person who had lived at least 20 km from a town in an area without tarred roads or electricity and piped water in individual houses for at least 9 months of the year for the previous 3 years.

Interviewers (NPG and BBM) administered the questionnaire verbally, examined the medications present in the house and if the respondent agreed, collected a urine specimen and immediately tested for the presence of aspirin using the ferric chloride test (Clarke, 1975), and chloroquine using the eosin colour test of Dill and Glazko (Lelijveld & Kortmann, 1970). A micro-biological disc diffusion method for the detection of antimicrobial activity using a stock culture of *Staphylococcus aureus* sensitive to penicillin, tetracycline, and sulphonamides was used (Cruikshank *et al.*, 1975). The two interviewers were trained to ensure uniform interpretation of the ferric chloride and Dill Glazko tests, and all plates testing for antimicrobial activity were read by a single observer (CMS). Statistical analysis comparing urban and rural samples was performed when appropriate using a chi-squared test. The level of statistical significance was set at $P < 0.05$.

Table 1 Demographic data of the respondents

	Urban (n = *200*) *Number (%)*	*Rural* (n = *200*) *Number (%)*
Sex		
Male	83 (41.5)	99 (49.5)
Female	117 (58.5)	101 (50.5)
($\chi^2 = 2.27$, P = NS)		
Age (years)		
⩽ 19	44 (22)	65 (32.5)
20–29	97 (48.5)	71 (35.5)
30–39	28 (14)	30 (15)
40–49	14 (7)	15 (7.5)
50–59	10 (5)	7 (3.5)
60–69	2 (1)	11 (5.5)
⩾ 70	5 (2.5)	1 (0.5)
($\chi^2 = 14.1$, $P < 0.05$)		
Formal education		
Nil	25 (12.5)	38 (19)
Primary school	69 (34.5)	92 (46)
Secondary school	104 (52)	68 (34)
Tertiary education	2 (1)	2 (1)
($\chi^2 = 12.7$, $P < 0.01$)		

Results

The demographic data of the study populations are shown in Table 1. The average number of persons per household was 6.2 (urban) and 6.6 (rural). The number of medications found in each household is shown in Table 2. The total number of medications found in the urban households was 231 and in the rural households 336. The types of medicines found are shown in Table 3. The source of the orthodox medicines in urban homes was: store (61%), pharmacy (27%), clinic or hospital (12%), and in rural homes: store (85%), pharmacy (11%) and clinic or hospital (4%). Drugs bought from a store are OTC drugs obtained from general dealer stores or supermarkets. Fifty-three urban respondents (26.5%) and 37 rural respondents (18.5%) said they had taken self-medication in the 24 h prior to the interview. Thirty-three of 130 urban urine specimens and 37 of 136 rural specimens tested

Table 2 The number of medications found in urban and rural households

Number of medications	*Number of households* *Urban* (n = *200*)	*Rural* (n = *200*)
0	74	75
1	51	36
2	50	34
3	22	25
4	1	14
⩾ 5	2	16

$\chi^2 = 28.0$, $P < 0.001$.

Table 3 The number of times each type of medicine was found in urban and rural homes

Type of medicine	*Urban*	*Rural*
Analgesics	125	136
Traditional	1	93
Chloroquine	7	40
Cough mixture	33	28
Antacids	18	17
Ointments	22	10
Prescription drugs	13	3
Miscellaneous	12	9

Table 4 The number of urine samples which yielded a positive screening test

Drug detected	*Urban (n = 130) Number (%)*	*Rural (n = 136) Number (%)*
Aspirin	25 (19)	14 (10)
Chloroquine	4 (3)	11 (8)
Antimicrobial	4 (3)	12 (9)

$\chi^2 = 7.9$, $P < 0.025$.

yielded a positive screening test for the presence of either aspirin, antimicrobials or chloroquine ($\chi^2 = 0.1$, P = NS). The details of the positive urine samples are shown in Table 4.

The interviewees response to common symptoms or illnesses are recorded in Table 5. All interviewees answered every question. The balance of the 100% response, except for questions relating to earache and diarrhoea, is formed by those who said they would do nothing or did not know what they would do. In addition to the options listed, other remedies were commonly used for earache and diarrhoea. Cooking oil, applied to the external auditory meatus, was used for earache by 13.5% of urban and 10.5% of rural respondents. Diarrhoea, in addition to the options in Table 5, was treated with a salt and sugar solution (14% urban, 3.5% rural), a salt solution (7.5% urban, 3.5% rural) or fluids alone (6.5% urban, 0.5% rural).

Malaria prophylaxis was taken by 38 (19%) urban and 65 (32.5%) rural respondents ($\chi^2 = 9.6$, $P < 0.01$). Chloroquine was the only agent used. Only six of 38 urban and 20 of 65 rural respondents who used chloroquine knew the correct dose ($\chi^2 = 2.11$, P = NS). Respondents were asked how they determined the dose of any OTC medication and the results are shown in Table 6. Thirty-two urban and 34 rural respondents said they continued self-medication while

Table 5 The response of urban and rural interviewees to common symptoms or illnesses

Symptom or illness	*Response (%) Urban (n = 200)*			*Rural (n = 200)*		
	OTC	*Clinic*	*Trad.*	*OTC*	*Clinic*	*Trad.*
Headache	89	2	0.5	67.5	13.5	10
Cough	81.5	9.5	2.5	44	14.5	22
Fever	30	36.5	0	33	41.5	4.5
Bilharzia	0	96.5	0	0	80	6
Vomiting	0	45.5	1	0	46.5	4
Constipation	68	22.5	4	39	32.5	10
Abdominal pain	34	50	13	12	38.5	32.5
Helminths	8	94	0.5	4	78	5
Influenza	57	17	0	35	31	5.5
Haemoptysis	4.5	94	0.5	1	83	4
Weight loss	1.5	79.5	0	0.5	64	3
Insomnia	0	10.5	0	0	18	1
Earache	3.5	78.5	4	3	59	18
Diarrhoea	8.5	33	5.5	6	46.5	28

OTC – interviewee would respond to the symptom by taking an OTC drug. Clinic – interviewee would respond to the symptom by visiting a primary care clinic or doctor. Trad. – interviewee would respond to the symptom by taking traditional medicine.

Table 6 How urban and rural respondents determined the dose of OTC medication

Response	*Number of respondents (%) Urban (n = 200)*	*Rural (n = 200)*
Package instructions	159 (79.5)	77 (38.5)
Did not know	29 (14.5)	96 (48)
Severity of symptoms	0 (0)	11 (5.5)
Asked storekeeper	6 (3)	4 (2)
Always took two	6 (3)	12 (6)

Table 7 Responses to questions testing knowledge about OTC medicines in urban and rural respondents

Question	% answering yes *Urban* (n = 200)	*(Rural* n = 200)	
Can any OTC drug be harmful?	38	21.5	$\chi^2 = 12.3$, $P < 0.005$
Can aspirin be harmful?	60.5	47.5	$\chi^2 = 6.3$, $P < 0.025$
Can taking many aspirins cause death?	18	15	$\chi^2 = 0.5$, P = NS
Do you change the dose of medicines for children?	94.5	84.5	$\chi^2 = 9.6$, $P < 0.01$

being treated by a doctor or clinic. The responses to questions which tested knowledge about OTC drugs are shown in Table 7.

Discussion

Orthodox medicines like analgesics, cough mixtures and antacids were commonly found both in urban and rural homes but chloroquine was found more commonly in rural homes. The widespread use of OTC drugs in rural communities with access to free health care has been reported previously (Raynal, 1985). We did not study the availability of drugs in stores or rural health centres in this study but Raynal (1985) found that the likelihood of an OTC drug being out of stock at any given time was 24% for rural health centres and 10% for nearby stores. Other reasons proposed for the use of OTC drugs obtained from stores were immediate and friendly service in stores, longer opening hours and greater privacy (Raynal, 1985). The larger number of medicines in rural homes (Table 2) was due to the 93 traditional medicines compared with a single traditional medicine found in an urban home. The number of items in each household (1.7/rural household and 1.2/urban household) compares with 1.6 items (urban black South Africans) (Joubert *et al.*, 1984), 5.6 items (urban black South Africans) (Buchanan, 1978), 8.8 items (urban white South Africans) (Joubert *et al.*, 1984), and 10.3 items (United Kingdom) (Dunnel & Cartwright, 1972) per household in other studies. Four or more drugs were found in 15% of rural homes compared with 1.5% of urban homes ($\chi^2 = 22.3$, $P < 0.001$). An explanation might be the relatively easy access in urban areas to immediate purchase of OTC medications compared with isolated rural areas. The source of drugs in rural areas was predominantly local stores (85%) whereas in urban homes 27% of drugs had been bought at a pharmacy. There is no pharmacy in the two rural areas studied but general dealer stores which stock OTC drugs are within walking distance. The monthly income of each household was recorded, but most rural respondents could not estimate this because income from subsistence farming was difficult to quantify. The relationship between income and the number of medicines found in each household could therefore not be examined. A history of drug ingestion in the previous 24 h was obtained from 26.5% (urban) and 18.5% (rural) respondents whereas in the United States 30% of respondents had used a non-prescribed medicine in the previous 48 h (Bush & Rabin, 1976) and in Canada 60% of subjects had taken at least one drug in the previous 48 h (Chaiton *et al.*, 1976).

Analgesics, most commonly aspirin containing compounds, were both the commonest drugs found in homes and the most frequently used. The ferric chloride test for aspirin was positive in 19% of urban samples and 10% of rural samples tested. This contrasts with developed countries where 60% of Australians are said to take two or more doses of analgesics a day (Wade, 1976), and a study from a Jerusalem blood transfusion service where the presence of aspirin was detected in the blood of 6% of healthy donors (Sharon *et al.*, 1980).

Malaria is not endemic in the city of Harare but during the wet season when the study was performed transmission occurs in both rural areas studied (Taylor, 1985), hence the more frequent presence of chloroquine in rural homes. Chloroquine is the only antimalarial agent widely available over-the-counter. The Dill Glazko urine test for organic bases such as chloroquine has been reported to be reliable (Ghosh *et al.*, 1976) but has also been criticized for lacking sensitivity (Verdier *et al.*, 1985). In view of this, our results may underestimate the true prevalence of chloroquine use. Chloroquine and antimicrobial activity were detected more commonly in urine specimens from rural people (Table 4). Only 16% of urban respondents and 31% of rural respondents who said they took chloroquine for malaria prophylaxis knew the correct dose. Dosage schedules suggested varied from two tablets (300 mg base) monthly to 2 tablets daily. The use of chloroquine obtained over the counter has not previously been studied in detail and our findings have been discussed elsewhere (Stein *et al.*, 1988).

A history of recent antibiotic use was obtained from two of the 12 rural and two of the four urban subjects in whom antimicrobial activity was found in the urine. The remaining 12 subjects gave no history of recent ingestion of traditional medicine or unidentified medications. In many other developing countries antibiotics are freely available from non-medical sources (McEvoy, 1976; Sekhar *et al.*, 1981; Hossain *et al.*, 1982). This has not been a documented problem in Zimbabwe where the sale of prescription drugs like antibiotics is strictly controlled, but remains a possible explanation.

Table 5 shows that rural respondents were more likely to take traditional medicines and less likely to take OTC medicines than urban respondents. This may reflect closer ties with tradition in rural areas. We could not record the identity of traditional medicines found in rural homes since the respondents could seldom accurately identify the medicine. An extensive pharmacopoeia of traditional medicines is used (Gelfand *et al.*, 1985) and identification by inspection of a powder or dried herb is seldom possible. Both urban and rural respondents commonly elected to seek medical treatment for intestinal helminths and schistosomal infections. Both also commonly elected to use OTC drugs for the treatment of headache, cough, constipation and influenza. Rural respondents commonly elected to use traditional medicines for the treatment of abdominal pain, cough, diarrhoea and earache. Very few people thought that insomnia was a symptom worthy of treatment. This contrasts with the frequency of hypnotic use in developed countries (Chaiton *et al.*, 1976; Baum *et al.*, 1984).

Diarrhoea is a major cause of childhood morbidity and mortality in developing countries. The use of oral rehydration therapy has been widely taught in Zimbabwe at primary health care level so that the responses to this question were disappointing. The advice given and drugs dispensed for diarrhoea at pharmacies in other developing countries has been shown to be inappropriate (Tomson & Sterky, 1986) and population education through the media as achieved in Egypt (Anonymous, 1986) has resulted in more appropriate management of diarrhoea.

Inappropriate use of OTC medications included the use of chloroquine for headaches (urban 1%, rural 1.5%), analgesics for malaria prophylaxis (rural 2.5%), chloroquine for influenza (rural 2%), magnesium containing antacids for diarrhoea (urban 3.5%, rural 3%) and aspirin containing analgesics for indigestion (urban 10%, rural 4.5%). Marked weight loss and haemoptysis are potentially serious symptoms which should not be treated with self-medication. Medical advice for haemoptysis would be sought by 94% of urban and 83% or rural respondents ($\chi^2 = 10.8$, $P < 0.01$) and for marked weight loss by 79.5% of urban and 64% of rural respondents ($\chi^2 = 11.1$, $P < 0.01$).

Raynal (1985) found that the dosage instructions for OTC drugs were incomprehensible to a rural Zimbabwean population and that advice was seldom sought from storekeepers. Dosage instructions on OTC drugs are usually printed only in English and few have warnings regarding side effects or toxicity (Raynal, 1985). The proportion of respondents literate in English to the extent of being able to follow the instructions on OTC drugs was not assessed. Since the majority of respondents had received some formal education comprehensible written instructions could be expected to result in more appropriate use. In developed countries although few patients seek advice from pharmacists (Stewart & Cluff, 1971) they generally follow the dosage recommendations on the container (Peach, 1983). We found that 48% of rural respondents (Table 6) were unable to say how they would determine the dose of an OTC drug, with only 2% consulting storekeepers. In rural stores OTC drugs such as analgesics are often sold in units of two tablets hence the concept of two tablets always being the correct dose in 6% of rural and 3% of urban respondents.

In the United States it is estimated that 18% of admissions to hospital for an adverse drug reaction are due to OTC drugs, with aspirin being the most commonly implicated drug (Caranasos *et al.*, 1974). The minority of our respondents were aware that OTC drugs could be harmful and knowledge about aspirin, the most commonly used OTC drug, was unsatisfactory with only 18% of urban respondents and 15% of rural respondents aware that aspirin in overdose is potentially fatal. In the United States 89% of a sample of parents of varying socio-economic status realized that an overdose of aspirin could be fatal (Kapasi *et al.*, 1980). Failure to alter the dose of OTC drugs for children (5.5% of urban respondents and 10.5% of rural respondents) is potentially dangerous, particularly for drugs like aspirin and chloroquine.

Self-medication for minor illness offers the patient immediate access to symptom relief and is common in both urban and rural Zimbabweans. Informed use of OTC drugs offers a valuable adjunct to the health services. Traditional medicines are still widely used, particularly by rural people. There is an urgent need for risk-benefit analysis of these preparations since life

threatening complications have been reported (Gold, 1980). Over-the-counter drugs are generally selected appropriately, but knowledge about dosages, the possibility of adverse reactions, and aspirin poisoning is unsatisfactory. Chloroquine is available over-the-counter but most people taking it for malaria prophylaxis are taking an incorrect dose and malaria prophylaxis is taken in Harare where there is no malaria transmission. Advertising on radio, television and in magazines (Sheiman, 1980; Nyazema, 1983) influences the sales of OTC drugs rather than attempting to achieve safe and appropriate use. The ability of advertising to educate and modify the behaviour of all sectors of the community has been demonstrated by the effective promotion of oral rehydration therapy in Egypt (Anonymous, 1986). It is through these media as well as comprehensive and comprehensible package inserts (Kyi *et al.*, 1977), that more efficient use of self-medication is possible. A comparable study could be performed in the future to assess change.

We thank Dr Guy Taylor for helpful criticism of the manuscript.

References

Anonymous. (1986). Notes and news: the silent emergency. *Lancet*, **ii**, 1472.

Baum, C., Kennedy, D. L., Forbes, M. B. & Jones, J. K. (1984). Drug use in the United States in 1981. *J. Am. med. Ass.*, **251**, 1293–1297.

Buchanan, N. (1979). Self-medication in a developing community. *S. Afr. med. J.*, **56**, 609–611.

Bush, P. J. & Rabin, D. L. (1976). Who's using nonprescribed medicines? *Med. Care*, **14**, 1014–1023.

Caranasos, G. J., Stewart, R. B. & Cluff, L. E. (1974). Drug induced illness leading to hospitalization. *J. Am. med. Ass.*, **228**, 713–717.

Chaiton, A., Spitzer, W. O., Roberts, R. S. & Delmore, T. (1976). Patterns of medical drug use – a community focus. *Can. med. Ass. J.*, **114**, 33–37.

Clarke, E. G. C. (1975). *Isolation and identification of drugs Vol. 1*, p. 8. London: The Pharmaceutical Press.

Cruikshank, R., Duguid, J. P., Marmion, B. P. & Swain, R. H. A. (1975). *Medical microbiology*, 12th edition, pp. 190–208. London: Churchill Livingstone.

Dunnel, K. & Cartwright, A. (1972). *Medicine takers, prescribers and hoarders*. London: Routledge and Kegan Paul.

Gelfand, M., Mavi, S., Drummond, R. B. & Ndemera, B. (1985). *The traditional medical practitioner in Zimbabwe: his principles of practice and pharmacopoeia*. Gweru: Mambo Press.

Ghosh, R. B., Roy, R. G. & Sitaraman, N. L. (1976). Dill and Glazko eosin colour test for detection of chloroquine in urine. *Trans. Roy. Soc. Trop. Med. Hyg.*, **70**, 169.

Gold, C. H. (1980). Acute renal failure from herbal and patent remedies in Blacks. *Clin. Nephrol.*, **14**, 128–134.

Hossain, M. M., Glass, R. I. & Khan, M. R. (1982). Antibiotic use in a rural community in Bangladesh. *Int. J. Epidemiol.*, **11**, 402–405.

Joubert, P. H., Sebata, P. D. B. & van Reenen, O. R. (1984). Self-medication in a developing community. *S. Afr. med. J.*, **65**, 129–131.

Kapasi, A. A., Lorin, M. I., Nirken, M. H. & Yudovich, M. (1980). Parents' knowledge and sources of knowledge about antipyretic drugs. *J. Pediatr.*, **97**, 1035–1037.

Kyi, K. K., Pradal, H., Simon, P., Kewitz, H., Adjepon-Yamoah, K. K., Kaldor, A. *et al.* (1977). Minimum information for sensible use of self-prescribed medicines. An international consensus. Report by an *ad hoc* working group. *Lancet*, **ii**, 1017–1019.

Lelijveld, J. & Kortmann, H. (1970). The eosin test of Dill and Glazko: a simple field test to detect the presence of chloroquine in urine. *Bull. WHO*, **42**, 477–479.

McEvoy, J. (1976). The bus-stop dispenser. *East. Afr. med. J.*, **53**, 193–195.

Nyazema, N. Z. (1983). An examination of the use of over-the-counter drugs in Harare. *Cent. Afr. J. Med.*, **29**, 203–208.

Peach, H. (1983). Trends in self-prescribing and attitudes to self-medication. *Practitioner*, **227**, 1609–1615.

Raynal, A. L. (1985). Use of over-the-counter medications in rural Matabeleland, Zimbabwe: the case for upgrading the dispensing skills of rural shopkeepers. *Cent. Afr. J. Med.*, **31**, 92–97.

Sekhar, C., Raina, R. K. & Pillai, G. K. (1981). Some aspects of drug use in Ethiopia. *Trop. Doct.*, **11**, 116–118.

Sharon, R., Kidroni, G. & Michel, J. (1980). Presence of aspirin in blood units. *Vox. Sang.*, **38**, 284–287.

Sheiman, D. J. (1980). Effects of televised drug commercials on children. *Pediatrics*, **65**, 678.

Stein, C. M., Gora, N. P. & Macheka, B. M. (1988). Self-medication with chloroquine for malaria prophylaxis in urban and rural Zimbabweans. *Trop. Geogr. Med.*, **40**, 264–268.

Stewart, R. B. & Cluff, L. E. (1971). Studies on the epidemiology of adverse drug reactions 6: Utilization and interactions of prescription and nonprescription drugs in outpatients. *Johns Hopkins med. J.*, **129**, 319–331.

Taylor, P. (1985). The malaria problem in Zimbabwe. 1. The epidemiology. *Cent. Afr. J. Med.*, **31**, 163–166.

Tomson, G. & Sterky, G. (1986). Self-prescribing by way of pharmacies in three Asian developing countries. *Lancet*, **ii**, 620–622.

Verdier, F., Ramanamirija, J. A., Pussard, E., Clavier, F., Biaud, J. M., Coulanges, P. & le Bras, J. (1985). Unreliability of Dill Glazko test in detecting choroquine in urine. *Lancet*, **i**, 1282–1283.

Wade, D. N. (1976). The background pattern of drug usage in Australia. *Clin. Pharmac. Ther.*, **19**, 651–656.

(Received 15 July 1988, accepted 17 February 1989)