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MIGRATION STATISTICS FROM THE 2001 CENSUS: What do we Want?

Phil Rees

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For further copies contact the Working Paper Secretary,
School of Geography, University of Leeds, Leeds, LS2 9JT
Telephone 0113 233 3300

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ABSTRACT

A vital but neglected aspect of social science research is the active participation in the development of official statistics. Without relevant and useful official statistics research findings must be confined to the small sample surveys that researchers can carry out. This paper contributes to the development of statistical outputs from the next decennial census. It reviews and evaluates the provision of migration information from previous censuses and makes recommendations for improved statistics on population movement from the 2001 Census.

CONTENTS

LIST OF TABLES

ACKNOWLEDGEMENTS

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1. MEASURING MIGRATION AND USING MIGRATION STATISTICS

This paper describes the statistical information on migration produced from previous British censuses, evaluates the information against analytical needs and makes recommendations about the migration statistics to be generated from the 2001 Census. In the first section conceptual and measurement issues are considered. The remaining sections of the paper look at the form and content of the different census data sets offering migration information.

1.1 What migration does a census measure?

Migration is the process of relocation of people over time and space. This demographic movement alters both sending and receiving communities. In low fertility countries where the balance between births and deaths is small, migration flows are the most important determinant of population change. This is the situation in the UK.

Censuses are used to measure migration through asking a question or questions about a person's prior location, at a fixed time in the past or at the time of the last migration. For most purposes the fixed internal question is preferable. The key advantages of a census for measuring migration are comprehensiveness and the ability to generate statistics about migrant characteristics. Censuses, however, have well known disadvantages as instruments for measuring migration. UK censuses only measure migration in one year out of every ten. Multiple migrations within the year prior to the census are missed as are migrants who die in the year. Censuses also fail to measure the number of emigrants. There is little that can be done about these deficiencies in the census. Other sources of migration information must be tapped (registers, surveys).

However, there are some improvements to the way migration is measured in a census that could be made. There a migration flow that can be measured, which is not. Children under one are not assigned a migrant status. However, they have a starting address in the year (place of usual residence at time of birth) and a usual address at the time of the census. Counts of such infant migrants are an essential input to subnational population estimation and projection. The American, Australian and Canadian censuses do manage to measure these migrants by tabulating place of birth against residence at the time of the census.

Recommendation 1. *Consideration should be given again to extending the migration question to capture* ***infant migrants****, as recommended by the Migration Question Sub-Group. If a question revision is ruled out, migration tables should report the migration status of the mother (or other parent/guardian if no mother is resident in the household) for children under one.*

There is also little information captured about the status of the migrant at the start of the year at the origin location, apart from those characteristics which can be easily inferred (e.g. age one year ago) or which do not change (e.g. country of birth). For example, the important relationship between employment status and migration cannot properly be measured because only status after the migration is known.

Recommendation 2. *Consideration should be given again to expanding the relevant questions to capture **economic position one year ago**, as recommended by the Migration Question Sub-Group.*

1.2 Undercounting of migration

Underenumeration is a particular problem for migration statistics. In the 1991 Census of Great Britain, the quality check (ONS, Heady, Smith and Avery 1996, Table 2.13, p.14) estimated that 0.9% more persons migrated in the year before the Census than were recorded therein. The mobility rate was 10.4% in the quality check sample but 9.5% in the census. An additional problem occurs when tables of migration flows are created. Many residents report that they had a different address one year ago but fail to provide details. The origin not stated category comprised 6% of migrants in the 1991 Great Britain Census. Migrant flows might therefore need boosting by an average of 16% to obtain a true picture of population movement. In most migration tables the number of migrants with an origin not stated are reported so that users can make their own adjustments. However, under the plans for a one number census (Jones 1997; ONS, GROS and NISRA 1997, pp.1-12) consideration should be given to imputing the missing origin information.

Recommendation 3. *Consideration should be given to the **problem of undercounting specific to the migration statistics**, because respondents systematically failed to report a different address one year before the census and because respondents who did report a different address failed to report origin details.*

1.3 What do researchers want to know about migration?

Accurate measures of the migration process are needed for several important purposes, which include population estimation, population forecasting, household forecasting and housing planning. A great many other activities and analyses are dependent on accurate achievements of these goals to which accurate measurement of migration contributes. Researchers also need data to examine the characteristics of migrants and to understand how characteristics affect the rate of migration. Flow data are vital for investigation of the relationship between migration and area characteristics and between migration and the friction of distance. Migration data linked to socio-economic data are important for understanding the influence of location and careers. Migration data from the Census are important for investigating the relationship between labour migration and labour market conditions. A comprehensive survey of questions about migration posed by researchers is provided in Champion and Fielding (1992).

Two kinds of migration are available from censuses to answer these kinds of questions. The first kind is made up of statistics that focus on areas, which include migrations into and out of those areas. The second kind consists of statistics that can be attached to flows between areas. Using the second kind of data the researcher can examine migration from origins to destinations. Using both kinds of migration the net balance of (intranational) migration for areas can be measured, while using flow data the net balance between specific places or types of places can be computed.

Researchers will want to classify migrants using as many of the attributes measured in the census as possible. For example, age and sex are frequently used in the demographic applications of migration data. Economic position, occupation and industry of migrant are used in economic analyses of migration. Migration by ethnicity has been examined in detail (Champion 1996; Rees and Duke-Williams 1995c). Housing market analyses use migration data classified by household attributes.

The analysis of migration by household structure is relatively undeveloped. The UK Censuses report the migration of wholly moving households and of households where the head has migrated, together with the residents of such households. However, there are other types of migration: individual migrants moving into households with non-migrant members and migrants moving between, into or out of communal establishments.

There is also the important migration flow of students from parental homes to university/college residences and from university/college residences to first career residences on graduation. This issue has been exposed by the Migration Question Sub-Group and the decision to record students as resident at their term time address will make possible the recording of these important, hitherto undercounted flows.

Recommendation 4. *A careful study should be undertaken of ways it will be possible to classify migrants by* ***household status*** *from the 2001 Census, with a view to recommending the kinds of new tables that might be produced. This study should involve collaboration between the Census Offices and customer sectors.*

Recommendation 5. *A careful study should be undertaken of ways it will be possible to classify migrants by* ***student status*** *from the 2001 Census, with a view to recommending the kinds of new tables that might be produced. This study should involve collaboration between the Census Offices and customer sectors.*

1.4 Published migration statistics from censuses

In the main body of the paper we review the statistics on migration produced in recent censuses. Some six different data sets from the UK census provide information about migration:

- National Migration Statistics
- Regional Migration Statistics
- Local Base Statistics and Small Area Statistics
- Special Migration Statistics
- Samples of Anonymised Records
- Longitudinal Study

These provide a wealth of information about migration in the UK, principally in the year before the Census. National Migration Statistics have been produced from the 1961, 1971, 1981 and 1991 Censuses and Regional Migration Statistics were published from the 1971, 1981 and 1991 Censuses. Some migration data are available in the Small Area Statistics from the 1971, 1981 and 1991 Censuses. Detailed flow data are

provided in the Special Migration Statistics from the 1981 and 1991 Censuses. The Samples of Anonymised Records provided microdata from the 1991 Census, from which users can produce their own tables of migrants. The Longitudinal Study (for England and Wales) provides information about migration over 25 years by recording migrant locations at seven points in time (1966, 1970, 1971, 1980, 1981, 1990 and 1991). These last two microdata sets are not considered directly in this paper but their shape in 2001 is being currently debated (Dale 1997; Gould 1997; Turton 1997).

1.5 Organisation of the paper

The rest of the paper is organised into five sections, which consider the main migration data sets in turn. The second section reviews provision of national migration statistics. The third section examines the regional migration statistics published from the census. The fourth section looks at migration data in the local base and small area statistics. The fifth section discusses the provision of flow data at local and small area scales in the Special Migration Statistics and tackles the confidentiality issue which is regarded as acute for such origin/destination flow data. The final section collects together the recommendations made in the paper into a comprehensive set.

2. NATIONAL MIGRATION STATISTICS

National Migration Statistics are part of the programme of Topic Reports laid before Parliament after each census and published by Her Majesty's Stationery Office. They provide the most detailed cross-classifications of migrants for countries, regions and a set of zones covering the whole of Great Britain. Separate statistics have been produced for Northern Ireland.

2.1 Harmonisation and integration of national migration statistics

The 1991 Census National Migration Statistics (OPCS and GROS 1994a, 1994b and 1994c) are organised in two parts occupying three bulky published volumes of nearly 1200 pages of statistics. The tables cover Great Britain only. A separate volume on Migration was published on Northern Ireland (CONI 1994). Harmonisation and integration of these into a volume covering the United Kingdom is needed.

Recommendation 6. *The National Migration Statistics should be consolidated into a* ***United Kingdom product*** *by harmonising and integrating the Great Britain and Northern Ireland tables.*

The content and organisation of the National Migration Statistics (Great Britain) are set out in Tables 1 and 2. The table titles, the cross-classification used, the geography adopted and the applicable population base for each table are described. This is not the place to debate the utility of each table but to extract some general points. It is useful to make a distinction between *migration area tables* and *migration flow tables.* The National Migration Statistics, the Regional Migration Statistics and the Special Migration Statistics all contain both kinds of table.

Table 1: Organisation and Contents of the National Migration Statistics, 1991 Census, Part 1 (100%)

N	Title	Contents (crosstab variables)	Geography (see Notes)	Migrants (different address one year before census)
1	**Origins and destinations**	*sex by area of origin by area of residence at Census*	Geography One	RESIDENTS
2	**Age and sex**	*sex by area of origin by age by area of residence at Census*	Geography One	RESIDENTS
3	**Marital status by age**	*age by sex by marital status by type of move*	Geography One	RESIDENTS
4	**Single years of age and marital status**	*age (single years) by sex by marital status by type of move*	Countries	RESIDENTS
5	**Economic position**	*sex by economic position by age by type of move*	Countries	RESIDENTS 16+
6	**Migrant households**	*type of move (for migrant and wholly moving households) by economic position of household head, amenities, car availability and persons per room by tenure, not in self contained accommodation and households with a least one child under one*	Countries	HOUSEHOLDS WITH RESIDENTS
7	**Migrants in households**	*type of move by economic position of migrants aged 16 and over, car availability and persons per room for all migrants, by tenure, not in self contained accommodation*	Countries	RESIDENTS IN HOUSEHOLDS
8	**Composition of wholly moving households**	*type of move by household composition*	Countries	WHOLLY MOVING HOUSEHOLDS
9	**Migrants in wholly moving households**	*type of move by age and limiting long-term illness*	Countries	RESIDENTS IN WHOLLY MOVING HOUSEHOLDS
10	**Distance of move**	*sex by distance of move by age*	Geography One	RESIDENTS
11	**Ethnic group**	*sex by age by ethnic group by type of move*	Countries	RESIDENTS
12	**Communal establishments**	*sex by type of establishment by limiting long-term illness by age by type of move*	Countries	RESIDENTS (NON-STAFF) IN COMMUNAL ESTABLISH-MENTS

Source: OPCS and GROS (1994a 1994b)
Notes:
Geography one: Great Britain, England and Wales, England, regions, metropolitan counties, Inner London, Outer London, other main urban centres, regional remainders, Wales, Cardiff District, remainder of Wales, Scotland, main urban centres, remainder of Scotland (32 zones plus aggregations)
Geography countries: Great Britain, England and Wales, England, Wales, Scotland

Table 2: Organisation and Contents of the National Migration Statistics, 1991 Census, Part 2 (10%)

N	Title	Contents (crosstab variables)	Geography (see Notes)	Migrants (different address one year before census)
1	**Origin and SEG**	*sex by area of origin by area of residence by economic position and SEG of employees, self-employed and unemployed*	Countries	RESIDENTS 16+
2	**Age and SEG**	*socio-economic group by sex by age by type of move*	Countries	RESIDENTS 16+ EMPLOYEES, SELF-EMPLOYED AND UNEMPLOYED
3	**Economic position and employment status**	*sex by economic position by employment status by type of move*	Countries	RESIDENTS 16+
4	**Occupation**	*sex by standard occupational classification (sub-major groups) by type of move*	Countries	RESIDENTS 16+ EMPLOYEES, AND SELF-EMPLOYED AND UNEMPLOYED
5	**Industry**	*sex by industry divisions by type of move*	Countries	RESIDENTS 16+ EMPLOYEES AND SELF-EMPLOYED
6	**Distance of move and SEG**	*sex by distance of move by economic position and socio-economic group of employees, self-employed and unemployed*	Geography one	RESIDENTS 16+, ECONOMICALLY ACTIVE
7	**Distance of move and occupation**	*sex by distance of move by standard occupational classification (sub-major groups)*	Geography one	RESIDENTS 16+ EMPLOYEES, AND SELF-EMPLOYED AND UNEMPLOYED
8	**Distance of move and industry**	*sex by distance of move by industry division*	Geography one	RESIDENTS 16+ EMPLOYEES, AND SELF-EMPLOYED AND UNEMPLOYED

Source: OPCS and GROS (1994c)

Notes:
Geography one:
Great Britain, England and Wales, England, regions, metropolitan counties, Inner London, Outer London, other main urban centres, regional remainders, Wales, Cardiff District, remainder of Wales, Scotland, main urban centres, remainder of Scotland (32 zones plus aggregations)

Geography countries:
Great Britain, England and Wales, England, Wales, Scotland

2.2 Migration area tables

Migration Area Tables classify residents in an area who report migration in the year prior to the census by a variety of attributes. An example is shown in Table 3 which shows a small part of National Migration Statistics, Part 2, Table 6. For 32 unit geographical classification proposed by Rees (1989), resident migrants aged 16 and over are counted by sex, distance of move class and socio-economic group. The table can be used to examine which SEGs move most over short distances and which over medium and long distances.

Where Migration Area Tables use the *Type of move (TYMO)* classification they organise migrants by general flow categories within which they are further classified. An example is shown in Table 4 which contains an extract from the National Migration Statistics, Part 1, Table 3. The type of move classification varies cleverly with the geographical scale of the focus (called area x below) but is basically of the form

a. Migrants resident in area x
b. Migrants moving within area x
c. Migrants moving within sub-areas of area x
d. Migrants moving into area x from the rest of the country
e. Migrants moving into area x from outside the country
f. Migrants moving into area x from origin not stated
g. Migrants moving from area x to the rest of the country

2.3 Migration flow tables

Migration Flow Tables provide interaction information about both origins and destinations. Flow tables can as a result be very large. The number of counts in area tables varies with N, the number of areas, but the number of counts in flow tables varies with N^2. As a result only two of the twelve 100% tables are flow tables (National Migration Statistics Part 1, Tables 1 and 2), and one out of eight 10% tables (National Migration Statistics, Part 2, Table 1). The flow tables spread over many pages and as a result it is difficult to grasp their structure. It would be better to present smaller, more readable tables in the published reports and to place larger tables in spreadsheet files which can be more easily inspected, comprehended and employed in further analysis.

Table 3: Portion of Table 6, Distance of move and SEG, National Migration Statistics, Part 2

Residents aged 16 and over with a different address within Great Britain one year before census									
TOTAL MIGRANTS	Economically active			Economically inactive					Sex and distance of move (kilometres)
	Total	On a government scheme	Students	Total	Students	Permanently sick	Retired	Other inactive	
a	b	c	d	e	f	g	h	i	j
				GREAT BRITAIN					
183,597	**154,731**	**2,237**	**912**	**28,866**	**8,710**	**6,549**	**11,743**	**1,864**	**All males**
98,146	82,392	1,257	430	15,754	4,004	4,091	6,827	832	0-4 km
23,768	20,706	270	96	3,062	791	781	1,299	191	5-9 km
16,288	14,293	154	47	1,995	530	511	827	127	10-19 km
12,278	10,445	122	61	1,833	582	405	669	177	20-49 km
5,901	4,776	69	55	1,125	473	169	359	124	50-79 km
27,216	22,119	365	223	5,097	2,330	592	1,762	413	80 or more km
196,134	**120,071**	**1,581**	**1,085**	**75,433**	**8,258**	**5,900**	**28,054**	**41,221**	**All females**
109,192	64,631	919	544	44,561	3,951	3,738	12,204	24,668	0-4 km
25,289	16,553	186	111	8,736	805	752	2,332	4,847	5-9 km
17,043	11,630	128	83	5,413	587	518	1,414	2,894	10-19 km
12,614	8,433	102	92	4,181	529	327	1,105	2,220	20-49 km
5,821	3,667	35	51	2,154	435	121	549	1,049	50-79 km
26,175	15,787	211	204	10,388	1,951	444	2,450	5,543	80 or more km

Source: OPCS and GROS 1994b, p.114. 1991 Census, Crown Copyright.
ESRC/JISC Purchase. Computer readable files provided by the Census Dissemination Unit, Manchester Computing on MIDAS service under */db/census91/topic/nm*.csv*.

Table 4: Extracts from Table 3, Marital Status and Age, National Migration Statistics, Part 1 for Yorkshire & Humberside Region

Residents with different address one year before census									
Age	TOTAL MIGRANTS	Males				Females			
		Total	Single	Married	Widowed or divorced	Total	Single	Married	Widowed or divorced
a	b	c	d	e	f	g	h	i	j
Migrants resident in Yorkshire & Humberside Region									
All ages 1 and over	442,196	218,340	122,560	75,491	20,289	223,856	114,355	76,475	33,026
1-4	35,852	18,494	18,494			17,358	17,358		
:									
90 and over	2,101	359	21	91	247	1,742	229	71	1,442
Migrants moving within Yorkshire & Humberside Region									
All ages 1 and over	346,817	168,372	92,120	59,534	16,718	178,445	89,671	60,438	28,336
1-4	28,780	14,782	14,782			13,998	13,998		
:									
90 and over	1,842	312	17	85	210	1,530	200	65	1,265
Migrants moving within districts of Yorkshire & Humberside									
All ages 1 and over	286,949	138,647	76,502	48,395	13,750	148,302	75,110	49,199	23,993
1-4	24,864	12,741	12,741			12,123	12,123		
:									
90 and over	1,505	252	13	65	174	1,253	158	52	1,043
Migrants moving into Yorkshire & Humberside Region from rest of Great Britain									
All ages 1 and over	55,805	28,893	17,602	9,579	1,712	26,912	14,378	9,913	2,621
1-4	3,789	1,950	1,950			1,839	1,839		
:									
90 and over	95	20	1	2	17	75	10	0	65
Migrants moving into Yorkshire & Humberside Region from outside Great Britain									
All ages 1 and over	18,540	9,439	5,156	3,940	343	9,101	4,610	4,029	462
1-4	1,479	790	790			689	689		
:									
90 and over	5	3	1	1	1	2	0	0	2
Migrants moving into Yorkshire & Humberside Region from origin not stated									
All ages 1 and over	21,034	11,636	7,682	2,438	1,516	9,398	5,698	2,095	1,607
1-4	1,804	972	972			832	832		
:									
90 and over	159	24	2	3	19	135	19	6	110
Migrants moving into Yorkshire & Humberside Region to rest of Great Britain									
All ages 1 and over	54,865	27,919	17,598	8,663	1,658	26,946	15,274	9,119	2,553
1-4	3,272	1,670	1,670			1,602	1,602		
:	:	:	:	:	:	:	:	:	:
90 and over	111	16	0	4	12	95	7	5	83

Source: OPCS and GROS 1994a, pp.340-343. 1991 Census, Crown Copyright. ESRC/JISC Purchase. Computer readable files provided by the Census Dissemination Unit, Manchester Computing on MIDAS service under */db/census91/topic/nm*.csv*.

2.4 Geographical classifications used in the National Migration Statistics

Two geographical classifications are used in the National Migration Statistics. In 13 tables a simple classification into component countries within Great Britain is used. In 7 tables a 32 zone classification system originally suggested by Rees (1989) is used that identifies large urban centres and region remainders using selected districts and counties. The aim of this classification was to enable researchers to examine the migrant flows into and out of large urban centres. In the event, researchers preferred to use their own classifications built up from ward and district migration matrices for this job (Champion and Dorling 1994; Rees, Durham and Kupiszewski 1996). From the 32 by 32 matrices in National Migration Statistics 1 and 2 researchers can extract interregional matrices and inter-country matrices, but not matrices for inter-county flows or flows between any other comparable classification at the same scale (e.g. NUTS 2 region). The Special Migration Statistics had to be used to generate those flow tables. There is a need to produce a wider set of migration flow tables as part of the National Migration Statistics.

Recommendation 7. *Plan to produce **a much wider set of computer readable flow tables** in the National Migration Statistics using a suite of geographies, ranging from standard regions, through counties (or equivalent) to local government units (unitary authorities, districts).*

2.5 The need to publish in computer file form

It would be impossible to provide all the area tables and flow tables that users might wish to use as printed tables. It is doubtful whether repeating the exercise of devoting nearly 300 printed pages to one origin-destination-age-sex array (National Migration Statistics, Part 1, Table 2) is a cost effective way of providing flow data. This was partially recognised in the 1991 Census with the abandonment of the publication of the Regional Migration Statistics as HMSO volumes and their release as computer readable data only. The National Migration Statistics from the 1991 Census were made available later in computer format for manipulation and analysis. The academic community copies are stored on the MIDAS system of Manchester Computing as a set of files under directory */db/census91/topic* with names in the generic form *nm*.csv*, where csv stands for comma separated variables. The *csv* files load easily into spreadsheet packages. Each table, however, spreads over several files and the user has to merge and edit these to obtain a convenient spreadsheet. Alternatively, spreadsheet files are also available from Census Customer Services of the Office for National Statistics.

The nature of the National Migration Statistics needs therefore to be re-thought. The published volume in 2001 should provide definitions, explanations and summary tables but the detailed tables can be published as a library of computer file form on CD-ROM. The number, format and contents of the files need thorough discussion between the census offices and census users.

Recommendation 8. *Plan the National Migration Statistics publication as **a single volume** containing selected summaries, definitions, explanations and analysis and a catalogue of the suite of more detailed tables placed on **an accompanying CD ROM**.*

3. REGIONAL MIGRATION STATISTICS

Tables 5 and 6 provide information on the content and geography of the Regional Migration Statistics from the 1991 Census. Table 1 in the Regional Migration Statistics, Part 1 (100%) provides migration flows between and within districts within each region. A typical regional table for Yorkshire and Humberside is shown in Table 7. Table 2 in the Regional Migration Statistics, Part 1 provides flows from origins outside the region to districts within the region, using the 32 zone system. Table 3 in the Regional Migration Statistics, Part 1, provides flows to destinations outside the region, using the 32 zone system (geography one), from districts within the region. The other 100% Regional Migration Statistics parallel the National Migration Statistics for those of the 32 zones within the region. The 10% Regional Migration Statistics also parallel the National Migration Statistics using the 32 zone system.

The Regional Migration Statistics from the 1991 Census were originally to be published as a set of volumes, one per region (as from the 1971 and 1981 Censuses) but the decision was made to scrap paper publication because of cost and they were published as computer readable tables. The academic community copies are stored on the MIDAS system of Manchester Computing as a set of files under directory */db/census91/regmig* with names in the generic form *xy*.csv*, where the letters *xy* are replaced by a two letter abbreviation for the region and *csv* stands for comma separated variables. The *csv* files load easily into a spreadsheet package such as MSExcel. Each table, however, spreads over several files and the user has to merge and edit these to obtain a convenient spreadsheet. Table 7 shows on one page the inter-district matrix for Yorkshire and Humberside merged to form an easy to read and interpret spreadsheet. Alternatively, spreadsheet files are also available from Census Customer Services of the Office for National Statistics.

Recommendation 9. *Plan the **Regional Migration Statistics publication as a single volume** containing selected summaries, definitions, explanations and analysis and a catalogue of the suite of more detailed tables placed on **an accompanying CD ROM.** Alternatively, the National and Regional Migration Statistics could be planned as an integrated volume.*

Table 5: Organisation and Contents of the Regional Migration Statistics, 1991 Census, Part 1 (100%)

N	Title	Contents (crosstab variables)	Geography for area of residence (see Notes)	Migrants (different address one year before census)
1	**Migrants within [region]**	*sex by area of origin [in the region] by area of residence[in the region] at Census*	Regions, counties, districts	RESIDENTS
2	**Origins**	*sex by area of origin [outside region] by area of residence at Census [in the region]*	Regions, counties, districts	RESIDENTS
3	**Destinations**	*sex by area of origin [in the region] by area of residence at Census [outside the region]*	Geography One	RESIDENTS
4	**Age and employment**	*sex by age and employment status by type of move*	Counties, districts	RESIDENTS
5	**Economic position**	*sex by economic position by age by type of move*	Geography one	RESIDENTS 16+
6	**Migrant households**	*type of move (for migrant and wholly moving households) by economic position of household head, amenities, car availability and persons per room by tenure, not in self contained accommodation and households with a least one child under one*	Geography one	HOUSEHOLDS WITH RESIDENTS
7	**Migrants in households**	*type of move by economic position of migrants aged 16 and over, car availability and persons per room for all migrants, by tenure, not in self contained accommodation*	Geography one	RESIDENTS IN HOUSEHOLDS
8	**Composition of wholly moving households**	*type of move by household composition*	Geography one	WHOLLY MOVING HOUSEHOLDS
9	**Migrants in wholly moving households**	*type of move by age and limiting long-term illness*	Geography one	RESIDENTS IN WHOLLY MOVING HOUSEHOLDS
10	**Ethnic group**	*sex by age by ethnic group by type of move*	Geography one	RESIDENTS
11	**Communal establishments**	*sex by type of establishment by limiting long-term illness by age by type of move*	Geography one	RESIDENTS (NON-STAFF) IN COMMUNAL ESTABLISH-MENTS

Source: OPCS and GROS (1991, 1995a)

Notes:
Geography one: Great Britain, England and Wales, England, regions, metropolitan counties, Inner London, Outer London, other main urban centres, regional remainders, Wales, Cardiff District, remainder of Wales, Scotland, main urban centres, remainder of Scotland (32 zones plus aggregations)

Table 6: Organisation and Contents of the Regional Migration Statistics, 1991 Census, Part 2 (10%)

N	Title	Contents (crosstab variables)	Geography for area of residence (see Notes)	Migrants (different address one year before census)
1	**Origin and SEG**	*sex by area of origin by area of residence [in the region] by economic position and SEG of employees, self-employed and unemployed*	Geography one	RESIDENTS 16+ EMPLOYEES, SELF-EMPLOYED AND UNEMPLOYED
2	**Destination and SEG**	*sex by area of residence [outside the region] by area of origin [in the region] by economic position and SEG of employees, self-employed and unemployed*	Regions, Wales, Scotland	RESIDENTS 16+ EMPLOYEES, SELF-EMPLOYED AND UNEMPLOYED
3	**Economic position and employment status**	*sex by economic position by employment status by type of move*	Geography one	RESIDENTS 16+
4	**Occupation**	*sex by standard occupational classification (sub-major groups) by type of move*	Geography one	RESIDENTS 16+ EMPLOYEES, AND SELF-EMPLOYED AND UNEMPLOYED
5	**Industry**	*sex by industry divisions by type of move*	Geography one	RESIDENTS 16+ EMPLOYEES AND SELF-EMPLOYED

Source: OPCS and GROS (1991, 1995b)

Notes:
Geography one:
Great Britain, England and Wales, England, regions, metropolitan counties, Inner London, Outer London, other main urban centres, regional remainders, Wales, Cardiff District, remainder of Wales, Scotland, main urban centres, remainder of Scotland (32 zones plus aggregations)

Table 7: Regional Migration Table 1, Origins and destinations, for Yorkshire and Humberside, reorganised into one matrix

Source: OPCS and GROS (1995a). 1991 Census Crown Copyright. ESRC/JISC Purchase, supplied by the Census Dissemination Unit, Manchester Computing on the MIDAS service in files */db/census91/regmig/yh1a.csv, yh1b.csv, yh1c.csv, yh1d.csv, yh1e.csv*

Table 1 Migrants within Yorkshire & Humberside Region			Yorkshire & Humberside Region, metropolitan counties, counties, districts																													
Residents of Yorkshire & Humberside Region with different address in Yorkshire & Humberside Region one year before census																																
	Area of residence at census																															
Area of origin and sex	YORKSHI	South Yorkshire Metropolitan County					West Yorkshire Metropolitan County						Humberside County						Humberside County - continued				North Yorkshire County			North Yorkshire County - continued						
	HUMBERSIDE REGION	Total	Barnsley	Doncaster	Rotherha	Sheffield	Total	Bradford	Calderdal	Kirklees	Leeds	Wakefield	Total	Boothferr	Cleethorp	East Yor	East Yorks Borough of Beverley	Glanford	Great Grimsby	Holderne	Kingston upon Hull	Scunthor	Total	Craven	Hambleto	Harrogate	Richmon	Ryedale	Scarboro	Selby	York
	TOTAL																															
Males																																
YORKSHIRE & HUMBE	186372	43928	7182	8762	7884	19100	70141	18480	8966	12534	24211	10068	90129	2003	2174	3338	3278	2184	3153	1727	10125	2141	34285	1552	2309	4891	1534	2904	3908	2654	4319
South Yorkshire Metropo	43821	41909	8955	9089	7786	16399	1044	150	60	184	303	347	686	150	41	69	48	35	28	25	61	49	414	21	49	93	31	26	87	86	93
Barnsley	8690	8487	8055	129	151	149	369	27	19	60	68	187	80	9	3	21	5	1	5	3	8	4	76	2	9	8	6	7	15	20	7
Doncaster	8592	8949	118	8533	217	83	245	31	17	34	79	84	297	115	16	29	16	15	8	7	30	24	131	6	22	20	8	4	23	39	10
Rotherham	7844	7590	205	265	8597	629	103	17	5	19	35	27	82	11	4	15	7	11	3	8	17	8	88	7	8	9	5	8	12	14	9
Sheffield	19405	18862	309	123	801	17839	328	75	20	81	133	49	148	11	19	19	21	6	12	9	38	12	138	7	12	18	11	11	36	22	24
West Yorkshire Metropol	71043	1105	405	309	99	201	67080	15805	8684	12187	22820	9384	791	136	28	272	84	98	25	71	136	25	2097	323	94	569	67	124	230	980	151
Bradford	18786	122	17	43	13	48	15044	14489	284	862	760	79	150	8	1	80	19	8	8	15	25	3	443	212	23	85	9	19	48	29	18
Calderdale	6813	58	26	11	5	16	6821	244	5897	260	107	33	48	8	2	29	1	2	1	1	4	0	66	20	4	12	6	12	14	13	7
Kirklees	12441	181	66	41	15	49	11962	284	277	10786	260	246	150	21	10	87	13	10	7	12	32	9	148	22	13	31	3	16	28	24	14
Leeds	25134	344	78	97	40	197	23976	840	129	436	21165	800	301	35	12	99	33	14	7	26	65	10	1114	64	45	402	27	81	103	329	66
Wakefield	9866	362	205	122	28	26	9066	58	37	242	606	8226	132	20	3	47	18	2	2	14	8	4	304	16	8	26	12	17	36	170	16
Humberside County	29529	498	42	234	66	113	619	86	29	66	296	62	27737	1814	2066	2603	3048	2060	3060	1697	9602	2056	886	17	40	80	80	131	142	122	133
Boothferry	1903	124	6	97	16	7	84	10	3	3	32	16	1589	1340	6	40	66	61	3	8	43	44	117	2	3	10	1	14	11	62	14
Cleethorpes	2189	23	4	5	8	6	30	4	2	9	12	4	2131	9	1366	8	11	65	826	10	15	6	16	1	0	4	1	1	3	3	3
East Yorkshire	2018	51	3	26	8	16	115	23	5	21	46	21	2650	22	4	2262	88	13	1	57	71	4	262	6	14	10	3	79	80	41	79
East Yorkshire Borough	3136	35	3	8	8	17	89	19	2	8	32	16	2940	78	4	117	1908	32	9	58	746	0	85	2	5	14	8	17	24	15	8
Glanford	1994	29	5	18	3	6	20	1	0	3	13	3	1990	22	63	17	16	1384	26	8	32	300	25	0	8	4	7	3	4	0	1
Great Grimsby	9186	38	5	13	9	13	87	10	6	4	10	7	3084	2	818	6	6	43	2386	0	25	8	18	0	2	3	0	1	4	1	7
Holderness	1872	14	5	3	2	3	48	6	5	6	17	11	1672	14	7	44	98	10	2	1117	279	0	36	1	5	3	2	7	14	4	2
Kingston upon Hull	10290	86	9	37	16	36	108	12	5	16	63	12	10000	64	8	82	894	48	15	342	6581	16	84	4	5	10	7	13	16	7	20
Scunthorpe	3287	45	3	29	3	10	28	4	3	3	18	2	2202	61	6	9	6	419	17	2	28	1875	12	2	0	2	0	2	5	0	1
North Yorkshire County	23778	357	47	160	60	110	1519	340	81	104	746	245	625	164	9	372	93	33	10	34	87	12	21068	1191	2128	4220	1416	2621	3447	2066	2661
Craven	1464	10	3	2	0	5	214	153	10	4	42	4	11	0	0	6	2	0	2	0	1	0	1229	1150	6	27	6	12	12	6	3
Hambleton	3226	26	4	10	6	0	80	16	10	13	22	9	58	17	4	18	15	2	3	0	7	2	2141	10	1866	142	66	80	40	34	100
Harrogate	4687	50	5	23	10	21	402	73	11	22	265	31	78	7	2	30	11	5	1	7	13	2	4327	14	143	3784	135	48	38	66	66
Richmondshire	1491	27	1	15	6	16	88	10	14	8	30	6	31	8	0	7	0	1	0	5	4	0	1355	5	85	46	1129	36	6	4	48
Ryedale	2769	34	4	13	4	13	85	17	11	11	46	10	142	7	0	66	8	8	2	8	11	0	2467	5	85	41	27	1726	66	85	418
Scarborough	3819	67	11	14	17	18	148	27	6	21	66	27	142	11	2	78	11	8	0	8	25	1	2414	3	29	38	18	118	3208	20	41
Selby	2788	68	11	42	7	6	334	24	10	17	183	140	227	66	1	73	16	8	2	8	16	8	2149	2	23	71	6	105	22	1601	318
York	4248	82	7	23	8	23	180	21	10	8	103	16	129	20	0	84	16	2	0	1	21	1	3898	2	76	71	23	497	23	248	2954
Females																																
YORKSHIRE & HUMBE	178445	46184	7908	10044	8482	19672	74810	17865	7299	13267	26648	10709	31944	2090	2273	3567	3674	2716	3262	1894	10548	2182	25907	1877	2299	5498	1207	3072	4329	2898	4843
South Yorkshire Metropo	48318	44407	7294	9424	8287	18412	1094	121	44	189	310	350	618	170	40	76	43	29	24	25	85	41	979	20	32	48	26	43	82	79	46
Barnsley	7618	7008	6602	122	129	152	379	26	17	71	79	180	56	8	4	21	6	0	4	3	4	6	78	1	6	11	6	13	12	21	5
Doncaster	8952	8387	134	8914	252	87	218	19	11	26	75	82	255	140	14	25	14	10	8	4	20	20	124	3	14	20	12	6	27	30	13
Rotherham	8354	8098	218	279	7963	518	118	16	2	26	41	27	73	15	3	14	8	10	0	5	14	8	68	7	4	5	1	12	15	15	10
Sheffield	20484	19936	329	109	823	18677	303	58	13	80	121	61	122	8	19	15	16	8	12	13	27	9	111	9	8	13	7	13	28	19	20
West Yorkshire Metropol	75840	1071	438	291	89	255	71872	17391	7113	12990	24288	10022	826	95	26	315	79	32	31	92	120	25	2289	353	89	856	51	136	267	869	147
Bradford	18189	134	23	37	21	53	17368	15998	333	874	706	89	168	8	0	80	16	8	10	14	24	5	600	246	25	110	10	23	44	20	22
Calderdale	7286	45	17	16	4	8	7078	272	6328	326	121	29	61	6	2	33	6	1	1	4	8	1	103	20	4	16	4	8	26	6	14
Kirklees	12294	203	109	41	12	47	12758	317	264	13614	391	242	141	18	9	41	12	11	9	10	22	9	182	24	21	92	3	26	26	33	17
Leeds	28488	287	74	82	28	102	24736	849	135	429	23657	772	320	28	13	118	38	11	9	41	63	18	1147	54	28	458	32	81	125	317	71
Wakefield	10583	402	319	118	23	45	9714	55	22	283	492	8882	140	35	6	45	11	0	9	23	19	5	337	6	6	36	2	19	48	181	22
Humberside County	31231	362	33	103	48	109	833	77	48	84	243	91	28900	1878	2196	2774	3442	2126	3180	1746	10348	2088	716	12	57	44	21	143	158	130	151
Boothferry	1908	90	4	78	6	6	83	4	8	2	31	8	1657	1369	2	31	94	69	2	4	69	44	106	3	6	6	2	12	11	63	16
Cleethorpes	2313	30	5	12	4	9	90	5	5	6	8	4	2240	6	1473	8	8	73	847	8	10	12	13	0	0	2	1	8	2	2	0
East Yorkshire	9244	63	4	28	12	12	108	20	4	28	37	16	2786	26	8	2449	108	10	5	48	80	8	224	4	16	12	3	74	74	41	66
East Yorkshire Borough	3493	33	2	12	6	13	86	8	3	10	34	11	2306	81	8	127	2241	34	10	80	726	2	87	1	10	10	6	17	23	16	8
Glanford	2067	37	3	21	3	10	30	3	1	6	20	1	1987	41	86	10	16	1436	41	6	30	322	23	1	6	0	2	3	5	1	3
Great Grimsby	3240	42	5	13	7	16	28	7	6	3	16	7	3144	1	814	6	5	36	2451	1	15	11	16	0	0	4	0	2	4	0	3
Holderness	1787	12	2	2	2	5	46	6	7	6	20	5	1686	6	8	64	100	7	6	1211	269	4	40	1	5	3	2	10	13	5	1
Kingston upon Hull	10903	65	6	16	7	21	126	20	10	20	61	17	10620	58	15	86	894	45	16	387	8108	9	100	0	7	6	5	16	25	11	27
Scunthorpe	2278	30	0	20	2	8	29	2	4	2	16	5	2212	50	8	4	4	479	13	2	16	1885	8	2	0	1	1	0	2	1	1
North Yorkshire County	25058	224	53	131	36	102	1911	267	94	124	730	258	800	146	6	427	110	28	17	32	115	19	22243	1292	2121	4740	1109	2748	3621	2116	4294
Craven	1556	8	2	1	0	5	225	165	15	7	27	1	10	0	0	6	3	0	1	0	1	0	1303	1236	6	23	8	11	9	6	3
Hambleton	2231	30	4	12	5	9	70	8	10	10	34	7	48	8	1	12	10	2	8	1	8	2	2063	10	1636	116	75	75	32	32	75
Harrogate	5370	85	7	23	8	19	441	83	10	26	276	34	87	8	1	34	12	8	2	4	18	2	4787	20	132	4304	41	53	41	78	118
Richmondshire	1272	16	0	11	3	5	50	10	12	7	19	3	26	3	0	8	6	0	1	1	6	0	1178	8	61	54	838	36	6	5	61
Ryedale	2834	37	3	18	3	13	93	12	10	11	43	18	157	103	1	105	14	4	0	7	16	0	2848	5	80	35	20	1838	122	87	456
Scarborough	4213	51	11	18	11	13	166	29	5	25	82	27	191	14	3	61	11	5	2	9	31	6	3832	8	28	49	11	127	3580	18	43
Selby	2813	53	13	26	2	10	255	25	18	88	185	150	238	66	0	66	30	6	4	6	14	3	2165	3	30	81	3	109	20	1827	302
York	4869	71	12	22	8	29	199	24	15	16	96	18	173	18	0	98	24	3	1	2	23	8	4257	2	84	86	19	606	41	266	3247
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4. LOCAL BASE STATISTICS AND SMALL AREA STATISTICS

There is relatively little migration information incorporated in the Local Base Statistics (LBS) or Small Area Statistics (SAS). Tables L15, L16 and L17 from the LBS and Tables S15, S16 and S17 from the SAS report on migrants resident in Local or Small areas. Tables L15 and S15 provide an age by sex by type of move classification. Tables L16 and S16 report on wholly moving households by household composition and type of move. Tables L17 and S17 simply report on numbers of migrants among residents in areas by ethnic group. There is considerable scope for extending the crossclassifications of migrants to cover all the dimensions tackled in the National and Regional Migration Statistics, perhaps with broader coding of the variables.

The type of move (TYMO) classification is developed more elaborately at smaller scales. In the Local Base Statistics (Table L15) the following TYMO classification is used

a. Moved within wards
b. Between wards but within district
c. Between districts but within county
d. Between counties but within region
e. Between regions or from Scotland
f. From outside GB
g. Between neighbouring districts
h. Between neighbouring counties/Scottish regions.

The classification is perhaps over elaborate: flows g and h are not needed to complete the picture of in-migration. More importantly "Migrants from the area of residence to the rest of GB" are omitted. There are also no statistics on migrants with origin not stated. These have been merged into the "Moved within wards" category. It is therefore not possible to measure the balance of inflowing and outflowing internal migrants properly. The tables cannot easily be used in population change analysis or population estimation. Out-migrant flows are missing because of the way the LBS and SAS were processed area by area. It is impossible to count out-migrants from an area until the whole national census has been processed. If the "one number census" approach is adopted for the 2001 Census, out-migrants can be counted for all areas, including those of the smallest scale.

Recommendation 10. *Improve the provision of **Migration Area Statistics** by tabulating out-migrant flows, by adopting a simplified type of move classification and by expanding considerably the crossclassifications of migrants. These could be provided as additional tables in the general area statistics produced from the census or as part of the Special Migration Statistics.*

5. SPECIAL MIGRATION STATISTICS

5.1 Content and organisation

To meet the need for flow data which users could aggregate to their own requirements the Census Offices in 1981 and in 1991 developed a system of Special Migration Statistics (SMS). Full details of the organisation and content of the SMS are given in OPCS and GROS (1993a, 1993b, 1993c), in Flowerdew and Green (1993) and in Rees and Duke-Williams (1995). These proved to be large and complex data sets subject to considerable suppression. Most users found the statistics very difficult to use, though the 1991 situation was much improved compared with the 1981. In fact, even within the academic community research using these migration data has relied for data extraction on the expertise of a small number of experts at Manchester Computing, and the geography departments at the Universities of Leeds and Newcastle upon Tyne.

In principle, the SMS from the 1991 Census as purchased by ESRC/JISC for academic research, can regarded as a pair of three dimensional arrays. The array dimensions are respectively origins, destinations and attributes, while the cell contents are counts of migrants falling in the origin-destination-attribute combinations.

The *Set 1* array has a very large origin-destination face or matrix. The origins are composed of four types: (1) 9930 wards in England and Wales, (2) 1003 pseudo postcode sectors in Scotland, (3) 96 areas outside Great Britain (individual countries or groupings of countries or other areas such as Northern Ireland), and (4) an origin-not-stated category. The destinations are made up of the first two types of area. The third dimension is made of broad age-sex groups (Table SMS M01) and the categories of wholly moving households and residents in such households (Table SMS M02).

The *Set 2* array has a much smaller origin-destination face or matrix. The origins consist of three types of area: (1) 459 local government districts in Great Britain, (2) 96 areas outside Great Britain (as in Set 1) and (3) an origin-not-stated category. The attribute dimension can be divided into two parts. The first part consists of the broad age-sex groups and wholly moving household categories of Set 1 plus a more detailed age-sex classification (19 age groups by sex). These data are published without modification and are extremely valuable for demographic analysis, population change analysis, population estimation and forecasting.

5.2 The confidentiality issue

The second set of attributes by which the Set 2 district migration flows are classified consist of a further 38 to 40 counts organised in 8 or 9 tables (the exact statistics available differ by country). These data were regarded by the Census Offices, despite the very broad coding used, to be a threat to the confidentiality of individual census microdata. As a result, these data were suppressed when the total number of migrants between an origin and destination was fewer than ten. This meant that, although a majority of migrants were reported in these tables, data for only a minority of flows were available. No sensible analysis or aggregation of these flow data could be carried out. Any analysis had to be confined to examining the total flows into and out of districts by these socio-economic characteristics (Champion 1996).

The difficulties posed by this wholesale suppression in the second part of the SMS Set 2 challenged Rees and Duke-Williams (1995b, 1997) to "reverse engineer" the suppression and to reconstruct the flow array virtually in its entirety. This new version of the SMS Set 2 has been made available for general use on the MIDAS service of Manchester Computing with the *smstab* interface software. The new flow data were used to analyse the pattern of inter-area migration by broad ethnic group (Rees and Duke-Williams 1995c).

So what should be done about the confidentiality problem if equivalent data sets are produced from the 2001 Census. The alternative protection devices which have been suggested include (1) a small amount of record swapping in master database, as part of the one number census approach, (2) sampling, as has been used with other census interaction data set, the Special Workplace Statistics, (3) rounding to a small number base and (4) random perturbation. The first two devices are applied before table production while the third and fourth devices are applied after table production. Because origin-destination matrices for wards/sectors and districts contain a majority of very small flows, methods (2), (3) and (4) will all introduce error. Record swapping is being canvassed widely because although it introduces a small amount of error, the errors should be self-cancelling when aggregation is carried out. However, the research to establish the viability of this method has still to be done. Sampling has the advantage of being used successfully in the past and of making possible tables with more detailed socio-economic coding if the precedent of SWS coding is followed (see Flowerdew and Green 1993 for details).

Recommendation 11. *If it is still considered essential to apply additional protection measures to some migration tables at the smaller geographic scales, **sampling** should be used in preference to suppression, rounding or random perturbation.*

5.3 An interface to the Special Migration Statistics

The SMS datasets are large and complex in organisation. ESRC/JISC commissioned two information technology tasks to help users use these data (extract subsets for further analysis).

The first task involved design of software to read, quality check and verify the SMS data sets (Rees and Duke-Williams 1995a). The program, *smstab*, written by Oliver Duke-Williams, was then adapted for general use on the MIDAS service of Manchester Computing (details of the software are provided via the *man smstab* command on MIDAS). The user runs *smstab* by attaching a set of options to the command when issued on-line or accumulates these in a script file. A moderate degree of *Unix* knowledge is needed by the user for success. Several look up tables have been prepared for common aggregations of wards/sectors or districts which the user can select or users can develop their own look up tables. The package is particularly suited to the extraction of migrant flow matrices for further analysis. Duke-Williams (1997) has outlined how the software might be developed into a menu driven, interactive interface for use over the World Wide Web.

The second task involved restructuring of the SMS data sets into system files for use with the fast database package *Quanvert* by Sandra Levine of Quantime Ltd. The *Quanvert* package is normally used with very large household record databases. The package is very good at extracting tables associated with sets of origin-destination pairs specified by users, which can be supplied either interactively or in batch mode. Users, however, have found the procedures for generating origin-destination matrices more difficult to master and prefer to use *smstab* for that kind of job.

Consideration should be given to the provision of a library of migration flow matrices for widely used sets of origins/destinations, the structure of which users can immediately grasp and use. A suite of flow matrices at each scale should be available. These could be linked to the flow matrices produced in the National, Regional and Local Migration Statistics.

Recommendation 12. *Once the structure of the National, Regional, Local and Special Migration Statistics is agreed, a user friendly interface to all data sets should be developed building on experience with the 1991 Census migration data.*

5.4 General system for flexible tabulation

In previous discussion between the Census Offices and census users, there has been a strong demand for a flexible tabulation system which users can employ to produce their own designed tables. This desire applies with particular force to migration statistics. The fast and efficient software required to generate the tables already exists and is being acquired by the Census Offices. Such standard database software is much easier to use for generating migration tables than the interface software developed for the SMS data sets. The other ingredients needed for a flexible tabulations system are:

(1) a method for assessing the confidentiality risk of a particular table request;
(2) a system which users can use to design their requests before submission (e.g. the software linked to a dummy database resembling the census database)
and
(3) administrative arrangements between ESRC/JISC and the Census Offices for funding table requests in a cost-effective way.

Recommendation 13. *Consideration should be given to the development* ***a flexible tabulation service*** *provided by the Census Offices or a designated agency to provide any additional migration tables needed by users.*

Recommendation 14. *To reduce the cost and speed the delivery of a flexible tabulation service, both the* ***tabulation/analysis software*** *and a* ***dummy census dataset*** *should be released to the academic community.*

6. SUMMARY OF RECOMMENDATIONS

This section of the paper summarises the recommendations emerging from the discussion in earlier sections of the paper.

The migration questions

1. Consideration should be given again to extending the migration question to capture **infant migrants**, as recommended by the Migration Question Sub-Group. If a question revision is ruled out, migration tables should report the migration status of the mother (or other parent/guardian if no mother is resident in the household) for children under one.

2. Consideration should be given again to expanding the relevant questions to capture **economic position one year ago**, as recommended by the Migration Question Sub-Group.

The migrant undercount

3. Consideration should be given to the **problem of undercounting specific to the migration statistics**, because respondents systematically failed to report a different address one year before the census and because respondents who did report a different address failed to report origin details.

A household classification of migrants

4. A careful study should be undertaken of ways it will be possible to classify migrants by **household status** from the 2001 Census, with a view to recommending the kinds of new tables that might be produced. This study should involve collaboration between the Census Offices and customer sectors.

A classification of student migrants

5. A careful study should be undertaken of ways it will be possible to classify migrants by **student status** from the 2001 Census, with a view to recommending the kinds of new tables that might be produced. This study should involve collaboration between the Census Offices and customer sectors.

National Migration Statistics

6. The National Migration Statistics should be consolidated into **a United Kingdom product** by harmonising and integrating the Great Britain and Northern Ireland tables.

7. Plan to produce **a much wider set of computer readable flow tables** in the National Migration Statistics using a suite of geographies, ranging from standard regions, through counties (or equivalent) to local government units (unitary authorities, districts).

8. Plan the **National Migration Statistics publication as a single volume** containing selected summaries, definitions, explanations and analysis and a catalogue of the suite of more detailed tables placed on **an accompanying CD ROM**.

Regional Migration Statistics

9. Plan the **Regional Migration Statistics publication as a single volume** containing selected summaries, definitions, explanations and analysis and a catalogue of the suite of more detailed tables placed on **an accompanying CD ROM**. Alternatively, the National and Regional Migration Statistics could be planned as an integrated volume.

Local Base and Small Area Statistics

10. Improve the provision of **Migration Area Statistics** by tabulating out-migrant flows, by adopting a simplified type of move classification and by expanding considerably the crossclassifications of migrants. These could be provided as additional tables in the general area statistics produced from the census or as part of the Special Migration Statistics.

Special Migration Statistics

11. If it is still considered essential to apply additional protection measures to some migration tables at the smaller geographic scales, **sampling** should be used in preference to suppression, rounding or random perturbation.

Interface to Migration Statistics

12. Once the structure of the National, Regional, Local and Special Migration Statistics is agreed, a user friendly interface to all data sets should be developed building on experience with the 1991 Census migration data.

A flexible tabulation service

13. Consideration should be given to the development **a flexible tabulation service** provided by the Census Offices or a designated agency to provide any additional migration tables needed by users.

14. To reduce the cost and speed the delivery of a flexible tabulation service, both the **tabulation/analysis software** and a **dummy census dataset** should be released to the academic community.

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Census Office Abbreviations: CONI = Census Office for Northern Ireland; ONS = Office for National Statistics; OPCS = Office of Populations and Censuses; GROS = General Register Office Scotland; HMSO = Her Majesty's Stationery Office