

# The point accuracy of paediatric population registers

JACQUELINE HEWARD, BA, SRN, SCM, HV

Nursing Officer, Leicestershire Area Health Authority (Teaching)

DAVID G. CLAYTON, MA

Senior Lecturer in Medical Statistics, Department of Community Health, University of Leicester Medical School

**SUMMARY.** The accurate identification of paediatric populations in primary health care is not being achieved. Fifteen per cent of the children were not at the address given for them on one or more of the three registers studied. Our calculations suggest that a further number of children in the community may appear on none of the three available registers.

### Introduction

**T**HE Report of the Committee on Child Health Services (1976) recommended the creation of a reorganized, integrated child health service based on the provision of comprehensive primary health care through the framework of general practice.

For this to be effective, the members of the primary health care team need to be able to identify the children for whom they are responsible. However, little is known about the accuracy of existing paediatric population registers held by general practices and area health authorities or their ability to provide reliable information about the location of children included on them.

### The three paediatric population registers

There are three paediatric population registers in common use and they are derived from two sources. The health visitor's record card and the area health authority immunization and vaccination computer appointment file are made up from the birth registration record and the general practice age/sex register from the medical record of the family practitioner committee.

© *Journal of the Royal College of General Practitioners*, 1980, 30, 412-416.

### 1. Health visitor records

The health visitor's record is separate from the medical record card held by the general practitioner, and is initiated by the area health authority at the time of the child's birth, or on notification of a move into the area by a health visitor or another area health authority. The record is removed if the health visitor or area health authority is made aware of a change of general practitioner or of the patient's moving out of the area.

### 2. Age/sex register

It is estimated that there are age/sex registers in 15 per cent of general practices, and 65 per cent of teaching practices (Irvine and Jeffreys, 1971). The cards making up the registers are completed from the details on the medical records, or from the files of the family practitioner committee, when the patient registers with the practice or later. The card is removed after recall of the medical record envelope by the family practitioner committee. Few of the registers are routinely checked for accuracy, and there has been little specific interest in the pre-school age population (Fraser, 1978).

### 3. Immunization and vaccination computer appointment file

Some area health authorities, including Leicestershire, hold a central file for the immunization and vaccination records of children within their area. The Leicestershire system has been extended to include an appointment scheme for developmental assessment as well as prophylaxis. The child's details are added to the file following a short delay during which parental consent is obtained, either at birth or after notification of a move into the area. The record is removed if the area health authority is made aware of a change of general practitioner or of the patient's moving out of the area.

**The study**

*Aim*

The aim was to measure how far the health visitor's record cards, practice age/sex register, and area health authority immunization and vaccination computer appointment files provided accurate information about the addresses of children aged from birth to their fourth birthday for whom the practice was responsible. It should be stressed that the present study was cross-sectional and could, therefore, only assess the accuracy at one point in time.

**Method**

The study was conducted in five teaching practices linked to the Department of Community Health. They are located in different kinds of areas, including the inner city, suburbs, large villages, and a small mining town. Each has one or more attached health visitors working in them. All the staff in each practice had the objectives of the study explained to them and gave permission for access to their records.

*Study population and sample*

The first stage was to compare and collate the three registers for these practices. This yielded 2,648 distinct names of children present on at least one of the three registers. This list was further sampled to provide the study group for the field survey. Of the 2,090 names that were present on all three systems, a total of 120 were sampled. In order to focus the fieldwork on possible inaccuracies, a stratified random sample of 406 children who were not on all three registers was chosen. This made a total sample size of 526 for the field survey.

The field survey took the form of a postal enquiry. A standard letter with reply paid envelope was sent to the parents of all the children included in the sample, in order to check that they were living at the given address. If there was no reply this was followed by a second letter and then a visit. A contactable child was defined as one

found to be living at an address given on one of the three registers and known to be a practice patient.

For the duration of the study, a card was allotted to each child, on which was recorded the sex, name(s), address(es), date(s) of birth, health visitor's record card number, and the general practice. The presence of the child's details on each of the three registers was noted, plus the response to the field survey.

**Results**

Of the 526 letters that were sent out at the first mailing, 82 per cent were returned either by the parents or the Post Office. This was increased to 94 per cent at the second attempt. The remaining 29 (six per cent) were visited at the address given on the register(s).

The presence or absence of children at the addresses given, as found in the postal survey, is shown in Table 1. Three hundred and seventy-four children (71 per cent) were found to be present. Of the three registers, the health visitor's record proved to be the best indicator of the child's presence at the address given. Seventy children had moved to a known new address, 23 of these being to a different health authority's area. Of the 47 that remained within Leicestershire, 17 had moved address but kept the same general practitioner.

Doubt remains about the address of 65 children who made up 12 per cent of the sample. Over half of these were present only on the age/sex register or the immunization/vaccination computer appointment file, and had probably moved. In all instances the letter posted to them was returned unopened.

The remaining 17 (three per cent) of the sample categorized as 'other' were mostly entries which proved to be clerical errors. These included several adults, children who did not exist, the records of a foster child that had not arrived in the area, a change of general practitioner, and one refusal to co-operate in the study. The age/sex registers were the greatest source of error in this group.

**Table 1.** Location of children in the field survey

Health visitor's record	Age/sex register	Immunization vaccination file	Sample size	Present	Moved				Other
					Same general practitioner	Within area	Out of area	Not known	
+	+	+	120	109	5	3	0	3	0
+	+	-	57	45	3	1	0	5	3
+	-	+	91	73	1	4	3	8	2
-	+	+	59	37	3	6	6	7	0
+	-	-	75	63	3	2	0	4	3
-	+	-	91	40	2	7	7	27	8
-	-	+	33	7	0	7	7	11	1
Total			526	374	17	30	23	65	17

**Table 2.** Estimated number of children contactable in the total practice population from which the sample was taken.

Health visitor's record	Age/sex register	Immunization vaccination file	Total number	Sample	Percentage present	Estimated total number present
+	+	+	2,090	120	90.33	1,888.8
+	+	-	63	57	80.09	50.5
+	-	+	142	91	80.22	113.9
-	+	+	67	59	63.81	42.8
+	-	-	88	75	84.00	73.9
-	+	-	165	91	43.24	71.3
-	-	+	33	33	21.21	7.0

Table 2 estimates the total number of children contactable in the study population by applying the sample results to the study population, and these results are aggregated in Table 3. This shows the number of entries on each register and estimates the number of children contactable within the study population. The health visitor's record card does marginally better than the other two registers, possibly because it records the existence of children from birth. However, taking a combination of all three registers, there are still 15 per cent of children not accounted for at the address given for them.

An attempt to estimate the true population of children within the five practices is given in Table 4. It is an estimate of the amount of deflation present within the three registers. In this table  $x$  represents the unknown number of children in the first four years of life, present in the community but not present on any of the three registers, and therefore not allocated to or known to any primary health care team. The appendix shows that this may represent as many as 200 to 300 children in the five practices. Of the estimated  $(2,415 + x)$  children present in the practices we would expect the health visitor records to identify 2,278, the age/sex register 2,210 and the immunization vaccination computer appointment file 2,197.

Table 5 shows the age distribution of children contacted, related to their presence or absence on each of the three registers. This allows us to judge if inaccuracies are related to age.

Few of the omissions from the health visitor's records were in the youngest age range, but inaccuracy increases with the age of the child. The reverse is shown for the age/sex register. The immunization vaccination computer appointment file shows a number of errors unrelated to age. This may partly be because of the effects on the results of a point accuracy study, and the delays in the recording system.

**Discussion**

The three paediatric population registers reflect a major characteristic of general practice. They are subject to continual change, even where the population is thought

**Table 3.** Number of entries on each register, and the number and percentage of children within the study population contactable at the given address.

Register	Number of entries	Present at address	
		Number	Percentage
Health visitor's record	2,384	2,127	89.2
Age/sex register	2,386	2,053	86.1
Immunization vaccination file	2,273	2,052	88.0
Any of three	2,648	2,248	84.6

to be relatively stable. All three registers are used for the identification of the children recorded on them and may provide a population for research purposes.

We have shown that if all three registers are taken together, 85 per cent of the children aged from birth to four years old are likely to be found at the address given for them. In an area health authority that has 40,000 children in this age group, approximately 6,000 will not be contactable at the address given for them. A further 3,200 to 4,800 children in group  $x$  are not even documented.

The health visitor's record card has proved to be the most accurate record of the presence and contactability of the child in the community, particularly because of the system of notification of new births.

It is rather disturbing that the age/sex register for pre-school aged children is most inaccurate for those aged from birth to one year, a time when mortality and morbidity is high and the child at greatest risk.

These findings reflect the way that additions are made to the age/sex registers reviewed in this study. The child is not added to the register until a medical record envelope arrives from the family practitioner committee, enabling the general practitioner to be eligible for the capitation fee. Registration of the newborn with the general practitioner services tends to be haphazard and the indications are that even in the minority of practices that maintain age/sex registers, the majority

of children in this age group cannot be quantified and identified.

The immunization and vaccination computer appointment file was the least accurate register. This result may reflect delays in processing and updating the system rather than permanent errors. However, the files studied did list seven children who were present at the field survey but not recorded on either of the other registers. This indicates that improvements could be made.

The accuracy and use of the three paediatric population registers may also be affected by other variables, which include mobility within the practice population, the knowledge staff may have of this movement, and the accuracy of record keeping. Communications between patients and staff, and among the different staff within the primary health care team, are also likely to be important factors.

In the study, it became apparent that children who remain with the same general practice from birth onwards are the ones most likely to have their details recorded on all three registers, and to be at the address given for them.

Of the 15 per cent of children who could not be contacted, most will have changed their address at least once. Delays in the generation or transfer of records for

each of the three registers may explain some of the inaccuracies in this group.

Some of these children may be particularly 'at risk'. They are the children of parents who may be 'absent' because they are homeless, of low income, unemployed, mentally ill, subnormal, single, or very young. Although a number may be known to members of other primary health care teams at their new address, others may not. It is likely that the number of such 'at risk' children will be increased further by some of the children in group *x*.

### Conclusion

We have shown that the accurate identification of paediatric populations in primary health care is not being achieved. Of the 2,648 total names on the three registers in the study population, there was total agreement in only 2,090 instances. The remaining 558 names represent a grey area where the system of communication was either slow or non-existent. If there is to be an improvement in paediatric surveillance, particularly of children who may be classified as 'at risk', the child health services will need to evolve strategies for overcoming some of the problems of identification and contactability discussed in this paper.

**Table 4.** Estimated true population of children present in the five practices.

Health visitor's record	Age/sex register	Immunization vaccination file	Total	Sample	Percentage			Estimated population present
					Present	Moved within practice	Total in practice	
+	+	+	2,090	120	90.33	6.41	96.74	2,022.8
+	+	-	63	57	80.09	11.04	91.13	57.4
+	-	+	142	91	80.22	4.87	85.09	120.8
-	+	+	67	59	63.81	5.54	69.35	46.5
+	-	-	88	75	74.00	3.32	87.32	76.8
-	+	-	165	91	43.24	7.03	50.27	82.9
-	-	+	33	33	21.21	2.15	23.36	7.7
-	-	-						<i>x</i>
								2,414.9 + <i>x</i>

**Table 5.** Age distribution of children contacted.

Age	Cumulative percentage							
	Present	Health visitor's records		Age/sex register		Immunization vaccination file		
		Present	Absent	Present	Absent	Present	Absent	
< 6 months	26.3	32.8	4.5	9.8	53.7	23.4	30.8	
Up to 12 months	37.9	44.0	16.9	20.9	66.0	35.7	41.0	
Up to 24 months	56.0	60.6	40.4	41.4	80.3	58.3	52.6	
Up to 36 months	73.9	76.8	64.0	65.6	87.8	76.2	70.5	
Up to 48 months	100	100	100	100	100	100	100	
Total	391	302	89	244	147	235	156	
		391		391		391		



## COLLEGE ACCOMMODATION

Charges for college accommodation are reduced for members (i.e. fellows, members and associates). Members of overseas colleges are welcome when rooms are available. All charges for accommodation include breakfast and are subject to VAT. A service charge of 12½ per cent is added. Children aged 12 years and over, when accompanied by their parents, can always be accommodated; for those between the ages of six and 12 years, two rooms are being made available on a trial basis. Children under the age of six cannot be accommodated and dogs are not allowed. Residents are asked to arrive before 18.30 hours to take up their reservations.

From 1 April 1980, charges will be (per night):

	Members	Others
Single room	£8	£16
Double room	£16	£32
Flat 1	£25	£40
Flat 3 (self-catering with kitchen)	£35	£60

Charges are also reduced for members hiring reception rooms compared with outside organizations which apply to hold meetings at the College. All hirings are subject to approval and VAT is added.

	Members	Others
Long room	£60	£120
John Hunt room	£40	£80
Common room and terrace	£40	£80
Kitchen/Dining room	£20	£40

Enquiries should be addressed to:

**The Accommodation Secretary,  
Royal College of General Practitioners,  
14 Princes Gate, Hyde Park,  
London SW7 1PU.  
Tel: 01-581 3232.**

Whenever possible bookings should be made well in advance and in writing. Telephone bookings can be accepted only between 9.30 hours and 17.30 hours on Mondays to Fridays. Outside these hours, an Autophone service is available.

## Appendix

### Population estimation

The total population of children in the five practices has been estimated from the results obtained from the stratified random sample. In order to reduce the effect of sampling errors on these estimates, less than fully parametrized models have been fitted to the sample results.

Table 2

The proportion of children contactable at their designated address is estimated by fitting a linear model on the logit scale by the method of maximum likelihood. The model fitted omitted the second order interaction term and the first order interaction between HV and IV ( $\chi^2$  test of fit was 0.135 on 1 degree of freedom, NS).

Table 3

For children who had moved to known destinations, the proportion moving within the practice population was estimated, again using a logit model (main effects of HV and A/S only). These proportions were applied to the total numbers moving to gain the estimates of the total within practice records shown in this table.

### Estimation of $x$

The quantity  $x$  shown in Table 4 is, of course, not observable in a study of this type. However, one can give some order of magnitude estimates by considering log-linear contingency table models for the last column of this table. On the assumption of no second order interaction,  $x$  would be estimated as about 300, while omission of the negligible HV \* A/S term yields an estimate of around 200.

## References

- Committee on Child Health Services (1976). *Fit for the Future*. Court Report. London: HMSO.
- Fraser, R. C. (1978). The reliability and validity of the age-sex register as a population denominator in general practice. *Journal of the Royal College of General Practitioners*, 28, 283-286.
- Irvine, D. & Jeffreys, M. (1971). BMA Planning Unit survey of general practice 1969. *British Medical Journal*, 4, 535-543.

### Acknowledgements

We owe especial thanks to Dr Robin Fraser, Lecturer in the Department of Community Health, for his help and co-operation with the study. We would also like to thank Professor M. L. Marinker for help with early drafts of this paper; the general practitioners and staff of the five teaching practices for giving us access to their age/sex registers; the health visitors and nursing officers for the use of the health visitor's records, and Leicestershire Area Health Authority (Teaching) for providing the information from the immunization vaccination computer files. We are particularly indebted to our clerical workers for their hard work and interest. The study was funded by the Trent Regional Clinical Research Scheme and administered by Leicestershire Area Health Authority (Teaching), North-West District.

### Addendum

As a result of this study, the inclusion criteria for recording details of a child on the age/sex register has been altered in some of the general practices discussed.