




Statistical confidentiality and privacy.
Implementing IPUMS-International
technical protocols in CSPro/IMPS
www.ipums.org/international
 * * *
Michael Levin and Robert McCaa
 Harvard University School of Public Health
 Minnesota Population Center
jlevin00@yahoo.com and rmccaa@umn.edu
"Inadequate use of microdata has high costs"
--Len Cook (2003, registrar general, ONS)



MPC: largest provider of integrated microdata to
trusted, non-commercial researchers

International (census)








USA (census)

Employment

MPC Minnesota Population Center

Home of the IPUMS and other data projects

The MPC is one of the world's leading developers of demographic data resources. We provide population data to thousands of researchers, policymakers, teachers, and students. All MPC data are available free over the internet.



Integrated Public Use Microdata Series	Other MPC Projects
 IPUMS-International Harmonized data for 1960 forward, covering 2.79 million people in 130 censuses from around the world.	 North Atlantic Population Project Complete count data from 1800s censuses of Canada, Great Britain, Norway, Sweden, and the U.S.
 IPUMS-USA Harmonized data on people in the U.S. census and American Community Survey, from 1850 to the present.	 National Historical Geographic Information System Tabular U.S. census data and GIS boundary files from 1790 to 2000.
 IPUMS-CPS Harmonized data on people in the Current Population Survey, every March from 1962 to the present.	 Integrated Health Interview Surveys Annual harmonized data on people in the U.S. National Health Interview Survey from the 1980s to the present.
	 American Time Use Survey Annual harmonized data from 2002 forward on how U.S. adults divide their time among activities.

History (19th c.)

GIS

Health

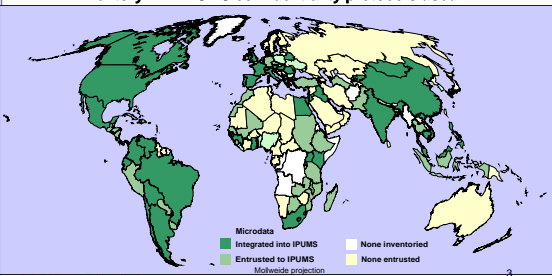
Time-Use


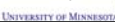



See "Inventory" IPUMS-Global (first 10 years)
handout

dark green = integrated and disseminating
(44 countries, 130 censuses, 279 million person records)
green = to be integrated (35 countries, 90 censuses, 150 mill.)

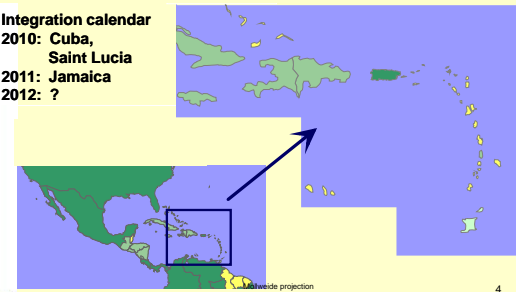
Inventory: * = IPUMS confidentiality protocols used









IPUMS-Caribbean
dark green = integrated and disseminating (1 country, 4 censuses)
mid-green = to be integrated (5 countries, 13 censuses)
light green = negotiating (2 countries)

Integration calendar
 2010: Cuba, Saint Lucia
 2011: Jamaica
 2012: ?




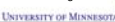






Outline: IPUMSi statistical confidentiality methods

1. IPUMSi: A restricted access, web-based microdata dissemination system
2. IPUMSi: The trusted user/institution approach
 - » A. Legal Disclosure Controls
 - » B. Administrative Disclosure Controls
 - » C. Technical Disclosure Controls
 - » Example: Saint Lucia, 1991
3. IPUMSi Technical Protocols in CSPro/IMPS:
 - » Design



Demonstration of concept







1. IPUMS-International: Goals

1. Inventory census microdata and documentation, world-wide
2. Recover and preserve at-risk microdata and documentation
3. Integrate anonymized census microdata and documentation
4. Disseminate--without cost--extracts of anonymized samples to bona-fide researchers worldwide, regardless of country of birth, citizenship or residence.
 - » Sustained funding 1999-2015—6 grants of 5 years duration:
 - » National Science Foundation (USA): 3 successive grants
 - » National Institutes of Health (USA): Latin America, Europe, Eur-Asia







IPUMS-International: a restricted-access, web-based microdata extraction system

- » Researcher licensed to access microdata: 1/3 rejected
- » **NO:** Public access, source files, or complete datasets
- » Licensed researcher selects:
 - » Countries,
 - » Censuses,
 - » Cases/sub-populations,
 - » Variables, and sample densities
- » Extract engine queues request, generates extract
- » Password protected: to make and retrieve extracts
- » Researcher retrieves extract via web with SSL 128-bit encryption and analyzes using own wares (soft/hard/wet)

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CAUTION
RESTRICTED AREA

See "10 tips" handout

6 steps using
www.ipums.org/international:

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IPUMS-International: world's largest disseminator of integrated microdata to trusted, non-commercial researchers

- » 1999: Founded by Steven Ruggles and Bob McCaa, –restrict access to trusted users, and apply corresponding confidentiality techniques
- » 2002: 1st release of integrated samples for 7 countries; >200 users in first year
- » Big success! 80+ countries signed; 70+ entrusted microdata to IPUMS, datasets for more than 250 censuses, >180 entire datasets
- » 2006...

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IPUMS-International: world's largest disseminator of integrated microdata to trusted, non-commercial researchers

- » 1999: Founded
- » 2006, 3rd release:
 - » data for 20 countries, samples for 63 censuses,
 - » 185 million person records,
 - » >1,000 users
- » 2010, 7th release:
 - » data for ~50 countries, samples for ~160 censuses
 - » ~300 million person records
 - » >4,000 users
- » Note: data extracts are provided only to licensed users.

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2. IPUMS-International
The "trusted-user/institution" approach to disseminating integrated, anonymized microdata extracts

Disclosure Controls:

- A. Legal: Memorandum with NSI
- B. Administrative: License with researchers
- C. Technical: Sample, Data modifications

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3 kinds of confidentiality protections:

- A. Legal:** Dissemination agreement between University of Minnesota and each National Statistical Institute
 - » Uniform 11 point Memorandum of Understanding regarding: ownership, use, authorization, restrictions, confidentiality, security, publication, violations, sharing, arbitration, and order of precedence
- B. Administrative:** conditional use license between the University of Minnesota and each researcher
 - » Permission to use restricted access microdata, 3 criteria: research need, research competence, and agree to abide by conditions of use license
- C. Technical** data protection measures
 - » specific to each country .../

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A. NSI with U of Minnesota

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 microdata and metadata provided by Statistics Austria shall be distributed by Integrated Public Use Microdata Series International of the University of Minnesota.

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

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

Authorization: The access or obtain copies of integrated microdata of Austria from Integrated Public Use Microdata Series International, a prospective user must first obtain 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 accessed from servers or other distribution media maintained by Integrated Public Use Microdata Series International, Statistics Austria, or other authorized distributors. Once approved, the user is limited to access integrated microdata and metadata of Austria from Integrated Public Use Microdata Series International or other authorized distributors. The data or other rights are conveyed to the user.

Restrictions: 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 other than that of the user.

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.

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

Publication: The publishing of data and analysis resulting from research using microdata or metadata 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(s).

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.

Violations: Violations of this agreement may lead to professional censure and/or prosecution.

Arbitration: Disagreements which may arise shall be settled by means of conciliation, mediation and friendly cooperation. Should a settlement by these means prove impossible, a Tribunal of Arbitration 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: September 28, 2005
Signed: [Signature]
Regents of the University of Minnesota
By: [Signature] [Signature] [Signature]
Date: September 28, 2005
Signed: [Signature]
For the NSI

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A. NSI with U. of Minnesota

Letter of Understanding (2005)

9. **Violations.** 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 [Official Statistical Institute of Country X] will assist in the enforcement of provisions of this accord.

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

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

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3 kinds of confidentiality protections:

A. Legal: Dissemination agreement between University of Minnesota and each National Statistical Institute

- Uniform 11 point Memorandum of Understanding regarding: ownership, use, authorization, restrictions, confidentiality, security, publication, violations, sharing, arbitration, and order of precedence

B. Administrative: conditional use license between the University of Minnesota and each researcher

- Permission to use restricted access microdata, 3 criteria: research need, research competence, and agree to abide by conditions of use license

C. Technical data protection measures

- Specific to each country .../

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B. License with researchers

Restricted Access web-based system

Legally-binding license agreement

- forces would-be intruder to violate law by which they can be fined and/or jailed
- Researcher's institution sanctioned
- protects privacy and confidentiality
- assures proper use

Access limited to:

- >>
- >>
- >>
- >>
- >>

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B. License with researchers

Restricted Access web-based system

Legally-binding license agreement

- >>
- >>
- >>

Access limited to:

- Bona-fide researchers (credentialed)
- with demonstrated scientific need
- who agree to abide by license restrictions
- Confidentiality
- No redistribution, no commercial use
- Data safely secured
- Alleging that a person can be or has been identified is a violation

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The screenshot shows the IPUMS International website. The main content area is titled "Integrated Public Use Microdata Series International" and describes the project as a census microdata for social and economic research. It lists the data sources as IPUMS Registration, Census Data Extract, Download or Review Extract, and US Register Files. The documentation section lists samples, variables, and census questionnaires. The resources section includes the World Data Inventory, Metadata Handbook, International Partners, and Metadata. The contact us section lists the Feedback Staff. The right sidebar contains IPUMS News and MPC Data Projects.

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DATA

- IPUMS Registration
- Download or Reuse Extract
- Download or Reuse Extract
- GIS Boundary Files
- Citation of IPUMS

DOCUMENTATION

- Samples
- Variables
- Census Questionnaires

RESOURCES

- World Data Inventory
- Microdata Handbook
- International Partners
- Bibliography

CONTACT US

- Feedback
- Staff

IPUMS-International is a project dedicated to collecting and distributing census data from around the world. Its goals are to:

- Collect and preserve data and documentation
- Harmonize data
- Disseminate the data absolutely free!

44 countries - 130 censuses - 279 million person records

Funding provided by: [National Science Foundation](#), [National Institutes of Health](#), and [Sun Microsystems](#).
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IPUMS International HOME DATA DOCUMENTATION FEEDBACK SEARCH

“Apply for Access”

Application to Use Restricted Microdata

IPUMS-International microdata are available free of charge, but their use imposes responsibilities upon the user.

To access the data from the Integrated Public Use Microdata Series-International (IPUMS-International), a prospective user must first submit an electronic authorization form (this form) identifying the user by name, electronic address, and institution.

The investigator must state the purpose of the proposed project and agree to abide by the regulations specified below. If multiple investigators are involved in a project, all must register separately. Once a project is approved, a message will be sent by email granting access to the system.

The notification licenses the user to acquire microdata from Integrated Public Use Microdata Series International or other authorized distributors. No titles or other rights are conveyed to the user.

Errors discovered in the microdata must be reported to: ipums@pop.umn.edu

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.

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PERSONAL INFORMATION

All information will be kept confidential.
All information on this form is required for registration unless otherwise indicated.

Personal Information

Given Name:

Family Name:

Employer/Institutional affiliation:
Name, Position and Identifying e-mail address and webpage, if any:

Supervisor/Department Head/Class Instructor Name:
e-mail address:

Address (institutional; if none, enter personal):
Street Address 1:

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Supervisor/Department Head/Class Instructor Name:

e-mail address:

Address (institutional; if none, enter personal):
Street Address 1:

Street Address 2:

City, State/Province, Zip:

Country:

Phone Number(s) (include country and city/area codes):

Fax Number (optional):

E-mail address to be used for this project:

Funding research, other than employer, if any:
Indicate name of granting institution, grant #, title, and year(s) of award, or state "None":

Does your institution have a Institutional Review Board (IRB), Office for Human Subject Protections, Professional Conduct or similar committee? If so, please indicate name:

No Yes

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RESEARCH PROJECT

Please provide at least 75 words in English describing your research project or educational use for the data. This description will be used to evaluate your application.

Which countries do you intend to study in your research?

<input type="checkbox"/> Argentina	<input type="checkbox"/> Armenia	<input type="checkbox"/> Austria	<input type="checkbox"/> Belarus
<input type="checkbox"/> Bolivia	<input type="checkbox"/> Brazil	<input type="checkbox"/> Cambodia	<input type="checkbox"/> Canada
<input type="checkbox"/> Chile	<input type="checkbox"/> China	<input type="checkbox"/> Colombia	<input type="checkbox"/> Costa Rica
<input type="checkbox"/> Ecuador	<input type="checkbox"/> Egypt	<input type="checkbox"/> France	<input type="checkbox"/> Ghana
<input type="checkbox"/> Greece	<input type="checkbox"/> Guinea	<input type="checkbox"/> Hungary	<input type="checkbox"/> India
<input type="checkbox"/> Iraq	<input type="checkbox"/> Israel	<input type="checkbox"/> Italy	<input type="checkbox"/> Jordan
<input type="checkbox"/> Korea	<input type="checkbox"/> Kyrgyz Republic	<input type="checkbox"/> Malaysia	<input type="checkbox"/> Mexico
<input type="checkbox"/> Mongolia	<input type="checkbox"/> Netherlands	<input type="checkbox"/> Palestine	<input type="checkbox"/> Panama
<input type="checkbox"/> Philippines	<input type="checkbox"/> Portugal	<input type="checkbox"/> Romania	<input type="checkbox"/> Rwanda
<input type="checkbox"/> Slovenia	<input type="checkbox"/> South Africa	<input type="checkbox"/> Spain	<input type="checkbox"/> Tanzania
<input type="checkbox"/> Uganda	<input type="checkbox"/> United Kingdom	<input type="checkbox"/> United States	<input type="checkbox"/> Venezuela
<input type="checkbox"/> Vietnam			

Other countries which you would like added to the database: (*)

If your research is funded by someone other than your employer, indicate the name of the granting institution, title of grant, and other pertinent information. (*)

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Usage Licenses

Integrated Public Use Microdata Series International (IPUMS International) and its partners

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. The purpose of this screen is to specify the terms and conditions under which Integrated Microdata samples distributed by Integrated Public Use Microdata Series International of the University of Minnesota may be used. The license is valid for one year and may be renewed.

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, group or class using the data must apply for access and be licensed individually. A change of status or affiliation requires the submission of a revised application if the microdata are to remain in the custody of the licensee. If

Field:

<input type="radio"/> Demography	<input type="radio"/> Student	<input type="radio"/> Class Exercise/Paper
<input type="radio"/> Economics	<input type="radio"/> Teacher	<input type="radio"/> Thesis
<input type="radio"/> History	<input type="radio"/> Academic Researcher	<input type="radio"/> Article
<input type="radio"/> Sociology	<input type="radio"/> Support Staff	<input type="radio"/> Policy Report
<input type="radio"/> Statistics	<input type="radio"/> Non-Academic Researcher	<input type="radio"/> Doctoral Dissertation
<input type="radio"/> Public Policy	<input type="radio"/> Consultant	<input type="radio"/> Book
<input type="radio"/> Other academic	<input type="radio"/> Other	<input type="radio"/> Other

Variables

Census Questionnaires

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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.

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 individual 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.

Census Questions

Must click acceptance of each restriction to gain access.

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The microdata must always be safely secured.

Users will implement security measures, such as the use of passwords, to prevent unauthorized access to microdata acquired from Integrated Public Use Microdata Series International, its partners or authorized distributors. Upon the completion of this research, data and results may be retained only if they can be securely guarded. If security cannot be guaranteed, the microdata and results 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 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.

Violation of this license agreement will result in disciplinary action, including possible loss of employment.

Violation of this agreement will lead to a revocation of this license, recall of all microdata acquired, a motion of censure to professional organization(s) and civil prosecution under the relevant national or international laws. Violation of the ~~Privacy Act of 1974~~ **Privacy Act of the State of Minnesota** and the national statistical agencies' sanctions likewise may be taken against the institution with which the violator is affiliated.

User agrees to notify ipums@pop.umn.edu of errors in the data or violation(s) of this agreement by individuals.

Description of Project Proposal:

License is for 1 year
End of application available

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C. 9 Technical Disclosure Controls (Thorogood, 1999)

1. Restrict access to samples
2. Limit geographical detail
3. Recode sparse categories
4. Truncate top and bottom codes
5. Construct age from birthdate, if necessary
6. Suppress: date of birth, precise place of birth
7. Migration: timing/place not identified in detail
8. Identify place of residence by major civil division (pop>20k, 60k, 100k, 250k, 1 million—i.e., national convention)
9. Suppress any sensitive variable requested by NSI

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C. Technical Disclosure Controls Example: Saint Lucia, 1991 Census

1. Restrict access to samples: 10% (13,405 persons)
2. Limit geographical detail (n<2,000): suppress region, district, town, settlement, enumeration district, school identification; retain urban-rural
3. Recode sparse categories (n<25)→ "other".
 - > Type of dwelling: suppress townhouse, barracks
 - > Land occupation: suppress sharecrop
 - > Type of ownership: suppress squatted, leased
 - > Type of roof: suppress 5 categories
 - > Wall material: suppress 5 categories
 - > Water supply: suppress pubwell
 - > Type of lighting: suppress gas
 - > Ethnic origin: suppress Chinese, Portuguese, Syrian-Lebanese
 - > Religion: suppress 6 categories
 - > School, work: mode of transport: bicycle
 - > Type of school: technical institute, university
 - > Number of hours worked last week: 5 hour groups. , 70+
 - > Pay period: suppress quarterly, annually
 - > Occupation, industry, training code: reduce from 4 digits to 1/23

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C. Technical Disclosure Controls Example: Saint Lucia, 1991


4. Top-bottom code
 - > Number of rooms: 10+
 - > Number of bedrooms: 7+
 - > Number of radios: 4+
 - > Number of tvs: 3+
 - > Number of videos: 2+
 - > Number of emigrants in dwelling: 2+
 - > Age: 81+
 - > Age at first child: <= 14
 - > Age at first union: <=14, 41+
 - > Age at last child: <=14, 45+
 - > Number of school subjects: <=3, >=7
 - > Income categories: 8+

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C. Technical Disclosure Controls Example: Saint Lucia, 1991


5. Suppress:
 - > date of birth, precise place of birth, type of work wanted
6. Migration: timing/place not identified in detail
 - > Country last lived: suppress 37 categories
 - > Year of immigration: <1948
7. Identify place of residence by major civil division (pop>20k, 60k, 100k, 250k, 1 million—i.e., national convention)
 - > all suppressed
8. Suppress any sensitive variable requested by NSI:
 - > none (as yet)

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3. Implementing IPUMS technical protocols using CSPro/IMPS

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B. Demonstration of Concept:

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Join us at the 58th ISI: Dublin, Aug 21-26, 2011 <http://www.isi2001.ie>

ISI 2011
58th SESSION - AUG 21st - 26th
ISI 2011 DUBLIN

- » IPUMS Workshop, Aug 19-20.
- » Microdata sessions.
- » IPUMS Funding for delegates from developing countries.
- » IPUMS booth
- » Participate in ISI sessions.
- » Network with stat offices, international agencies, etc.

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Thank you!

More:
www.hist.umn.edu/~rmccaa/ipums-global
 see: Durban workshop (2009):
 Microdata recovery, Jamaica report
 Lisbon workshop (2007):
 Saint Lucia report
 * * * * *

Contact: rmccaa@umn.edu
 this ppt is also available at:
ipums-global
 (See "Saint Lucia Seminar")

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