Indigenous Population: Small Domain Issues

JNK Rao Celebration
May 30, 2012

Daniel Lee and Fritz Scheuren
"Native American isn’t blood; it is what is in the heart. The love for the land. The respect for it, those who inhabit it; and the respect and acknowledgement of the spirits and the elders. That is what it is to be Indian."

White Feather
Navajo Medicine Man
Advice About Birthdays

• Only celebrate when your age is prime
• Anyway, it “slows” down aging? So much to enjoy!
• Finally, be sure to invite a few hundred friends
Exploratory Nature of Talk

- In the world of PDCA (Deming) our work is at an early stage
- Problem well Motivated, Data Described, Hypotheses formed
- Confirmatory efforts yet to come, if resources are found
- Will end asking for your help
How Small is Small?

• What is our Observational Unit?
• State Vital Records Offices?
• What is Our Analysis Unit?
• Individuals/Proxies Self-Identified as Indigenous?
• Goal is Reliable Indigenous data over time and space?
Outline of Talk

• A Brief Background on the Indigenous Peoples

• General Statistical Challenges to Indigenous Research

• A Case Study Application to US Indigenous Infant Mortality

• Some Next Steps in Producing Child Mortality and Life Tables
About Indigenous Peoples

• Traditional Homelands in North America (Pictured)
• But also in Australia and New Zealand (Not Shown)
• These First Migrants went to Truly Empty Lands
• Later Cut off from the Bulk of Humanity
Then Europeans Re-Discovered Them

- Original Land Bridges were covered by a Rising Sea, leading to their Isolation
- Cut-off ended by European Discoverers or Invaders in Sailing Ships about 500+ years
- Lands Were often Treated as Still Empty (Jefferson Story)
Haiti and the Louisiana Purchase

• Haiti’s Slave Revolts from France 1791-1804 were emboldened, in part, by the French Revolution

• Spain had ceded the lands which became the Louisiana Purchase to France

• France no longer needed the Spanish lands and sold them
Jefferson’s “Empire”

• Louis and Clark Famously Surveyed Jefferson’s Purchase Claiming all these lands as if they were vacant

• Indigenous do not believe anyone can own land and this cultural difference has cost them dearly
Cost and Consequences of Noncontact

- Separation not too long ago, variously put about 20,000 years in the Americas
- Still enough to Change indigenous Peoples
- Not Protected, for example, against Certain Infectious Diseases
Another North America Map
Strangers in Their Own Lands?

• Indigenous were Displaced, Variously, Depending on Country

• In the USA by Disease, Warfare and Sharp Dealing, Often Shameful

• Indigenous People became a Small and Marginal Group
Bottom Line: Indigenous Populations

• Of Interest in Canada, Australia, New Zealand, and the United States

• Typically, indigenous now a Small Part of Total Population

• Usually quite poor, disadvantaged and in ill health

• Culturally different!
Decided on a Joint Indigenous Project

• Idea was to tackle a hard project together,
• To learn faster, lower cost, and avoid discouragement
• Sharing Successes and not Repeating Failures
Indigenous Life Table

• Lots had been done, especially in Canada and Australia, US was last/least

• Given the small size of the Indigenous Population makes this a small domain problem

• But there are nonsampling problems to tackle too
Traditional Indigenous Family
Small Domain Issues

- Samples too small to support inference alone
- So use models to borrow strength from elsewhere
- JNK’s major Small Area contributions were here!
Small Death Sample Size

• Historically, life tables were made using three Census centered years of mortality data in numerator

• Not enough sample for the US Indigenous? But data are now obtained monthly?
Curse of Smallness

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<th>Ratio Volume (in³) to Area (in²)</th>
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<tbody>
<tr>
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<td>4</td>
<td>64/96</td>
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<td>5</td>
<td>125/150</td>
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<td>6</td>
<td>216/216</td>
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A Marginalized People

• US Indigenous Peoples are now Small, Marginalized, Poor.
• Accidents occurred (Oil In Oklahoma) but mostly they got the “Bad Lands.”
• Measurement, thus, has became a real problem, as a result.
Measurement Difficulties

- Lived In Small Clusters or Villages and a Small Population Overall
- Hard to Separate Dominant and Indigenous Groups
- Special Linkage Issues exist, especially re Family Names.
- Proxy Reporting (Re Deaths)
Language, Culture and Names and linkage

• 8 Written Languages (Armenian, Arabic, Cyrillic, Egyptian, Georgian, Greek, Hangul, Latin or Roman)

• Plus Chinese, a character based written language

• Name order, Patrilineal, matrilineal differences, etc.
Validating Indigenousness

- Linkage Needed to Reduce ethnicity Misclassifications
- Linkage Needed to Reduce Sampling Error of Rate
- Linkage Error with Indigenous Population is Ethnically Difficult and may vary by age
Linkage Error Impacts

• Assume, to begin, just two groups; Indigenous (D) and balance (B) where B>> D

• Assume M Mismatches from B to D and N Nonmatches from D to B
Indigenous Linkage Paradox

• To improve Indigenous death rate, linkage is needed to get the proper birth records
• But being Indigenous makes it harder in some cases to obtain a true link
• Further the likelihood of treating true nonlinks as links is an issue too (B>> D)
More on Statistical Challenges

• Definitions vary, usually based on self-identification, but sometimes Tribal Membership (Head Rights?)

• Some calculations are made difficult culturally, due to name changes, etc., especially as people age

Death per 1,000


Arizona Then Montana Reliability Limited

Death Rate per 1,000

Montana
How Handle Challenges? 
An Extended Example

• Standardization to reduce Misclassification for Death Rates and Life Expectancy

• Focus on Birth and Death Register Differences

• Small error rate on large group can greatly Impact differential for smaller group
Assume Further

- Linkage System Closed
  \[ M = N \]

- Then ratios of rates
  \[ \frac{R_{(D+M)}}{R_{(B-N)}} \] are distorted depending on size of M
Error Impacts (Closed)

• The Larger $M$ is relative to $D$, then the smaller any Difference is between the Indigenous group $D$ and the Remainder $B$.

• Usually $N$ is not Large relative to $B$, so Impact on $R_{(B-N)}$ can be ignored.
Lots More to Say

• Still unfinished. See following two slides for more on issues
• Need to illustrate with recent NCHS infant mortality studies and how they were conducted
1. Method to assess level of Indigenous identification in Census that is false negative, false positive, not stated
2. If Post Enumeration Survey (PES), method to assess level of Indigenous identification that is false negative, false positive, not stated in the PES
3. Accuracy of the linkage between census and PES? (% of records not linked?)
4. Method to assess level of Indigenous identification in death registration that is false negative, false positive, not stated – linkage with census, hospital records, health service records, land title registers? entitlement programs, other?
5. If via linkage with census, what is the accuracy of the linkage between census and death records - % of records not linked?
6. Should misclassification in death records be adjusted in proportion to misclassification in the census? If yes, what is the justification? If not, what alternative method can be used?

7. Age adjustment for misclassification in both census and death registration?

8. Method for assessing face validity of all results?

9. What is the minimum size of a linked sample for reliable analysis?

10. Should deaths identified as Indigenous in death records but not in the census be included?

Is age adjustment for incompleteness possible for indirect methods?
General Statistical Challenge

- Small Domain Context
- Sampling Issues (JNK Rao’s Contributions, mostly here)
- Nonsampling Issues (Main Focus Today)
- Applying General Concerns to Indigenous People Issues
Many, Many Thanks!

Contact Information
Scheuren@aol.com
+1-202-320-3446