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IPUMS-EUROPE: CONFIDENTIALITY MEASURES FOR LICENSING AND DISSEMINATING RESTRICTED-ACCESS CENSUS MICRODATA EXTRACTS TO ACADEMIC USERS

Invited Paper

Submitted by the University of Minnesota, United States of America and the
Autonomous University of Barcelona, Spain [1]

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IPUMS-EUROPE: CONFIDENTIALITY MEASURES FOR LICENSING AND DISSEMINATING
RESTRICTED-ACCESS CENSUS MICRODATA EXTRACTS TO ACADEMIC USERS

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"Inadequate use of microdata has high costs"
—Len Cook (2003)

Abstract. Confidentiality protections for census microdata depend not only on the sensitivity and heterogeneity of the data, but also on the potential users. It is widely recognized that statistical agencies exert substantial effort to protect microdata from mis-use by academics, their most trust-worthy users. The IPUMS-International projects, by disseminating only integrated, anonymized microdata and restricting access to licensed academic users, shifts the risk-utility curve sharply rightward—substantial increasing utility with only marginal increments in risk. The IPUMS-International approach provides access to microdata of high utility at the same time that confidentiality risks are minimized. Many statistical institute partners anonymize the microdata and implement technical measures of confidentiality protection before the data are entrusted to the project. This paper discusses legal, administrative and technical practices of the IPUMS-International project for disseminating harmonized census microdata extracts with specific reference to the IPUMS-Europe regional initiative.

Introduction: IPUMS-International. The IPUMS-International is a global initiative led by the University of Minnesota Population Center to confidentialize, harmonize and disseminate high-density census microdata samples on a restricted access basis to academic users (Ruggles et. al. 2003). Begun in 1999 with funding provided by the National Institutes of Health and the National Science Foundation of the United States, to date the initiative enjoys the endorsement of official statistical institutes of more than fifty countries. Marginal costs of constructing and maintaining the database are born by the MPC, its funding agencies, the University of Minnesota and academic partners—not by the statistical institute partners. On the contrary each is paid a modest fee per census to supply microdata and documentation to the project. In May 2002, the first phase of integrated census microdata for Colombia (1964-1993), France (1962-1990), Kenya (1989-1999), Mexico (1960-2000), the United States (1960-2000), and Vietnam (1989-1999) were made available to licensed users, followed by China (1982) in 2003 and Brazil (1960, 1970, 1980, 1991, 2000) in 2004. More than 500 users representing more than 30 countries are currently licensed to obtain custom-tailored extracts free of charge from the project website: https://www.ipums.org/international

With the inclusion of the data for Brazil, the IPUMS-International website offers some 120 million person records consisting of more than 100 variables from 28 samples with densities varying from 0.1 to 10 percent (Table 1). Over the next five years, the database will expand to 44 countries with regional initiatives in Europe, Africa, Asia, Oceania and Latin America (McCaa and Esteve 2005). It should be noted that the

mode of access to IPUMS-USA samples differs from the International project. The former, a public site, makes data available to anyone and therefore has tens of thousands of users, while the later provides data only to licensees, numbering only in the hundreds.

<div align="center">Insert Table 1 here</div>

The IPUMS-International/Europe regional project began in September 2004. Thanks to additional funding by the European Community Sixth Framework Program, the innaugural workshop was held in Barcelona in July 2006. Delegates from the official statistical agencies and academics met to discuss data availability, samples, general harmonization issues, and overall project procedures. A second workshop, hosted by L'Institut National d'Études démographiques, to be held in 2006 will focus on detailed harmonization issues. In 2007, the first European region data release is scheduled for release with a mirror-site at the Centre d'Estudis Demogràfics (Barcelona).

<div align="center">Insert Table 2 here</div>

Dissemination of IPUMS-International "Extracts". Users of IPUMS-International are not permitted to access microdata containing the original codes provided by the Official Statistical Insitutes. Instead, the microdata are integrated, that is, they are transformed into a complex coding scheme which seeks to preserve all significant detail yet assign identical codes to identical concepts. The integrated microdata are provided only in the form of extracts, custom tailored to each researcher's needs. What this means is that there is no distribution of entire datasets by means of compact discs or otherwise. Since each dataset is custom tailored, "collecting" or "boot-legging"datasets is not only illegal, but effectively curtailed. The database is so enormous and evolving so quickly that users and their institutions have a powerful interest in safe-guarding the data and promoting good use.

To request an extract, the user must first become licensed (see below) and then sign into the project website ("*create an extract*") by entering the registered password. Then a series of selections are made by means of point-and-click menus. The user selects the country or countries, census years, samples, and variables as well as the form of metadata required for the statistical package to be used (SAS, STATA or SPSS are provided). The IPUMS extract engine also makes it possible to select cases (persons, households, or dwellings) with specific characteristics, such as, say, females aged 15-19 in the workforce. Selected cases may also include members of household or family in which the selected case is found.

One of the most valuable enhancements of the database is the "SUBSAMPLE" feature. With SUBSAMPLE, the user may request any of 100 subsamples each of which is nationally representative and preserves any stratification of the larger sample from which it is drawn. This tool may be used to test procedures, economize resources (where the research does not require large samples), or estimate variances through the replicate method.

Once the selections are complete, there is an opportunity to review or revise before final submission of the request. Then, once submitted, the extract engine registers the request and places it in a data processing queue. When the extract is ready (usually in a matter of minutes), the researcher is notified by email that the data should be retrieved within 72 hours. A link is provided to a password-protected site for downloading the specific extract. The data are encrypted during transmission using 128-bit SSL (Secure Sockets Layer) encryption standard, matching the level used by the banking and other industries where security and confidentiality are essential. The researcher may then securely download the file, decompress it and proceed with the analysis using the supplied integrated metadata consisting of variable names and labels. The metadata are in ASCII format so that a researcher may readily adapt them for use by any statistical software.

<div align="center">2</div>

Confidentiality. IPUMS-International means Integrated Restricted-Access, Anonymized Microdata Extracts. The IPUMS-Europe acronym carries "PUMS" embedded in its name, but in fact the data are available only as "restricted-access extracts" from anonymized, integrated samples. Thus, "IRAAME" would be the more literal abbreviation, and indeed when the IPUMS was internationalized in 1998, the Principal Investigators discussed replacing "PUMS" with a more accurate moniker. We also discussed inserting "scientific" in place of "public". However, a decade-long, unbroken string of successes in securing monetary resources for IPUMS from the National Science Foundation and the National Institutes of Health dissuaded us then from abandoning the acronym, as it does now with the sister projects, IPUMS-Latin America and IPUMS-Europe.

Nonetheless, it is important to understand that a comprehensive array of additional protections, much greater than those for IPUMS-USA, are in place to guarantee the privacy and statistical confidentiality of census microdata samples incorporated into the IPUMS-International database. These protections involve three elements:

1. legal: dissemination agreements between the University of Minnesota and each participating Official Statistical Institute
2. administrative: licenses between the University of Minnesota and each user, specifying conditions and restrictions of use
3. technical: perturbations of the data (swapping, recoding, etc.) to make exceedingly unlikely the identification of individuals, families or other entities in the data. Technical measures have the additional benefit that any assertion of absolute certainty in identifying anyone in the data is false.

While much of the literature on statistical confidentiality ignores the legal and administrative environment (and in doing so exaggerates the risk of improper use), we remain firmly persuaded that the strongest system of protections must take into account all three types of guarantees (Thorogood 1999). IPUMS-International confidentiality standards seek to comply with EC Regulation 831/2002, although this regulation encompasses only four datasets at present: European Community Household Panel, Labor Force Survey, Community Innovation Survey, and Continuing Vocational Training Survey (King 2003).

Legal protections. First, with regard to legal protections, IPUMS-International projects are undertaken only in countries where explicit authorization is forthcoming, usally in the form of a memorandum of understanding endorsed by the official statistical institute and the legal authority of the University of Minnesota (see Appendix A). No work is begun with the microdata of a country without prior signed authorization from the corresponding OSI. The agreement is highly general and uniform across countries. Details specific to each country such as fees and sample densities are negotiated separately with each official agency and do not form part of the agreement. Under a carefully worded legal arrangement, the Regents of the University of Minnesota are responsible for enforcing the terms of the accords. The ten clauses spell out: 1) rights of ownership, 2) rights of use, 3) conditions of access (in which statistical institutes cede their gate-keeping authority to grant individual licenses to the IPUMS-International project), 4) restrictions of use, 5) the protection of confidentiality, 6) security of data, 7) citation of publications, 8) enforcement of violations, 9) sharing of integrated data, 10) and arbitration procedures for resolving disagreements. There are no secret clauses or special considerations. Although minor rewording of clauses is permissible, all members of the consortium are treated equally.

Nonetheless, the protocols are revised, indeed expanded, as OSIs suggest, or request, modifications. Any request for modification is reviewed by the legal cabinet of the University of Minnesota. Compare for example the violations clause in Appendix A (as signed by Statistics Austria in January 2002) with the current text (additions in italics), as follows:

<u>Violations</u>. Violation of the user license may lead to professional censure, loss of employment, and/or civil prosecution. *The University of Minnesota, national and international scientific organizations, and the [the Statistical Agency of Country X] will assist in the enforcement of provisions of this accord.*

Recently the tenth clause, which establishes jurisdiction for the settlement of any dispute between the University and any signatories to the memorandum, was amended, substituting the International Court of Arbitration for the Chamber of Commerce of Paris. An eleventh clause, regarding order of precedence, was added, specifying that the clauses in the letter of understanding supersede any contract, purchase order or other document signed between the parties. Under the agreement, the Minnesota Population Center and its authorized partners are obliged to share the integrated data and documentation with the official statistical institutes and to police compliance by users.

Administrative measures. Second, due to confidentiality restrictions, researchers must apply for a license to gain access to the microdata extraction system (click "*Apply for Access*"). Grounds for approval are based upon three considerations:

1. whether the data are appropriate for the proposed project as stated in the applicant's project description

2. whether the applicant is an academic, non-commercial user

3. whether the applicant agrees to abide by the restrictions on conditions of use (see Appendix B).

The vetting of applications is performed by the Principal Investigators of the IPUMS-International project. It is noteworthy that approximately one-third of applications are denied because of a failure to adequately satisfy one or more of the specified conditions. It is gratifying to report that no user has yet appealed a denial of access.

Administrative measures limit access to the extract system to users, who:

1. sign the electronic non-disclosure license;
2. endorse prohibitions against a) attempting to identify individuals or the making of any claim to that effect, b} reporting statistics that might reveal an identity and c) redistributing data to third parties;
3. agree to use the data solely for non-commercial ends and to provide copies of publications to ensure compliance;
4. place themselves under the authority of educational institutions, employers, institutional review boards, professional associations, and other enforcement agencies to deal with any alleged violations of the license.

The license is granted to users, individually, not to research groups, classes, or institutions. The license application instructs the applicant regarding conditions of use (see Appendix B). The license is not transferable. Should the individual change institutions or employment, the license must be updated. Data can be reassigned within an institution, but the person responsible for the microdata must apply for access. Once licensed, the user is permitted to download data extracts of samples and variables according to need. Licensee import the extracts into their statistical software of choice to analyze at the convenience in their own institutional setting.

Since its adoption in 2002, the basic application procedure remains unchanged. Even though advice is solicited from users, statistical institutes, funding agency review boards, and outside experts, there have been few suggestions for enhancing the application form or approval process. Nevertheless in 2006, we plan to strengthen application and vetting procedures, primarily to guard against fraudulent applications. In addition

to requesting additional details about the applicants institutional affiliation, the application form will contain the following statement as a heading:

> **Legal Notice: Submission of this application constitutes a legally binding agreement between the applicant, the applicant's institution, the University of Minnesota, and the relevant official statistical authorities. Submitting false, misleading or fraudulent information constitutes a violation of this agreement. Mis-using the data by violating any of the conditions detailed below also constitutes a violation. Violation of this agreement may lead to professional censure, loss of employment, civil prosecution under relevant national and international laws, and to sanctions against your institution, at the discretion of the University of Minnesota and the official statistical authorities.**

An Institutional Review Board for the protection of human subjects is required of every academic research institution in the United States to apply for a grant to the National Institutes of Health. IRBs provide a strong mechanism for enforcement of the license agreement in the United States. Elsewhere, similar oversight boards exist.

Once the revisions are in place on the website, licenses will be valid for one year and will be renewable. A license may be suspended at any time.

Technical protections. Third are the technical measures taken to ensure statistical confidentiality. Sampling of datasets alone "provides the additional uncertainty needed to protect many data releases…" (Anderson and Fienberg 2001). Census errors and non-response error also provide their own confidentiality protections. As Fienberg (2005) has noted the principal threats are geographic detail and extreme values. Many statistical institute partners anonymize the microdata and implement technical measures of confidentiality protection before the data are entrusted to the project. When the OSI provides a sample that is also made available to others—such as public use samples, SARs and the like—no additional protections are implemented by the project. Usually the project is not informed of the precise technical measures imposed on the data. Where the samples are unique, we impose the following technical protections (based on Thorogood 1999):

1. adopt sample density according to official norms or conventions (see tables 1 and 2);
2. limit geographical detail by means of global recoding to administrative units with a minimum number of inhabitants. For some countries, this limit is as high as 100,000 and for others as low as 10,000. For the European project, NUTS3 is likely to be the lowest level of identifiable administrative geography, with the minimum threshold varying from 20,000 to 100,000 inhabitants according to the most recent census
3. top and bottom code unique categories of sensitive variables (identified by the OSI);
4. round, group, or band age as necessary;
5. suppress date of birth (only age is provided);
6. suppress detailed place of birth (<20/100,000 population);
7. suppress detailed place of residence, work, study, and migration (<20/100,000 population);
8. systematically "swap" (recode) place of enumeration for a fraction of households, inversely proportional to population size at the NUTS3 level; Data swapping protects confidentiality by introducing uncertainty about sensitive data values, yet maintains the strength of statistical inferences by preserving summary statistics (see Fienberg and McIntyre, 2004).
9. randomly order households within administrative units (NUTS3);
10. and, conduct a sensitivity analysis once these measures are imposed to determine what additional measures may be required.

We continue to evaluate emerging methods and technologies for disclosure protection (McCaa and Ruggles 2002). At present we have decided against automatic data protection methods such as *µ-Argus* (Hundepool et al, 1998; Polettini and Seri 2003). It should also be noted that no synthetic data are added to the IPUMS samples.

Shifting the R-U Curve Upward. In practice, disclosure of confidential information from census microdata samples is highly improbable. Moreover, researchers have no interest or incentive to even attempt to identify individuals. On the contrary, there are compelling reasons for jealously guarding confidentiality. Any partially successful effort, such as that by a rogue intruder, will require an enormous investment of resources to obtain rather trivial details invariably with a high degree of uncertainty about whether any one record truly corresponds to a targeted individual or entity (Dale and Elliot 2001). Indeed, over the past forty years of disseminating census microdata in the United States and elsewhere there is not a single *allegation* of misuse or breach of statistical confidentiality by an academic researcher. The IPUMS-International procedures are designed to extend this perfect record.

Len Cook (2003) notes that increased access is not a threat to statistical systems. On the contrary he observes that increasingly there is an expectation that analysis of microdata will inform research and evaluation of policy. Increased access builds trust in statistical systems, while lack of access leads to suspicion. He advocates that different forms of access be granted for different degrees of trust. Moreover academic researchers possess a range and depth of expertise that national statistical institutes cannot replicate.

Julia Lane (2003) highlights five classes of benefits which accrue from broader access to microdata: address more complex questions, calculate marginal effects, replicate findings, assess data quality and build new constituencies or stakeholds. Replication is extremely important because there is an overwhelming temptation for scientists to misrepresent results when the data are unlikely to be available to others. The IPUMS system facilitates replication by providing access to microdata to all academic users on an equal basis.

Conclusion. Now that the construction of anonymized microdata data samples is becoming an increasingly widespread practice, harmonization of census microdata is an obvious next step to enhancing use. With the emergence of global standards of statistical confidentiality and the massive power of ordinary desktop computers, the major challenge that remains is the actual construction of integrated, anonymized of census microdata samples. By restricting access to a class of academic users, high-density microdata extracts can be provided to researchers at vanishingly low risk.

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Table 1. IPUMS-International Integrated Census Microdata Sample Characteristics 120 million person records Source: https://www.ipums.org/international/sample_descriptions.html			
Country census	**Sample %**	**No. of Person records**	**Additional details**
Brazil 1960	5.0	3,001,000	Long-form, cluster sample
1970	5.0	4,954,000	Same
1980	5.0	5,870,000	Same
1990	5.0	8,523,000	Same
2000	6.0	10,136,000	Same
China 1982	0.1	1,003,000	Every thousandth household
Colombia 1964	2.0	350,000	Every fiftieth person
1972	10.0	1,989,000	Every tenth household
1985	10.0	2,643,000	Long-form, cluster sample
1993	10.0	3,247,000	Every tenth household
France 1962	5.0	2,321,000	Every twentieth household
1968	5.0	2,488,000	Same
1975	5.0	2,629,000	Same
1982	5.0	2,714,000	Same
1990	4.2	2,361,000	Every twenty-fourth household
Kenya 1989	5.0	1,074,000	Every twentieth household
1999	5.0	1,410,000	Same
Mexico 1960	1.5	503,000	Every 67th individual
1970	1.0	483,000	Every hundredth household
1990	10.0	8,028,000	Every tenth household
2000	10.6	10,099,000	Long-form, cluster sample
USA 1960	1.0	1,800,000	Stratified, random sample
1970	1.0	2,030,000	Same
1980	5.0	11,337,000	Same
1990	5.0	12,500,000	Stratified, cluster sample
2000	5.0	14,082,000	Same
Vietnam 1989	5.0	2,627,000	Long-form, cluster sample
1999	3.0	2,368,000	Same

Table 2. IPUMS-Europe: Likely Censuses and Sample Sizes (in 000s), by Country.
Bolded census year indicates sample has been drawn and entrusted to project.

	Sample Density (%)	Census	N	Census	N	Census	N	Census	N	Census	N
Austria	**10**	**2001**	**910**	**1991**	**780**	**1981**	**760**	**1971**	**750**		
Belarus	**10**	**1999**	**1040**			.		.	.	.	.	.
Bulgaria	5	2001	395	1992	425	.		.	.	.	.	.
Czech Rep.	5	2001	515	1991	515	.		.	.	.	.	.
France	**5**	**1999**	**3,005**	**1990**	**2,361**	**1982**	**2,714**	**1975**	**2,629**	**1968**	**2,488**
Germany	?	2001	414	1991	400	1987	306	1982	308	1970	305
Greece	**10**	**2001**	**1090**	**1991**	**1,020**	**1981**	**970**	**1971**	**880**	.	.
Hungary	**5**	**2001**	**505**	**1990**	**520**	**1980**	**535**	**1970**	**515**	.	.
Netherlands	**1**	**2001**	**160**	.	.	.	.	**1971**	**130**	**1960**	**115**
Poland	?	2002	1,930	1995	1,940	1988	1,900	1984	1,850	1978	1,745
Portugal	?	2001	500	1991	495	1981	490	.	.	.	.
Romania	**10**	**2002**	**2,240**	**1992**	**2,280**	.		.	.	.	.	.
Russia	5	2002	7,200	1989	7,400	.		.	.	.	.	.
Slovenia	10	2001	200	1991	200			.	.	.	.	.
Spain	**5**	**2001**	**2,040**	**1991**	**1,940**	**1981**	**1,875**	.	.	.	.
UK	1	2001	600	**1991**	**574**	.		.	.	.	.	.

Notes: *Total Person Records ~65 million*

Microcensuses: Germany 1982, 1991, 2000; Netherlands 2001; Poland 1974, 1984, 1995.

Samples for 1962 France and 1960 and 1974 Poland are included in the total case count.

Final agreements for Poland, Russia and Turkey are pending, and some of the earliest censuses may not be recoverable.

8

2

Letter of Understanding
Integrated Public Use Microdata Series International and Statistics Austria

Purpose. The purpose of this letter is to specify the terms and conditions under which metadata and microdata provided by **Statistics Austria** shall be distributed by **Integrated Public Use Microdata Series International** of the University of Minnesota.

1. Ownership. **Statistics Austria** is the owner and licensee of the intellectua property rights (including copyright) in the metadata and microdata supplied to the University of Minnesota to be distributed by **Integrated Public Use Microdata Series International**.

2. Use. These data are provided for the exclusive purposes of teaching, academic research and publishing, and may not be used for any other purposes without the explicit written approval, in advance, of **Statistics Austria**.

3. Authorization. To access or obtain copies of integrated microdata of Austria from **Integrated Public Use Microdata Series International**, a prospective user must first submit an electronic authorization form identifying the user (i.e., principal investigator) by name, electronic address, and institution. The principal investigator must state the purpose of the proposed project and agree to abide by the regulations contained herein. Once a project is approved, a password will be issued and data may be acquired from servers or other electronic dissemination media maintained by **Integrated Public Use Microdata Series International**, Statistics Austria, or other authorized distributors. Once approved, the user is licensed to acquire integrated metadata and microdata of Austria from **Integrated Public Use Microdata Series International** or other authorized distributors. No titles or other rights are conveyed to the user.

4. Restriction. Users are prohibited from using data acquired from the **Integrated Public Use Microdata Series International** or other authorized distributors in the pursuit of any commercial or income-generating venture either privately, or otherwise.

5. Confidentiality. Users will maintain the absolute confidentiality of persons and households. Any attempt to ascertain the identity of a person, family, household, dwelling, organization, business or other entity from the microdata is strictly prohibited. Alleging that a person or any other entity has been identified in these data is also prohibited.

6. Security. Users will implement security measures to prevent unauthorized access to microdata acquired from **Integrated Public Use Microdata Series International** or its partners.

7. Publication. The publishing of data and analysis resulting from research using metadata or microdata of Austria is permitted in communications such as scholarly papers, journals and the like. The authors of these communications are required to cite **Statistics Austria and Integrated Public Use Microdata Series International** as the sources of the data of Austria, and to indicate that the results and views expressed are those of the author/user.

8. Sharing. **Integrated Public Use Microdata Series International** will provide electronic copies to **Statistics Austria** of documentation and data related to its integrated microdata as well as timely reports of authorized users.

9. Violations. Violation of this agreement may lead to professional censure and/or civil prosecution.

10. Jurisdiction. Disagreements which may arise shall be settled by means of conciliation, transaction and friendly composition. Should a settlement by these means prove impossible, a Tribunal of Settlement shall be convened which will rule upon the matter under law. This Tribunal shall be composed of an (1) arbitrator, which shall be elected by lot from the list of Arbitrators of the Chamber of Commerce of Paris. This agreement shall be governed by, and construed in accordance with, generally accepted principles of International Law.

Date: _____December 20, 2001_____
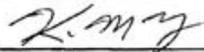
Signed: _____
Regents of the University of Minnesota
By: Kevin McKoskey, Grants Manager, Sponsored Projects Administration

Date: ___January 28, 2002_____

Signed: _____

Rev. Oct. 23, 2001

Appendix B. Proposed IPUMS-International Usage License Text
[For current text, see: https://ww.ipums.org/international/apply_for_access.html]

The license is valid for one year and may be renewed.

Please check each of the following boxes to indicate that you have read about the limitations of the IPUMS-International data and you agree to abide by the conditions of use.

[ ] **Data must not be redistributed without authorization.** All data extracted from the IPUMS-International database are intended solely for the use of the licensee. Under IPUMS-International agreements with collaborating agencies, redistribution of the data to third parties is prohibited. Each member of a research team using the data must apply for access and be licensed individually.

[ ] **The microdata are intended only for scholarly research and educational purposes.** These microdata are provided for the exclusive purposes of teaching and scholarly research, and may not be used for any other purposes without explicit written approval from the relevant official statistical authority.

[ ] **Commercial use and redistribution of the microdata is strictly prohibited.** Users are prohibited from using microdata acquired from the Integrated Public Use Microdata Series International or other authorized distributors in the pursuit of any commercial or income-generating venture either privately, or otherwise.

[ ] **Use of the microdata must follow strict rules of confidentiality.** Users will maintain the confidentiality of persons and households. Any attempt to ascertain the identity of persons or households from the microdata or to link records between microdatasets is prohibited. Alleging that a person or household has been identified in these data is also prohibited. Statistical results that might reveal the identity of persons or entities may not be reported or published in any form.

[ ] **The microdata must always be safely secured.** Users will implement security measures to prevent unauthorized access to microdata acquired from Integrated Public Use Microdata Series International, its partners or authorized distributors. Upon completion of this research, data may be retained only if they can be safely secured. A change of status or affiliation requires the submission of a revised application. If reponsibility for the microdata is to be transferred to another individual within the same institution, that person must apply for access. If security cannot be guaranteed, the microdata must be destroyed.

[ ] **Scholarly publications are permitted, and must be cited appropriately.** The publishing of research results based on IPUMS-International microdata is permitted in communications such as scholarly papers, journals, and the like. The authors of these communications are required to cite Integrated Public Use Microdata Series-International and the relevant official statistical authority as the source of the microdata, and to indicate that the results and views expressed are those of the author. Users are requested to provide the IPUMS-International staff with a full citation for any publications resulting from their work with these data.

[ ] **Any violation of this license agreement will result in disciplinary action, including possible loss of employment.** Violation of this agreement will lead to revocation of this license, recall of all microdata acquired, a motion of censure to the relevant professional organization(s), and civil prosecution under national or international statutes, at the discretion of the Regents of the University of Minnesota and the official statistical agencies. Sanctions likewise may be taken against the institution with which the violator is affiliated.

[ ] **User agrees to notify ipums@pop.umn.edu regarding errors in the data.**