Internal Migration Around the World: Towards a Global Inventory

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Abstract

For scholars interested in making cross-national comparisons of demographic processes, an essential first step is a thorough understanding of the available data. This is a particular issue for migration because of differences in the way it is measured, in the spatial and temporal referencing of moves, and in the sources from which the data are derived. This paper reports results from the IMAGE project ((Internal Migration Around the Globe) which aims to establish a comprehensive global inventory of internal migration data collections, as a foundation for comparing mobility levels, patterns and impacts between nations. We review prior work, identify the information needed for cross-national comparison and describe our data collection strategy. Focusing on the 193 UN member states, we then summarise the methods used to collect data on internal migration in countries around the world, the types of data collected, the intervals over which migration is measured and the spatial frameworks employed. Our conclusions describe the inventory of data collections and the associated data repository, and identify the most effective avenues for cross-national comparisons.

1. Introduction

This paper reports results from the IMAGE project (Internal Migration Around the Globe), a program of research which aims to facilitate cross-national comparisons of internal migration, the ultimate goal being to develop and apply a robust set of measures that can be used to advance understanding of the way migration within countries varies between countries around the world. The stimulus to this work derives from the fact that, compared with fertility and mortality, surprisingly little attention has been given to understanding the way internal migration varies between nations. The significance of internal migration in facilitating human development and shaping settlement patterns is now widely recognised (see eg United Nations 2009, World Bank 2009) and there is a growing literature comparing different aspects of mobility (see eg Rogers and Castro 1981, Nam et al, 1990, Rees & Kupiszewski 1999a, Bell & Muhidin 2011). However, comparative indicators are conspicuous by their absence from international statistical collections, such as the UN Demographic Yearbook, and there is no comprehensive 'league table' of mobility akin to those ranking countries according to rates of birth and death.

This lack of development can be traced in part to the multifaceted nature of migration and the absence of a standard, internationally-agreed set of statistical indicators, akin to the TFR or life expectancy (Bell et al 2002, Rees et al 2000). More fundamental, however, is a deficit of basic information on the data that are collected by statistical agencies around the world. If analysts are to

undertake rigorous comparisons of the way population mobility differs between countries, a sound understanding of the way internal migration is being measured is indispensable. More broadly, if the study of internal migration is to be placed on the same comparative footing already enjoyed by its demographic sister processes, a comprehensive inventory of data collections is an essential pre-requisite. An assessment of contemporary processes is also pivotal to development of international standards for collection of migration data, and the adoption of best practice.

We address this information deficit through an inventory of internal migration data collections among the 193 member states of the United Nations. The complete inventory is held in database format at the University of Queensland. Our aim in the present paper is to provide a global picture of the types of internal migration data collected around the world. We focus in particular on the instruments used for data collection, the way in which migration is measured, the time intervals considered and the spatial frameworks employed. By way of background, we review relevant prior work, identify the information needed for cross-national comparisons of mobility and describe our data collection strategy. Following a general summary, we then focus in turn on data collected using the three main information sources: censuses, surveys and population registers. Our conclusions describe the inventory of data collections and the associated data repository, and identify the most effective avenues for cross-national comparisons.

2. Prior work

There appears to have been only one previous attempt to establish a global inventory of internal migration data collections, undertaken by the UN Statistical Commission, with a final report from the worldwide survey published in 1978 (United Nations 1978). While the original aim was to develop guidelines for collection of migration data, the Commission decided that 'the need for, and possibilities of, international comparability were not as great in the case of internal migration statistics as in that of international migration statistics….and the desired statistics would necessarily vary significantly from one country to another'. After reviewing the provisional study results, the Commission firmed on this view, concluding that 'although internal migration was an extremely important phenomenon for most countries…the wide diversity of national needs and practices made it difficult to formulate recommendations on migration statistics currently' (United Nations 1978, iii). Despite these reservations, the Commission determined that a report summarising contemporary practise would provide useful background for national statistical agencies, supplementing the earlier guide to methods of estimating migration (United Nations 1970). The ensuing document identified 121 countries that collected migration data and reported on a range of features including the sources of migration information, the type of data collected, and the uses to which it was put. It also attempted to identify how migration was defined and establish the geography of the 'migration defining regions'.

In a more recent project for the Council of Europe, Rees and Kupiszewski (1996, 1999a) reviewed the types of internal migration data collected by the then 28 member countries of the Council of Europe. Although more spatially restricted, the study was more definitive with respect to the nature of the data. Rees and Kupiszewski (1996) established the mechanisms used to collect internal migration data and reported the time span for which such data were available. They also identified the temporal intervals over which migration was measured, and the zonal systems against which the movements were recorded. The significance of migration as a component of population change is well recognised and data on inter-regional migration in Europe have been assembled on subsequent occasions as input to multi-regional projections, for example as part of the EU's DEMIFER project (http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/demifer.html), but no more recent general summary of contemporary data collection practice in Europe has been produced.

Notwithstanding the dearth of metadata, cross-national comparisons have attracted attention from a number of scholars and there are several collections which examine internal migration across a range of countries. Some such studies provide a broad overview of migration patterns, trends and impacts. A prominent example is the 'Handbook' edited by Nam *et al.* (1990), which drew together individual experts to set out the sources of migration data, and analyse patterns of movement, selectivity, and the causes and consequences of migration in 21 countries dispersed widely around the world. Rees et al (1996) present a similar, systematic analysis for the countries of Europe based on a survey of member states (see also Rees and Kupiszewski 1999b), while Rodriguez-Vignoli (2004) employs UN sources to analyse migration data for Latin America and the Caribbean. Others scholars have focused on particular aspects of migration, such as counter-urbanisation (eg Champion 1989), age composition (eg Rogers and Castro 1980) or migration distance (Long *et al.* 1988), using a variety of data sources, while Long (1991) published what appears to be the first international 'league table' comparing countries with respect to migration intensity.

More recently, the 1999 United Nations World Monitoring Report (United Nations 2000) drew on documents from national statistical offices to compare internal migration propensities and explore trends in rural-urban migration across 15 countries in Asia, Africa and Latin America. In a similar vein, the World Bank 2009 Development Report (World Bank 2009) produced estimates of labour mobility for 35 countries drawn from household surveys, pointing to substantial variations in migration propensity between countries. Rigorous comparisons are commonly hindered by differences in temporal and spatial frameworks but the flagship 2009 United Nations Development Report (United Nations 2009) sets out estimates of aggregate migration intensity in a form which endeavours to correct for these variations (see also Bell & Muhidin 2009, 2011).

Collectively, this body of work provides numerous valuable insights into the variety of data that are available, but one universal obstacle to further analysis arises from the difficulties of assembling internal migration data for individual countries in a clear and consistent form that is readily accessible. The creation of central data repositories with access facilitated by development of the internet offers the potential to overcome this constraint, and facilities such as IPUMS International, maintained by the Minnesota Population Centre, represents a unique resource, as does the database managed by CELADE, the population division of the UN Economic Commission for Latin America and the Caribbean. However, these facilities encompass a large range of data, and do not provide for direct comparison of data on population mobility.

3. Towards a Global Inventory

Internal migration is measured in many different ways using a variety of data collection instruments and, unlike registration of births and deaths, is rarely the sole, or even the primary focus of data collection. Moreover, the information collected is not necessarily a reliable guide as to the data that are subsequently coded and made available. Considerable care is therefore needed to ensure that a data inventory focuses on capturing the critical information. The UN and European studies described earlier provided valuable guidance as to the type of information which should be sought in a new, global inventory, but we also took into account the data items needed to implement the comparative measures of internal migration proposed by Bell et al (2002), and the impediments identified in that work.

Synthesising this material, the information required on the migration data collected in each country could be grouped into five broad categories:

- the type of instrument used to collect the data. While many countries seek information on mobility at the Census, others rely on Population Registers. Sample surveys are also widely used.

- the way in which migration is measured. The two most common forms of data are events (from population registers) and transitions (from Censuses), but duration of residence is also widely collected.
- the interval over which migration is recorded. While event data are generally made available for single year periods, transition intervals vary widely
- the zonal system against which migration is recorded, with particular regard to the number of such zones in a country, and the associated nomenclature.
- the population characteristics available, confined for this project to the basic demographic dimensions, age and sex.

A full list of the data items collected is set out in Table 1. No attempt was made to elicit a formal definition of migration for each country, but the project did aim to determine whether an aggregate mobility indicator could be derived from the available sources capturing all residential moves, or changes of address, within the country.

Table 1 about here

Both the UN and European studies were based on questionnaire surveys of national statistical offices. Survey work formed part of the research strategy for this project too, but the inventory reported here also draws on other sources of information. Five main research tools were used:

- A comprehensive review of prior inventories and published papers
- Systematic mining of international statistical organisation websites
- A questionnaire survey of national statistics agencies, and
- Collection and analysis of individual country Census forms
- Advice from an international collaborative network of migration scholars

In setting the scope of the inventory, a primary task was to decide on its spatial and temporal coverage. There are numerous ways in which to define the number of countries in the world but for the IMAGE Project it was decided to adopt the listing of United Nations member countries generating a total of 193 target nations (http://www.un.org/en/members/index.shtml). A formal database structure was established to provide a framework for the inventory. We then sought to populate the cells in the database from the above sources, with thorough cross-checking for consistency as additional data items came to hand.

Of the 193 countries in the study, complete or partial information has been assembled for 179 (93%). Coverage is complete for Oceania and North America, and data have been assembled for all but one country in Europe (Bosnia and Herzegovina) and one country in Latin America and the Caribbean (Saint Kitts and Nevis) (Table 2). Information for Africa and Asia is less complete, with seven countries in Africa and five countries in Asia missing any useable data. In Africa, the principal voids are in the Middle and Northern parts of the continent[1] while in Asia the biggest gap is in the Middle-East, with more isolated data deficiencies in South, Southeast and East Asia[2] Many of the countries for which it has not been possible to obtain data are either geographically small (and may not collect internal migration data at all), are currently disrupted by war or civil strife, or have political regimes that may collect but not release data on population movements.

Table 2 about here

[1] African countries for which data are missing are Angola, Equatorial Guinea, Libya, Madagascar, Sao Tome and Principe, Somalia and Togo

[2] In Asia data are missing for the Bahrain, Myanmar, Saudi Arabia, United Arab Emirates and Uzbekistan.

Migration statistics evolve in a sporadic manner: while registers are commonly updated on an annual basis, censuses take place on a less regular schedule and are less coordinated in time. Surveys are undertaken on a regular or even a continuous basis in some countries, and only intermittently in others. These differences in temporal coverage across the three main sources of internal migration data makes it difficult to set a single start date for the inventory. The inventory database includes extensive historical information, but for this paper, we focus on data collected since 1995, corresponding to the start on the UN's 2000 round of censuses. Limited information has been included for eight countries whose latest census was conducted prior to this date[3] and also for countries with survey programs commencing prior to 1995

4. Internal Migration Data at a Global Scale: Who Collects What?

Of the 179 countries for which we have information, all but three collected internal migration statistics in some form. The three countries which do not appear to collect such data are Andorra, San Marino, and Nauru. The remaining 176 nations employ a mix of data sources but the most common was the Census, with 163 countries (93%) drawing data from this source while forty-five countries (26%) utilised data from some form of population register or administrative data set. One hundred and eighteen countries (67%) collected internal migration data in a Demographic and Health Survey (DHS); Living Standards Measurement Survey or other nationwide population survey (Table 3). One hundred and thirty six countries (77%) drew on more than one information source. Table 3 reveals considerable geographic variation in the types of data sources used. Population registers are common in Europe, as Rees and Kupiszewski (1999b) have shown, almost rivalling the Census across the 42 countries for which we have data[4]. Registers also feature strongly in Asia, with more than one third (14) of the 40 nations drawing migration data from some form of registration system[5]. Sources of this type appear to be much less common in other parts of the World, although at least some forms of registration data appear to be available in parts of North America. The project identified comparatively few regular, large scale purposive surveys of migration, however, both the DHS and LSMS have included migration questions in at least some phases. The 13 countries in Oceania stand out for their almost exclusive reliance on Censuses for data on population movements[6].

Table 3 about here

The following sections focus sequentially on the information collected by Census, by survey and finally by population register.

5 Internal Migration Data Collected at the Census

Notwithstanding the best endeavours of the UN to encourage regular Census-taking and common timing among member nations, there is substantial variation between countries in contemporary practice. While some countries undertake Censuses on a systematic five or ten yearly basis, others are much more sporadic and, in some cases, the latest Census is now quite dated. For the purposes of this project we have sought to assemble data from the latest Census in each country, irrespective

[3] Lebanon (1932);; Afghanistan (1979); Congo (DR) (1984); Uzbekistan (1989); Bosnia and Herzegovina (1991); Angola (1970); Comoros (1980); Eritrea (1984)

[4] Laihonen (1999, 2000) discusses the development of administrative systems as a replacement for the traditional Census in countries of Western and Northern Europe.

[5] The eight are Armenia, Azerbaijan, China, Israel, Japan, Kazakhstan, Korea, Nepal, Singapore,

[6] Australia is the notable exception with internal migration data derived from administrative records and the quinquennial census

of its timing, together with Censuses conducted during the United Nation's 2000 round (1995 to 2004). Table 4 reports the details. We focus here on the 148 countries for which we have information from the 2000 round of Censuses, 142 of which collected data on internal migration.

Table 4 about here

Three main forms of migration data are commonly collected in Population Censuses:

- place of birth
- migration transitions, derived by comparing place of residence at the Census with place of residence at some previous date, and
- duration of residence

Table 5 sets out the frequency with which each of these types appear in the 142 country dataset. Transitions may be recorded for any interval but analysts often distinguish 'place of birth' so these data, which generate statistics on lifetime migration, are identified separately in the table. The results indicate that 123 nations collected data on place of birth (within the country) and 137 collected place of residence for another interval. There is also a large number of countries (72) that sought information on duration of residence. Duration of residence data were widespread in Asia but less common elsewhere, while place of birth data featured strongly in Censuses across all continents but were least ubiquitous in Europe and Asia.

Table 5 about here

Although place of previous residence at some prior date appears to be the most common data type, Table 6 shows there was little commonality between countries in the choice of reference date. Among those countries collecting transition data (other than since birth), the most popular interval was no fixed reference date, with 54 countries asking a question of this type. This was almost always in associated with a question on duration of residence[7]. A further 53 countries asked a five year question, while 29 countries specified a one year interval. There were 32 countries which employed some other interval length. Common choices included 2 and 10 years while 12 countries used the last census as the reference point. Other points of reference are derived based on the timing of important national events. For example, the 2004 Census of Morocco asked for place of residence at the time "His Majesty Mohamed VI acceded the throne". In a similar vein, the 2003 Census of the Central African Republic asked respondents where they were living "at the time of the last National Election".

Table 6 about here

Some variation is apparent in choice of transition intervals. One year intervals appear to be most common in Europe (principally parts of Southern and Eastern Europe plus the UK and Ireland), but also feature in a number of African countries, together with South Korea, Suriname, Trinidad and Tobago, Canada, Australia and Samoa. Five year intervals are more popular across Latin America, Asia and Oceania. Non-standard intervals appear in Censuses across all continents and, perhaps surprisingly, are especially prominent in Europe.

Although transition data are the most prominent, questions on duration of residence are also common in Censuses around the world (Table 7). Eighteen of the 33 African countries collecting migration data during the 2000 Census round sought information on duration of residence and the same was true of 24 of the 33 Asian nations. Around two-fifths to one half of countries in Europe,

[7] Qatar stands alone as asking a question on place of previous residence without an accompanying question on duration of residence

Latin America and Oceania did likewise. Countries differed, however, in the spatial framework against which duration was measured. In 9 of the 72 countries, the question sought to establish duration of residence in the dwelling currently occupied. In 51 other countries, however, it was length of residence in the same 'locality' that was requested. Elsewhere, there was considerable ambiguity with some Census forms asking for duration of residence "here" or in this "place". These differences are important because changes of residence clearly occur more often than shifts between localities, so it is not always entirely clear what is being measured. The time dimension of questions on residence duration is also treated differently from place to place. Such data are collected in two main forms, measured either as time living at the current residence (40 of 72), or by reference to date of arrival at that residence (32 of 72). However, coding of responses varies, and while a small number of countries measure duration in months, most record duration in years or multi-year intervals, or ask for year of arrival. Since Census collection dates vary widely, true duration of residence can often not be determined with any real precision. These differences not only prejudice comparability but, as demonstrated later, severely reduce the utility of the data.

Table 7 about here

Many countries collect more than one type of migration data at the Census. The combination of place of birth with place of previous residence is most common (118 countries), and about half of these countries also assemble data on residence duration. Figure 1 shows that other blends of data also occur and there were just 12 countries which confined attention to a single type of data, principally place of previous residence. Where countries collected transition data (other than place of birth), the majority (80 of 137) focused on a single transition interval (Figure 2). Just one country (Trinidad and Tobago) sought information on place of residence at three different points in time, but another 15 assembled data for two intervals. Of these, eight countries asked both one year and five year transition questions (Australia, Botswana, Canada, Greece, Malta, Namibia, Samoa, and Suriname) while another seven combined either one year (Albania, Central African Republic, Croatia, Macedonia and Mozambique) or five year (Philippines and Timor Leste) data with information for some other interval

Figure 1 about here
Figure 2 about here

Migration is inherently a form of spatial behavior, so a central issue for any data collection is the division of space and the geographic framework against which the movements are recorded. Current and previous place of residence are commonly sought through discrete questions but countries differ widely in the way this information is collected. While some (eg Australia) ask for specific address on a defined date one or five years previously, others (eg Gambia) seek only the village, town or province of previous residence. Moreover, the data sought on the Census form is not necessarily a reliable guide to the way the information is coded, nor to the geographic level at which information is subsequently released. Table 8 couples close scrutiny of Census forms with information from national statistical offices to indicate the geographic levels at which inter-regional migration flows are *potentially* available across the 142 countries. The results indicate substantial differences, with zonal systems varying from less than 10 in countries such as Swaziland and Turkmenistan to more than 5,000 in Spain, Italy and the UK. Some variation is even apparent within countries, with birthplace coded to state or region while residence five years previously is available at municipality or district level (eg Mexico, Ghana).

These variations in the granularity of zonal systems, coupled with differences in the geographic size of countries, in the distribution of human settlement, and in the pattern of zonal boundaries severely hinder rigorous cross-national comparisons. These difficulties are commonly grouped under the rubric of the Modifiable Areal Unit Problem (MAUP) which plagues all geographical inquiries

(Wrigley et al 1996, Bell et al 2002). As explored by Long (1991), one solution is simply to compare countries in terms of aggregate migration intensity, effectively capturing all residential moves. Unless a specific question is asked, however, transition data normally capture only those moves that cross zonal boundaries, omitting any changes of address that occur within the zone of current residence. Table 9 shows that this was the case in only a minority of countries.

Table 8 about here
Table 9 about here

A final feature of the data which merits brief mention is the inclusion of other questions of interest in Censuses of the various world's nations. Two groups of questions stand out. The first are the questions on reasons for moving which are found in the Censuses of eleven countries. Most countries asking this question pose it in a relatively general form, but others are more specific. For example, the 1999 Solomon Islands Census asked people away from home 'Did you flee because of ethnic tension?'. Similarly the 2001 Census of Armenia and the 1999 Census of Kazakhstan both asked whether migration had been involuntary or forced. Another interesting group are the countries which endeavour to capture aspects of temporary migration. While many Censuses seek to identify people who are away from home, thirteen countries show more formal recognition of non-permanent mobility. This number includes a surprisingly large contingent of European nations (Albania, Croatia, Czech Republic, Italy, Lithuania, Macedonia and Switzerland) as well as African countries such as Morocco, Madagascar and Chad, the last of these being the only Census that formally seeks to distinguish between 'sedentary' and 'nomadic' populations.

6 Internal Migration Data Collected by Nationwide Surveys

Surveys are an important tool in the migration researcher's toolkit. They are often the sole source of internal migration data, particularly in the developing world, they provide data at more regular intervals than censuses and, in a number of countries, are being adopted as an alternative to traditional censuses (Franklin & Plane 2006). It is difficult to know how many surveys capturing internal migration have been conducted globally over recent decades, so a complete inventory of all migration-related surveys is impractical. Reflecting the aims of the IMAGE project, we therefore focus on surveys that potentially facilitate cross-national comparison in both developing and developed regions of the world. For the former, we examine two large scale survey programs: USAID's Demographic and Health Survey, and the World Bank's Living Standard and Measurement Survey. For the latter, we examine a number of large scale survey programs which offer an alternative to census based collections of internal migration, including the European Union Labor Force Surveys and the American Community Survey. Table 10 shows the coverage of the inventory with respect to these three survey types.

Table 10 about here

The *Demographic and Health Survey* (DHS) program has been running since the 1980s, with surveys conducted in more than 80 countries worldwide (Measure DHS 2012). Surveys are targeted at women of reproductive ages (15-49) and men aged 15-59. There have been six DHS phases: Phase I (1984– 1989); Phase II (1988-1993); Phase III (1992-1997); Phase IV (1997-2003); Phase V (2003-2008) and Phase VI (2008-2012). Questions on internal migration were included in the model questionnaires in Phases I through V, but were excluded from the latest round of the survey (Phase VI). Migration questions included in the model questionnaires have varied by phase, but have generally included the following:

- How long have you been living continuously in (Name of village, town, city)?
- Just before you moved here, did you live in the countryside, in a town, or in a city?

Duration of residence is the most common question, with all countries asking this at least once over the five survey rounds (Table 11). Unlike the Census duration of residence is generally framed in terms of completed years. The duration question has almost always been coupled with the question on place of previous residence. However, the utility of the latter is limited by the coarse granularity of the response categories which only differentiate between "the countryside; in a town, or in a city". Thirteen countries sought information on previous residence at a finer level of resolution[8], but this information is still relatively coarse when compared with equivalent data collected at the Census. Moreover, despite relatively large sample sizes, flow matrices computed from DHS survey data quickly become sparse.

Table 11 about here

In Phase 2, the model questionnaire for "High Contraceptive Prevalence Countries" dropped the questions on duration and place of previous residence in preference for a detailed migration history, which included information on place of residence five years previously. This alternative formulation was retained by a number of Latin American countries in subsequent survey phases. Deviating from the model questionnaire, the special DHS held in Afghanistan in 2010 also asked a question on place of previous residence five years previously. Three countries included a question on place of birth in each survey phase. Despite its undoubted value in other fields of demography, the DHS, even in its early incarnation, has therefore been of limited value in the comparative study of mobility.

The *Living Standards Measurement Survey* has been conducted in more than 40 countries over the past two decades (World Bank 2012). While the collection of migration data is not a priority of the program, 31 countries have collected some form of internal migration data over the various phases of the survey (Lucas 2000). Place of birth has been asked in 25 countries and duration of residence in 24 countries. As in the case of the DHS, however, the spatial detail is necessarily coarse, and like the census, there is some variation in recording of residence duration. In eight of the 24 countries, duration of residence is measured with respect to year of arrival rather than length of residence at the destination. This again results in some differences in precision, which are exacerbated in the case of surveys by the fact that enumeration periods often extend over many months. A question on place of previous residence five years ago is asked in four countries, three of which are in Latin America. Surveys in six countries include a question on the number of moves made by an individual within a given interval.

The DHS and LSMS programs are targeted at developing countries, but surveys are also used to collect internal migration data in the developed world. The largest multi-national survey program is the European Union Labour Force Survey (EULFS) which is conducted in the 27 European Member States, four candidate countries and two European Free Trade Association Countries (EUROSTAT 2012) on a rolling basis. In 2011, data on internal migration were collected in 28 of 33 countries, with 24 countries asking a question on region of residence one year ago. The four remaining countries (Croatia, The Netherlands, Switzerland and Turkey) collected information on duration of residence and the place of previous residence. Information on place of birth (within country) was collected by Spain and Italy.

In recent years, surveys have replaced the long form census questionnaire in both the United States of America and Canada. Both the American Community Survey (ACS) and the Canadian National

[8] Benin; DR of Congo; Egypt; Eritrea; Guinea; Mali; Niger; Togo; Zimbabwe; Turkey; Albania; Bolivia; Colombia

Household Survey (NHS) collect data on place of previous residence one year ago and place of birth. The NHS also collects information on place of residence five years ago. While the two surveys appear to collect similar information, the data are not strictly comparable. This is because the ACS is conducted on a rolling basis whereas the NHS is implemented on a single day. Moreover, while the NHS collects one and five year interval data, conceptually equivalent to that collected at the Census, the ACS asks for address one year prior to the date of response, which is not strictly the same time frame (Franklin & Plane 2006). This problem is not limited to the ACS, but is a feature of all surveys collecting internal migration data on a rolling basis, including the EULFS, and surveys with an enumeration period extending over many months. This raises serious questions about the utility of survey data for any type of cross-national comparison and underlines that considerable care is needed when undertaking migration analyses using these types of data.

7 Internal Migration Data Collected by Population Registers

Population registers are an important source of internal migration data in Europe and some parts of East Asia, but remain relative rare elsewhere in the world (Table 3). Such registers are most commonly associated with Scandinavia, where countries such as Finland have maintained continuous records at the individual level since the seventeenth century. While the range of data held on population register differs widely between countries, their particular value for migration analysis lies in recording the precise address of each individual, and capturing changes in their place of residence as these occur. As such, population registers commonly generate movement data since they count migration events, as distinct from the transition data associated with Censuses and surveys (Rees et al 2000). In practice, it is also feasible to generate transition data from comparison of population registers at two points in time, and it is not always clear which approach has been used to create particular datasets. This is an important distinction, because the two forms of data count different phenomena (moves and movers), adopt different age-time plans, and are not readily harmonised (Long & Bortlein 1990, Bell and Rees 2006).

Also under this heading we include a number of administrative datasets that are commonly employed to derive statistics on inter-regional population movements. Examples here include NHSCR data in the United Kingdom and Medicare data in Australia. What distinguishes these sources is that, in general, they offer only partial coverage of the population and rarely include any legal imperative that would ensure complete or timely registration of events. Their key advantage of such administrative by-product statistics is their timeliness and regularity.

In their survey of internal migration data collection in Europe, Rees and Kupiszewski (1999) identified 20 Council of Europe member states which collected some form of migration data from population registers. Of these, 14 relied exclusively on data from register while the reminder drew data both from registers and the Census. Looking more widely across the continent, our inventory identified 28 nations reporting data from registration systems of one type or another. Many of these now have a long pedigree, with fully 18 countries holding data that extend back to the early 1990s (Table 12). Less information is available on the date such registers were established in Asia, but at least two (Japan and Vietnam) also provide lengthy time series.

Table 12 here

Despite their common currency in focusing on migration events, population registers differ in a number of respects which complicate interpretation. For example, there are differences in how residence is defined, with some countries allowing individuals to identify multiple residences, while elsewhere a qualifying period applies before an individual is considered to be resident at a new

address, and therefore to have migrated. In Mongolia and Lithuania this period is 6 months, while in Romania it is a full year.

It might be expected that population registers would capture all changes of address, and hence all residential moves. In practice, however, such data tend to be available only for movements that cross an administrative boundary. Of the 45 countries reporting data from population registers, only six (Poland, Armenia, Australia, Hungary, Mongolia and Bosnia-Herzegovina) also counted moves within the same administrative district. The level of spatial disaggregation also tends to be relatively coarse in comparison with that which is available from Censuses. While current information is incomplete, Table 13 reveals that few countries commonly release register data at fine spatial scale, although such data are theoretically available, and can often be provided 'on request'.

Table 13 here

8 Conclusions

Bell et al (2002) argued that placing migration in a comparative framework offers a number of benefits: results for individual countries become more meaningful when viewed in an international context; commonalities and differences help to distinguish unusual findings from those that have more general applicability; cross-national contexts provide a more rigorous test-bed for migration theory; they also encourage greater analytical rigour in empirical research in individual country settings. As the inventory of migration data collections described here makes clear, however, the goal of assembling an international league table of comparative migration indicators faces a daunting obstacle course. The 193 member states of the United Nations differ widely in regard to the types of migration data they collect, the sources used, the way migration is measured, the time intervals employed, the periodicity of collection, the scope of the questions, and the spatial frameworks involved. Harmonisation between countries on any of these dimensions is a major undertaking (Bell and Rees 2006).

In terms of the migration indicators proposed by Bell et al (2002), even computation of the simplest comparative measure, the crude migration intensity, is not readily accomplished for a majority of countries of the world. We have identified just 15 countries which capture data on all residential moves occurring within their territory in a single year interval. These data from the Census might be supplemented by drawing on duration of residence statistics which are collected in many Censuses elsewhere, or from national Surveys which include migration questions. In practice, however, inconsistencies in the wording and coding of questions on residence duration around the world seriously prejudices comparability. Similarly, few population registers capture intra-regional moves, and harmonisation of event and transition data would also be needed.

Countries differ widely in the intervals over which migration is measured, but it is place of birth statistics, capturing lifetime migration, that emerges as the most common form of data, accounting for 123 countries at the Census. Fully 137 nations collected data over some other interval, with five years (53 nations) the most common choice, followed by one year (32), but fully 29 used some other interval and 54 simply left the migration interval undefined. If wide-ranging comparisons are to be made, further progress will be needed in the quest for analytical solutions to the problem of comparing migration measured over intervals of differing lengths (Courgeau 1973b, Rogerson 1990, Schmertmann 1999).

The issues of comparability are compounded by differences in migration space. It is here that the various aspects of the MAUP, mentioned earlier, take on their greatest significance because of the huge diversity that exists in the size, shape, settlement pattern and administrative geography of the

world's nations. Nevertheless, as recent work has shown, it is possible to make productive comparisons of migration dynamics between countries which differ radically in their physical and human geography, as well as in their migration data (Stillwell *et al.* 2000, 2001, Bell and Muhidin 2009, Courgeau, Muhidin and Bell forthcoming).

The inventory reported here represents a crucial first step in the IMAGE project by assembling the first comprehensive review of internal migration data collected by the majority of nations around the world. The overarching goal is to help advance migration analysis towards the same rigorous foundation already long established in the fields of fertility and mortality (Rees *et al.* 2000). In parallel with assembly of this metadata, the project is also progressively building a repository of internal migration statistics, encompassing both inter-regional migration flows and the associated datasets which are needed to implement a comprehensive set of statistical measures (populations at risk, spatial boundaries, etc) and the analytical software with which they can be interrogated.

References

Australian Bureau of Statistics (1991) *1991 Census Dictionary.* Catalogue No 2901.0. Canberra: ABS.

Bell, M. (1996) How often do Australians move? Alternative measures of population mobility. *Journal of the Australian Population Association,* 13(2), 101-24.

Bell, M. (2002) Comparing population mobility in Australia and New Zealand, in Populations of New Zealand and Australia at the Millennium, Joint Special Issue of the *Journal of Population Research and New Zealand Population Review*, 169-193.

Bell, M., Blake, M., Boyle, P., Duke-Williams, O., Rees, P., Stillwell, J. and Hugo, G. (2002) Cross-national comparison of internal migration: issues and measures. *Journal of the Royal Statistical Society A,* 165(3), 435-464.

Bell, M. and Maher, C.A. (1995) *Internal Migration in Australia 1986 to 1991, The Labour Force.* Canberra: Australian Government Publishing Service.

Bell, M. & Muhidin, S. [2009]: Cross-National Comparisons of Internal Migration, Human Development Research Paper 2009/30, United Nations, New York http://hdr.undp.org/en/reports/global/hdr2009/papers/HDRP_2009_30.pdf

Bell, M. and Rees, P. (2000) Lexis diagrams in the context of migration: a review and application to British and Australian data. Paper presented to a workshop on *Lexis in Context: German and Eastern & Northern European Contributions to Demography 1860-1910*, Max Planck Institute for Demographic Research, Rostock Germany, 28-29 August.

Bell, M. & Rees, P. [2006]: 'Comparing migration in Britain and Australia: harmonisation through use of age-time plans', *Environment and Planning A,* 38(5:) 959-988

Bell, M. and Stratton, M. (1998) Understanding the 1996 Census migration data. *Journal of the Australian Population Association,* 15(2), 155-69.

Blake, M., Bell, M. and Rees, P. (2000) Creating a temporally consistent spatial framework for the analysis of interregional migration in Australia. *International Journal of Population Geography,* 6, 155-74.

Boden, P., Stillwell, J.C.H. and Rees, P.H. (1992) How good are the NHSCR data? In *Migration Processes and Patterns Volume 2, Population Redistribution in the United Kingdom* (eds J.C.H. Stillwell, P.H. Rees and P. Boden), pp. 13-27. London: Belhaven Press.

Boyle, P. and Flowerdew, R. (1997) Improving distance estimates between areal units in migration models. *Geographical Analysis,* 29, 93-107.

Champion, A.G. (1989) *Counterurbanisation, the Changing Pace and Nature of Population Deconcentration.* London: Edward Arnold.

Commonwealth of Independent States (2002) *Commonwealth of Independent States in 2001: Statistical Yearbook*, Moscow

Courgeau, D. (1973a) Migrations et découpages du territoire. *Population,* 28(3), 511-37.

Courgeau, D. (1973b) Migrants and migrations. *Population,* 28, 95-128.

Courgeau, D., Muhidin, S. and Bell, M. [forthcoming]: 'Estimating changes of residence for cross-national comparison', *Population,* (accepted 7 Feb 2012)

Domschke, E. and Goyer, D.S. (1986) *The Handbook of National Population Censuses, Africa and Asia*. New York: Greenwood Press.

Franklin, RS & Plane, DA 2006, 'Pandora's box: the potential and peril of migration data from the American Community Survey', *International Regional Science Review*, vol. 29, no. 3, pp. 231-46.

Goyer, D.S. and Domschke, E. (1983) *The Handbook of National Population Censuses, Latin America and the Caribbean, North America and Oceania*. New York: Greenwood Press.

Goyer, D.S. and Draaijer, G.E. (1992) *The Handbook of National Population Censuses, Europe*. New York: Greenwood Press.

Holdsworth, C. (2000) Leaving home in Britain and Spain, *European Sociological Review*, 16(2), 201-222.

Kitsul, P. and Philipov, D. (1981) The one year/five year migration problem. In *Advances in Multiregional Mathematical Demography* (ed A. Rogers) pp. 1-34. Research Report 81-6. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Laihonen, A. (1999) Development of the use of administrative data in population and housing Censuses in Europe. Working Paper 6, Joint ECF/Eurostat Work Session on Registers and Administrative Records for Social and Demographic Statistics, Conference of European Statisticians, Geneva, 1-3 March.

Laihonen, A. (2000) 2001 round population Censuses in Europe. Paper to the Insee-Eurostat seminar on censuses after 2001, Paris, November.

Law, G. (1999) *Administrative Subdivisions of Countries*, Jefferson, North Carolina: McFarland.

Long, J.F. and Boertlein, C.G. (1990) Comparing migration measures having different intervals. *Current Population Reports, Series P-23*, Special Studies No 166, pp. 1-11. Washington DC.: US Bureau of the Census.

Long, L.H. (1991) Residential mobility differences among developed countries. *International Regional Science Review,* 14, 133-47.

Long, L.H. (1992) Changing residence, comparative perspectives on its relationship to age, sex and marital status. *Population Studies,* 46, 141-58.

Long, L.H., Tucker, C.J. and Urton, W.L. (1988) Migration distances, an international comparison. *Demography,* 25, 633-40.

Nam, C.B., Serow, W. and Sly, D. (1990) *International Handbook on Internal Migration.* Westport, Connecticut: Greenwood.

Newbold, K.B. and Bell, M. (2001) Return and onwards migration in Canada and Australia, evidence from fixed interval data. *International Migration Review,* 35(4), pp. 1157-1184.

Plane, D.A. and Mulligan, G.F. (1997) Measuring spatial focusing in a migration system. *Demography,* 34(2), 251-62.

Rees, P., Bell, M., Duke-Williams, O. and Blake, M. (2000a) Problems and solutions in the measurement of migration intensities, Australia and Britain compared. *Population Studies,* 54(2), 207-222.

Rees, P., Bell, M. Blake, M., and Duke-Williams, O. (2000b) Harmonising databases for the cross national study of internal migration: lessons from Australia and Britain. Working Paper 00/05, School of Geography, University of Leeds, Leeds, Leeds. http://www.geog.leeds.ac.uk/wpapers/00-5.pdf

Rees, P. and Kupiszewski, M. (1996) Internal migration and regional population dynamics: what data are available in the Council of Europe member states? Working Paper 96/1, School of Geography, University of Leeds, Leeds, Leeds. http://www.geog.leeds.ac.uk/wpapers/96-1.htm.

Rees, P. and Kupiszewski, M. (1999a) Internal migration: what data are available in Europe? *Journal of Official Statistics,* 15(4), 551-86.

Rees, P. and Kupiszewski, M. (1999b) *Internal Migration and Regional Population Dynamics in Europe: a Synthesis.* Population Studies No.32. Strasbourg: Council of Europe Publishing. Also available as *Migrations Internes et Dynamique Démographique Régionale en Europe.* Strasbourg: Editions du Conseil de l'Europe.

Rees, P.H., Stillwell, J.C.H., Convey, A. and Kupiszewski, M. editors. (1996) *Population Migration in the European Union.* Chichester: Wiley.

Rodriguez-Vignoli, J.R. [2004]: Migración interna en América Latina y el Caribe: estudio regional del período 1980-2000, LC/L 2059-P, Serie Población y Desarrollo, No 50, Centro Latinoamericano y Caribeño de Demografía (CELADE, División de Población de la CEPAL), Santiago de Chile. http://www.eclac.cl/cgi-bin/getProd.asp?xml=/publicaciones/xml/7/14467/P14467.xml&xsl=/celade/tpl/p9f.xsl&base=/celade/tpl/top-bottom.xsl

Rogers, A. and Castro, L.J. (1981) *Model Migration Schedules.* Research Report RR-81-30. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Rogers, A. and Raymer, J. (1998) The spatial focus of US interstate migration flows. *International Journal of Population Geography,* 4(1), 63-80.

Rogerson, P.A. (1990a) Migration analysis using data with time intervals of differing widths. *Papers of the Regional Science Association,* 68, 97-106.

Rogerson, P.A. (1990b) Buffon's needle and the estimation of migration distances. *Mathematical Population Studies*, 2(3), 229-238.

Schmertmann, C.P. (1999) Estimating multistate transition hazards from last move data. *Journal of the American Statistical Association*, 94(445), 53-63.

Stillwell, J., Bell, M., Blake, M., Duke-Williams, O. and Rees, P. (2000) A comparison of net migration flows and migration effectiveness in Australia and Britain: Part 1, total migration patterns. *Journal of Population Research*, 17(1), 17-38.

Stillwell, J., Bell, M., Blake, M., Duke-Williams, O., & Rees, P. (2001) A comparison of net migration flows and migration effectiveness in Australia and Britain: Part 2, age-related migration patterns. *Journal of Population Research*, 18(1), 19-39.

United Nations (1970) *Manuals on Methods of Estimating Population, Manual VI Methods of Measuring Internal Migration,* Population Studies. Number 47. New York: Department of Economic and Social Affairs, United Nations.

United Nations (1978) *Statistics of Internal Migration: A Technical Report*, Studies in Methods, Series F23, ST/ESA/STAT/SER F/23, Department of International Economic and Social Affairs, New York: United Nations.

Wrigley N., Holt, T., Steel, D. and Tranmer, M. (1996) Analysing, modelling, and resolving the ecological fallacy. In *Spatial Analysis, Modelling in a GIS Environment* (eds P. Longley and M. Batty), pp. 23-40. Cambridge: GeoInformation International.

Table 1: Principal data items contained in the global migration data inventory

	Table 1: Index
1	Country
2	Region
3	Population 2010
4	Area

	Table 2: Census		Table 4: Population Register		Table 3: Survey
1	Internal migration data collected by the Census	1	Internal migration data collected by register	1	Internal migration data collected by survey
2	Date of Census	2	Name of collection	2	Name of survey
3	Recency/proximity of Census	3	Type of collection	3	Year of Survey
4	De jure / De facto	4	Population coverage	4	Periodicity of survey
5	Place of residence 1 year ago	5	Year collection commenced	5	Sample size and characteristics
6	Place of residence 5 years ago	6	Periodicity of data releases	6	Place of residence 1 year ago
7	Place of residence no fixed interval	7	Crossing administrative boundary required / Definition of migration	7	Place of residence 5 years ago
8	Place of residence other interval	8	Definition of place or residence	8	Place of residence no fixed interval
9	Duration of residence	9	Place of previous residence	9	Place of residence other interval
10	Place of birth within country	10	Date of registration	10	Duration of residence
11	Name of smallest zone for which data collected*	11	Date of move	11	Place of birth within country
12	Number of such zones*	12	Date of birth	12	Age
13	Age	13	Name of smallest zone for which data available	13	Sex
14	Sex	14	Number of such zones	14	Comments
15	Comments	15	Age	15	
		16	Sex	16	
		17	Comments	17	

Table 2: Coverage of internal migration database by continent (number of countries)

Region	Partial or complete Information available	Information not available	TOTAL
Africa	50	4	54
Asia	40	6	46
Europe	42	2	44
Latin America	31	1	32
North America	3	0	3
Oceania	13	1	14
TOTAL	179	14	193

Source: Global Inventory of Internal Migration

Table 3: Countries collecting internal migration data by continent and source, Latest Census and/or 2000 round of Censuses

Region	Countries	Data sources			
		Census	Register	Survey	Multiple sources
Africa	50	47	0	41	38
Asia	40	37	14	24	26
Europe	42	32	28	35	35
Latin America	31	31	0	14	31
North America	3	3	2	2	3
Oceania	13	13	1	2	3
TOTAL	179	163	45	118	136

Source: Global Inventory of Internal Migration

Table 4: Countries collecting internal migration by Census, 2000 and 2010 Census rounds

Region	2000 round		2010 round	
	Data collected	No data collected	Data collected	No data collected
Africa	33	1	25	1
Asia	33	2	24	4
Europe	32	2	22	3
Latin America	28	0	19	0
North America	3	0	2	1
Oceania	13	1	11	0
TOTAL	142	6	103	9

Source: Global Inventory of Internal Migration

Table 5: Countries collecting internal migration in the 2000 Census round by continent and data type

Region	Place of Birth	Other Transition Interval	Duration of residence	TOTAL Countries
Africa	30	32	18	33
Asia	26	32	24	33
Europe	26	31	12	32
Latin America	28	28	13	28
North America	3	3	0	3
Oceania	10	11	5	13
TOTAL	123	137	72	142

Source: Global Inventory of Internal Migration

Table 6: Countries collecting transition data at the Census by continent and data type

Region	One year	Five year	Other defined interval	Interval undefined	TOTAL Countries
Africa	9	9	9	13	32
Asia	1	13	7	17	32
Europe	14	4	12	10	31
Latin America	2	16	2	12	28
North America	1	3	0	0	3
Oceania	2	8	2	2	11
TOTAL	29	53	32	54	137

Source: Global Inventory of Internal Migration

Table 7 Countries collecting duration data in the 2000 Census round by continent and data type

Region	Dwelling	Locality	Ambiguous	Countries
Africa	1	11	6	18
Asia	5	12	7	24
Europe	2	9	1	12
Latin America	0	12	1	13
North America	0	0	0	0
Oceania	1	4	0	5
TOTAL	9	48	15	72

Source: Global Inventory of Internal Migration

Table 8: Number of smallest spatial units recorded in countries by type of migration data, 2000 Census round

Number of zones	1 year	5 year	Other defined interval	Interval undefined	Birth place
2-24	3	8	2	8	25
25-99	7	6	4	17	27
100-249	1	5	3	2	10
250-999	3	11	3	5	17
1000+	9	12	8	5	17
n/a	6	11	12	17	27
TOTAL	29	53	32	54	123

Source: Global Inventory of Internal Migration

Table 9: Countries including a mobility indicator in Census form, 2000 Census round

Region	One year	Five year	Other defined interval
Africa	1	2	0
Asia	1	5	1
Europe	10	4	2
Latin America	1	2	1
North America	1	2	0
Oceania	1	3	0
Mobility indicator included	15	18	4
Mobility indicator not included	14	35	50
TOTAL	29	53	54

Source: Global Inventory of Internal Migration

Table 10: Countries collecting internal migration data by continent and survey type

Region	DHS	LSMS	National surveys	All surveys	All countries
Africa	41	7	0	41	54
Asia	21	10	3	27	46
Europe	3	6	31	35	44
Latin America	13	7	0	15	32
North America	1	0	2	2	3
Oceania	1	1	0	2	14
TOTAL	80	31	36	122	193

Source: Global Inventory of Internal Migration

Table 11: Internal migration questions asked by survey type and continent

Region	Duration of residence	Place of previous residence	Place of birth	One year	Five year
	Demographic Health Survey				
Africa	41	40	1	0	3
Asia	21	20	0	0	5
Europe	3	3	0	0	0
Latin America	13	11	2	0	7
North America	1	1	0	0	0
Oceania	1	1	0	0	0
TOTAL	80	76	3	0	15
	Living Standards Measurement Survey				
Africa	4	4	4	0	1
Asia	8	7	8	0	0
Europe	5	4	5	0	0
Latin America	7	4	7	0	3
North America	0	0	0	0	0
Oceania	0	0	1	0	0
TOTAL	24	19	25	0	4
	National Surveys				
Africa	0	0	0	0	0
Asia	1	1	0	0	0
Europe	4	4	2	24	0
Latin America	0	0	0	0	0
North America	0	0	2	2	1
Oceania	0	0	0	0	0
TOTAL	5	5	4	26	1

Source: Global Inventory of Internal Migration

Table 12: Date internal migration data collection by population register commenced by continent

Region	Before 1995	1995-2004	2005 to present	Missing data	Total
Africa	0	0	0	0	0
Asia	2	1	2	9	14
Europe	18	2	1	7	28
Latin America	0	0	0	0	0
North America	0	0	0	2	2
Oceania	1	0	0	0	1
Total	21	3	3	18	45

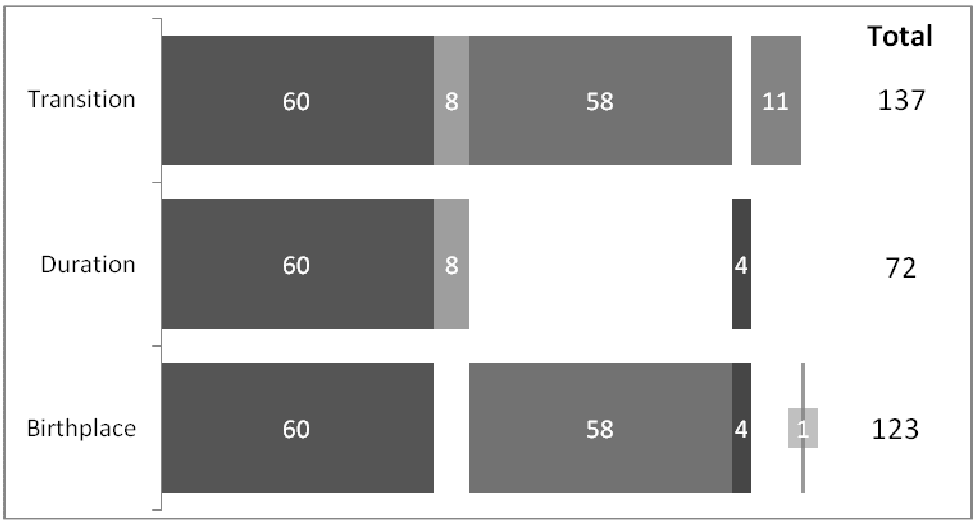
Source: Global Inventory of Internal Migration

Table 13: Number of spatial units for which internal migration data are available from population registers

Number of Spatial Units	Data available "Off the shelf"	Data available "On request"
2-24	8	1
25-99	6	1
100-249	4	2
250-999	2	1
1000+	0	7
Not known	25	33
Total	45	45

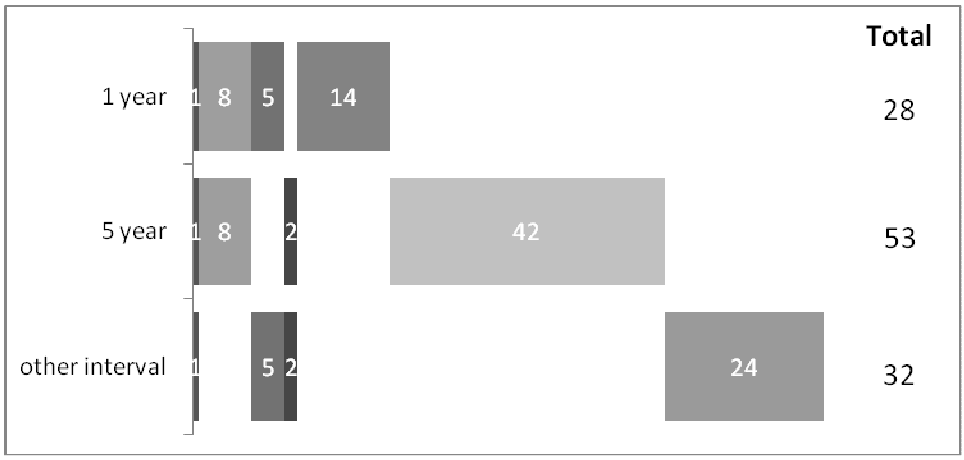
Source: Global Inventory of Internal Migration

Figure 1 Countries collecting multiple types of data in the 2000 census round by data type



Source: Global Inventory of Internal Migration

Figure 2 Countries collecting transition data in the 2000 census round by transition interval



Source: Global Inventory of Internal Migration