

Health & Demographics of Idjwi Island, DRC: Key findings of a multidisciplinary assessment

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ABOUT THE HARVARD HUMANITARIAN INITIATIVE

The Harvard Humanitarian Initiative (HHI) is a university-wide center involving multiple entities within the Harvard community that provide expertise in public health, medicine, social science, management, and other disciplines to promote evidence-based approaches to humanitarian assistance. The mission of the Initiative is to relieve human suffering in war and disaster by advancing the science and practice of humanitarian response worldwide. Harvard Humanitarian Initiative fosters interdisciplinary collaboration in order to:

- Improve the effectiveness of humanitarian strategies for relief protection and prevention;
- Instill human rights principles and practices in these strategies;
- Educate and train the next generation of humanitarian leaders.

The Harvard Humanitarian Initiative, through the Cogan Family Fund for Humanitarian Studies, sponsored a multi-disciplinary group of Harvard graduate students to conduct a comprehensive population-based health needs assessment of Idjwi island. Idjwi is located in Lake Kivu and presents a unique research environment due to its close proximity to both Rwanda and the Democratic Republic of Congo, countries with complex histories of genocide and prolonged conflict. Following standard practices for survey design and implementation, the students surveyed the health of 2100 households in 50 enumeration areas distributed at random throughout populated areas. The following report provides a detailed account of their results.

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ABSTRACT

Located in Lake Kivu in eastern Democratic Republic of Congo (DRC), Idjwi Island is largely overlooked by development organizations operating in the region. At the invitation of Idjwi's political leaders, our team performed the first, broad, representative assessment of health conditions facing the island's population of approximately 220,000. Following standard practices for survey design and implementation, we surveyed 2100 households in 50 enumeration areas distributed at random throughout populated areas. Concurrently, we performed ethnographic research on a variety of health issues. We found that health and economic conditions on Idjwi are often worse than the DRC as a whole. Fertility and mortality are both extremely high. Hunger and infectious disease are rampant, particularly among children. And women experience severe disempowerment, violence, and lack of reproductive health services. This report provides a detailed descriptive account of our results.

INTRODUCTION

Idjwi Island is a Territory of South Kivu Province in the Democratic Republic of the Congo. In the 1970s, under the Mobutu regime, the island was occupied by the military. During this time, locals suffered forced labor, expropriation of small stock, and brutality at the hands of military groups.¹ The federal government continues to administer local ports, prisons, and markets, but its authority over the people of Idjwi remains somewhat superficial.²

Idjwi's primary political structures are two kingdoms in the north and the south. This administrative split is the result of colonial rule and an enduring cleavage within the royal family.³ The king (or mwami) of the south retains more ritual status and traditional importance, while the mwami of the north is more closely affiliated with the federal government and somewhat less influential.⁴ Increasingly, kingship has shifted from ritual significance towards administrative functions.

Regardless, neither kingship nor the federal government penetrates meaningfully into communities that receive no government support.⁵ Instead, allegiances are increasingly formed with external institutions, such as the Catholic Church, which operates schools and health centers across the island.⁶ Other religious groups on Idjwi include Adventist, Anglican,

1 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

2 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

3 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

4 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

5 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

6 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

Baptist, Islam, Jehovah's Witnesses, and Kimbanguist, some of which have opened their own schools.⁷ As described by Newbury, religion plays an organizing role in Idjwi's social structures and norms.⁸

Idjwi's distance from major markets and lack of transportation have deterred significant industrial development.⁹ Described on the mainland as "the land beyond the mists," the island is thought by many to be home to smugglers and sorcerers.¹⁰ Consequently, initiative for interaction with the mainland has been placed mainly in the hands of the people of Idjwi.¹¹ Indeed, improved social and economic contacts with the mainland are a major preoccupation of Idjwi's nurses, teachers, and administrative officials.¹²

Idjwi continues to be overlooked by the international development community. Since the repatriation of refugees following the Rwandan genocide, very few organizations have provided assistance. Over the last 40 years, only a handful of health studies have been conducted, all on rather specific topics like birth spacing¹³ and endemic myxedematous cretinism.¹⁴ Currently,

only the Catholic Church and HEAL Africa (a large, local NGO) provide health supplies and personnel. However, these resources are insufficient to meet the population's health needs.

Correspondences with Idjwi's leaders and with development organizations in the nearby mainland cities of Goma and Bukavu suggest that Idjwi is overlooked for the following two reasons: (1) Little is known about health conditions and infrastructure on Idjwi, so it is difficult to plan an intervention and recruit funding. To our knowledge, no thorough, representative health assessment of Idjwi has been performed in at least 40 years. (2) Idjwi is isolated from the conflict in eastern Congo, so it is presumed by some to have less need than the mainland.

In an attempt to overcome this lack of information and to support planning and decision making, Dr. Jacques Sebisaho, nephew of the king of the southern kingdom, approached researchers at the Harvard School of Public Health for recommendations on how to improve health conditions on Idjwi. In response, we worked with faculty at the Harvard School of Public Health and with Dr. Sebisaho's contacts on Idjwi to design a community-tailored survey and methodology (the Idjwi Island Health Assessment), which we implemented over summer 2010.

Through a careful analysis of the results of our survey, this report aims to provide a reliable, representative account of health and demographics across Idjwi Island.

BACKGROUND

| Idjwi Island Geography and Ecology

Idjwi Island rests in Lake Kivu along the border between Rwanda and the Democratic Republic of the Congo (DRC) (Figure 1). Lake Kivu, one of the African Great Lakes, stretches for 55 miles along the highest segment of the western Rift Valley. The lake lies nearly 5,000 feet above sea level,

7 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

8 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

9 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

10 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

11 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

12 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

13 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

14 Delange F, AM Ermans, HL Vis, JB Stanbury. Endemic cretinism in Idjwi Island (Kivu Lake, Republic of the Congo). *Journal of Clinical Endocrinology* (1972); 34: 1059-66.

and is surrounded by mountains over 10,000 feet tall, which descend precipitously to the waterfront. Reaching depths over 1,500 feet, the lake stores an estimated 60 cubic miles of carbon dioxide and 15 cubic miles of methane, resulting from interactions between the lake and nearby volcanoes. A limnic eruption of these gas deposits would be the largest in recorded history and threaten the lives of the 2 million people living in the lake basin.¹⁵



FIGURE 1
Satellite image, Idjwi Island (center) in Lake Kivu

Idjwi is the world's tenth largest inland island, stretching 25 miles down the center of Lake Kivu to cover an estimated 110 square miles. Only 2 miles wide in places, the island has a long shoreline relative to its area. This fact, coupled with the island's rugged mountains and complete lack of paved roads, makes boat the preferred method of transportation.¹⁶

Idjwi's climate provides two dry seasons from December to January and from June to September, with July and August mostly devoid of precipitation.¹⁷ Average temperature is approximately 65°F and annual rainfall is approximately

55 inches¹⁸. The climate provides a longer and more reliable growing season than that on the mainland, and a variety of crops are grown over several cropping seasons¹⁹. Once densely forested, the island is home to little endemic vegetation, having been replaced by cassava fields to feed the growing population²⁰.

Idjwi Island Population

Idjwi is home to approximately 220,000 Havu people, the majority of whom live in a subsistence agricultural tradition disconnected from the industrialized cities on the mainland²¹. The Havu people are located on the Western shores and islands of Lake Kivu. They share a common heritage through the Ki'Havu language, union under the Basibula royal dynasty, and orientation towards the lake for communication and livelihood²².

Additionally, the island is home to approximately 6,500 Bambuti or Barhwa (Pygmies), the indigenous people of the Lake Kivu basin²³. The

15 Nayar, Anjali. A lakeful of trouble. *Nature* (2009); 460: 321-323.

16 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

17 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

18 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

19 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

20 Kizungu, B, S Kanyamibwa, W Gatarabirwa, T Ukizintambara. Inventaire des oiseaux de d'île Idjwi (Lac Kivu, République Démocratique du Congo) et statut de ses forêts. *Malimbus* (2002); 24:15-22.

21 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

22 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991). Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

23 Bideri, C & HP Hergum. The Pygmies of the Great Lakes: An assessment of the Batwa/Mambutu Situation in Burundi & Eastern part of the Democratic Republic of Congo and Batwa/Bambutu Organizations in Bukavu (DRC) and Bujumbura (Burundi). Norwegian Church Aid Occasional Paper Series No. 02/2004.

Bambuti are a severely oppressed minority on Idjwi, without rights to land, fishing, or hunting. To many residents, they are viewed as creatures, rather than full people. Forced to move from place to place, the Bambuti live in makeshift shelters and rely on pottery as their principal source of income²⁴.

METHODS

| The Idjwi Island Population Health Assessment

Research setting. This survey was the first of its kind on Idjwi. To our knowledge, no other broad, detailed, representative survey of health has been conducted, even by local health officials. We conducted 2100 interviews in 50 enumeration areas across Idjwi Island from June to August, 2010. Activities were based out of Bugarula and Kashofu, the respective political centers of the northern and southern kingdoms. In Bugarula, we met with community leaders, tested and translated the questionnaire, and selected and trained teams of interviewers and supervisors. We made frequent trips to Goma and Bukavu (large cities on the mainland), to purchase supplies and meet with leaders of political, religious, and development organizations, such as South Kivu's Governor and Archbishop.

The resource-limited setting necessitated creative approaches to fieldwork. We employed owners of canoes and dirt bikes to transport teams to distant enumeration areas. In the absence of cellular reception, we used whistles to communicate. We cultivated a new shipping route to supply specialized equipment to Idjwi, such as paper and ink for printing questionnaires. And we

rented a vacant Catholic School to house interviewers during work in the southern kingdom.

Questionnaire design and translation. As discussed above, the goal of the household survey was to provide the first representative portrait of health and demographics on Idjwi for

Figure 2

Household

- Household roster, including age, sex, marital status, education, and occupation
- Household characteristics, including water source, sanitation, lighting, kitchen, bed nets, and socioeconomic indicators
- Persons who have died in the past 12 months, including symptoms and health care

Respondent (woman age 18-50)

- Birthplace, language, religion, migration
- Education, employment, and income
- Access to health care and health-seeking behavior
- Food security and nutrition
- Health care and norms surrounding HIV/ AIDS, malaria, tuberculosis, and oral health
- Self-reported measures of health, covering general health, mobility, self-care, pain & discomfort, cognition, interpersonal activities, sleep, energy, vision, and affect
- Marriage and household decision-making
- Rape, inter-partner violence, and norms regarding gender-based violence
- Reproductive health, including family planning, fertility preferences, and sexual history
- Birth history, including infant mortality.
- Child health, including vaccinations, recent health problems, material possessions, and orphanage

use in an array of development initiatives. We therefore selected pretested questionnaire items covering a broad range of health topics (Figure 2). Special emphasis was placed on topics closely associated with poverty and disease in eastern DRC, such as infectious disease, maternal and child health, education, food security, and sexual violence. The Demographic and Health Surveys

24 Bideri, C & HP Hergum. The Pygmies of the Great Lakes: An assessment of the Batwa/Mambutu Situation in Burundi & Eastern part of the Democratic Republic of Congo and Batwa/Bambuti Organizations in Bukavu (DRC) and Bujumbura (Burundi). Norwegian Church Aid Occasional Paper Series No. 02/2004.

(DHS) Household Survey and Women’s Module²⁵ surveys were used as templates. To this were added items from the following instruments: WHO World Health Survey Household and Individual Questionnaires²⁶, the Women’s Health Study of Accra Questionnaire (2003), and the Harvard School of Dental Medicine Global Oral Health Survey (2008). The completed questionnaire contained approximately 300 items in addition to the household roster and pregnancy history.

We used an array of widely reported health and demographic indicators to guide the design of the questionnaire and subsequent analysis. Key indicators were drawn from the Millennium Development Goal Indicators and UNICEF World Fit for Children Indicators²⁷. Examples of indicators include total fertility rate, crude mortality rate, percentage living on less than US\$1 PPP per day, median age of first intercourse, unmet need for contraception, percentage of births attended by skilled health personnel, percent of children under 5 with diarrhea two weeks prior to the survey, and percent of households with at least one insecticide-treated bed net. A summary of key indicators is provided in Table 1. In addition to these widely reported indicators, we collected information from households on a variety of topics relating to health conditions and demographics on Idjwi.

The questionnaire was translated into Ki’Havu, which is the only language spoken by all residents of the island. We hired teachers at Bugarula secondary school fluent in both English and

Ki’Havu to translate the questionnaire. A second, independent group of teachers was hired to translate the questionnaire back into English. All differences between the original and back-translated versions were resolved. Additionally, all items were tested in focus groups of local women. Problematic items were reworked until the meaning was clear. In several cases, response categories were added to better encompass the range of local responses. The final questionnaire was printed in Bukavu and assembled on Idjwi.

Interviewer and supervisor training and employment. Working with professors in the Bugarula secondary school, we identified a group of literate local women who were interested in working from June through August as full-time interviewers. To reduce response bias, we hired only local women to become interviewers. This group of 61 women ages 17-27 consisted mostly of students nearing completion of their studies.

We conducted a 4-week interviewer training course that followed DHS manuals closely²⁸. We employed school professors as translators and instructors. Interviewers were taught how to select eligible respondents, build rapport, ask questions, record responses, and work as part of a larger team. The first 3 weeks of training were held in classrooms in the Bugarula secondary school, and the final week was dedicated to fieldwork practice. At the end of training, all interviewers completed both a practical and written exam. Based on the results, we hired 41 capable interviewers for the summer. We hired the eight highest performing students to observe other interviewers and provide constructive feedback throughout the duration of the survey, in addition to their interview duties.

For supervisors, we contracted 7 male and female school professors who were fluent in English and

25 http://www.measuredhs.com/pubs/pub_details.cfm?ID=981

26 <http://www.who.int/healthinfo/survey/instruments/en/index.html>

27 MEASURE DHS. Indicator Appendix (2011). http://www.measuredhs.com/pubs/pub_details.cfm?ID=719 MEASURE DHS. Indicator Appendix (2011). http://www.measuredhs.com/pubs/pub_details.cfm?ID=719

28 http://www.measuredhs.com/pubs/pub_details.cfm?ID=711

well-regarded by the potential interviewers. We trained supervisors in parallel with interviewers, again following DHS manuals closely²⁹. Supervisors were taught how to use maps and GPS to locate enumeration areas, select households, assign work to interviewers, reduce nonresponse, monitor interviewer performance, edit questionnaires, and maintain motivation and morale.

In the field, each supervisor led a team of approximately 6-7 interviewers. Supervisors reported daily on their team’s performance, and interviewers were consulted weekly about the performance of their supervisor. Teams surveyed between 10-30 households per day, depending on travel time. Supervisors played a central role in arranging food, accommodation, and transportation for their team. Throughout training and fieldwork, we provided all employees with a high salary, hot lunch, and bonuses for good performance.

Sampling framework and data collection. An extensive literature review found no recent census of the island. Consequently, we devised the following one-stage cluster design to obtain a representative sample.

First, we created a map of Idjwi’s population distribution by overlaying a LandScan³⁰ population grid (Figure 3) with satellite imagery of the island³¹. We clipped the population estimate grid

to the outline of Idjwi and found that there were not LandScan population estimates for some coastal grid cells. To estimate population density for these areas, we used LandScan population density numbers for a nearby grid cell that appeared on the satellite imagery to have a human presence similar to the area in question. This adjustment resulted in an increase in total estimated population for the year 2000, from 177,528 to 190,026.

Next, we selected sampling clusters to be representative of population density. Within each grid cell, we placed random points of number

$$\text{Probability of selecting a respondent} = \frac{\text{Probability of selecting a household}}{\text{Number of eligible women in the household}}$$

proportional to the LandScan population density value for that cell. This resulted in a distribution of 5293 points representative of population density across Idjwi. We then randomly selected 50 points from this distribution as seeds for 50 representative enumeration areas (Figure 4). Using high resolution satellite imagery³², we drew boundaries around approximately 40 households nearest to the seed coordinate (Figure 5),

$$\begin{aligned} & \text{Probability of selecting a household} \\ &= \text{Probability of selecting grid cell} \times \text{Probability of selecting household in that cell} \\ &= \frac{\text{Number of EA seeds in cell} \times 50 \text{ EAs selected}}{5293 \text{ total EA seeds}} \times \frac{\text{Number of households selected in cell}}{\text{Population in cell} / \text{Avg. household size in cell}} \end{aligned}$$

29 http://www.measuredhs.com/pubs/pub_details.cfm?ID=712

30 <http://www.ornl.gov/sci/landscan/>

31 <http://maps.google.com/>

32 <http://maps.google.com/>

ensuring no overlapping of nearby enumeration areas. This resulted in 50 non-overlapping enumeration areas distributed in proportion to Idjwi's population density (Figure 6).

Due to resource limitations, we were unable to catalog all households within an enumeration area and then randomly select a subset of these households for sampling. Therefore, for each enumeration area we used a GPS device to guide the survey team to the exact centroid coordinates of the area. The team then fanned out in 360 degrees from the centroid, visiting the nearest households (up to 48) regardless of their construction, position on or off a road, location uphill, etc. Teams used satellite imagery maps (Figure 5) to stay within enumeration area boundaries. Within each enumeration area, we sampled 40-48 households, for a total of 2100 households sampled. Because of time and

resource constraints, we chose to sample not more than 50 enumeration areas and not more than 48 households within each enumeration.

Women ages 18-50 were eligible to be interviewed. (Women under age 18 were not eligible under IRB regulations. We interviewed women up to age 50, rather than age 49, because women in their late forties who did not know their exact age were likely to report their age as 50 years.) When visiting a household, interviewers inquired whether any women age 18-50 currently lived in the house. The household was skipped if no eligible woman was present. We did not keep track of the number of skipped households. Therefore, this survey is restricted to households containing at least one woman age 18-50. If a household had more than one eligible woman, the interviewer used a simplified KISH table to select one woman at random³³. If the selected woman was not present or unable to complete the interview, the interviewer followed up with the woman at an agreed upon time, as specified by DHS guidelines³⁴.

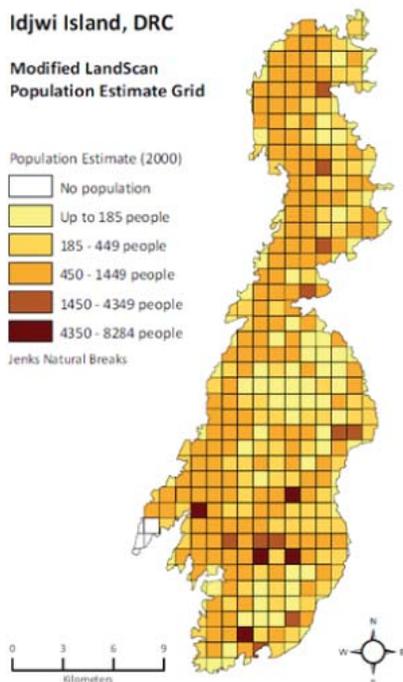


FIGURE 3

Population density map of Idjwi Island, created by overlaying LandScan 2000 population grid with satellite imagery.

Adjustments for sampling. We weighted all data according to the probability of selection in our sampling frame. Unless otherwise noted, all findings presented in this report are adjusted according to the following parameters:

1. Primary sampling units (PSUs): Each observation received a number between 1 and 50 corresponding to enumeration area.
2. Finite population correction (FPCs): Since our unit of observation is the household, each observation received an FPC value equal to the

33 World Health Survey (2002). Appendix C (KISH tables, Vignettes, Cards). <http://www.who.int/healthinfo/survey/whslongversionappendices.pdf>

34 http://www.measuredhs.com/pubs/pub_details.cfm?ID=715

estimated total number of households on Idjwi, calculated as the estimated population divided by the average adjusted household size:

$$190,026/5.175 = 36,720.$$

3. P-weights for household: Our p-weight calculation follows our sampling frame. The probability of selecting a household is equal to the product of the probability of selecting the grid cell containing that household and the probability of selecting the household within that grid cell. Here, the probability of selecting a grid cell in one selection is equal to the number of potential EA seeds in the grid cell divided by the total number of EA seeds on the map. This probability is multiplied by 50, since 50 selections were made. Likewise, the probability of selecting a household within the grid cell is equal to the number of households interviewed in the cell over the total number of households in that cell. Here, the total number of households in the cell is estimated as the population of the cell (from Landsat) divided by average household size across all households interviewed in the cell. No adjustments are made for refusals, since no refusals were reported. This low refusal rate is consistent with previous studies conducted on Idjwi³⁵. The formula for this calculation is given below (Figure 1). The P-weight for a household is the inverse of this probability and is used in this report for adjustments of all household-specific items (eg. water source, household income, etc.).

4. P-weights for respondent: The probability of selecting a respondent is equal to the probability of selecting her household (see above) times the probability of selecting her among the other eligible women in the household. Since interviewers followed a rubric that selected the respondent at random from the eligible women in her household, the probability of selecting the

respondent is equal to the inverse of the number of eligible women in the household. Again, no adjustments are made for refusals, since no refusals were reported. The formula for this calculation is given below. The P-weight for a respondent is the inverse of this probability and is used for adjustments of all respondent-specific items (eg. contraception use, self-reported measures of health).

Data editing and uploading. Data were edited three times. First, supervisors edited questionnaires in the field. If by accident a section had been left incomplete, interviewers were instructed to return to the household to complete the interview. After shipping back to Boston, questionnaires were edited by hand to correct for ambiguous or illegible coding. Corrections

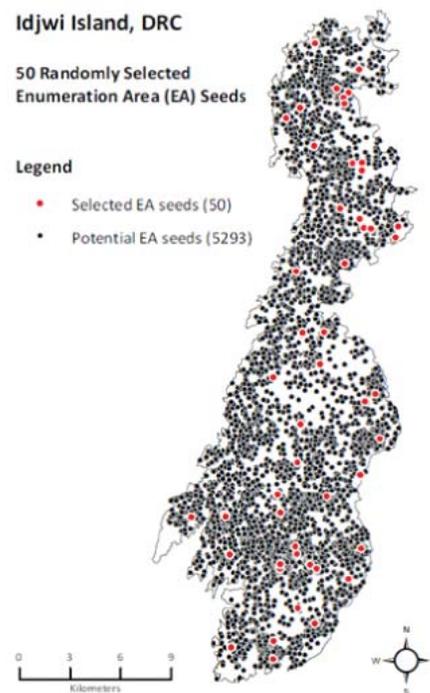


FIGURE 4
50 enumeration area seeds selected at random in proportion to population density on Idjwi.

35 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.



FIGURE 5
Creation of an enumeration area by using satellite imagery to select households in close proximity to an enumeration area seed.

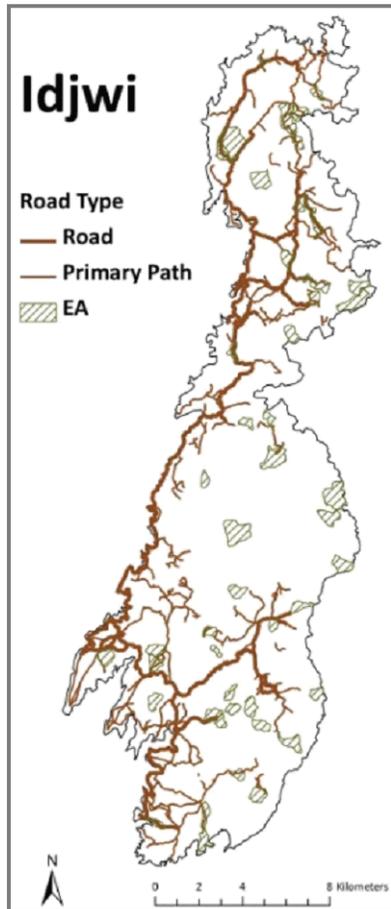


FIGURE 6
Location of 50 representative enumeration areas sampled across Idjwi.

followed the United Nations Handbook on Population and Housing Census Editing³⁶.

We manually entered all responses coded on all questionnaires into a computerized form developed in CSPro Version 4.0³⁷. Questionnaires were uploaded only once to expedite uploading of the 42,000 pages. Double-entry of 2,500 pages revealed an entry error rate of only 0.8%, suggesting that data quality was preserved with single-entry. Following upload, all items were systematically cleaned and edited following the UN Handbook³⁸. All calculations were performed in STATA v.11³⁹.

Ethical considerations

Before beginning the survey, we met with local political and religious leaders to ensure that our research would be acceptable to the local community. We conducted town hall meetings in communities to be surveyed, allowing residents to ask questions and express concerns.

Respondents were not asked about potentially distressing experiences, but rather their perceptions of the problems in the broader community. Moreover, all questions were pretested in focus groups to ensure they were not distressing to any respondents.

36 United Nations Department of Economic and Social Affairs—Statistics Division. Handbook on Population and Housing Census Editing. United Nations Studies in Methods (2001); F, 82.

37 US Census Bureau. CSPro 4.0.004. June, 2010. <http://www.census.gov/ipc/www/cspro/download.htm>

38 United Nations Department of Economic and Social Affairs—Statistics Division. Handbook on Population and Housing Census Editing. United Nations Studies in Methods (2001); F, 82.

39 STATA v. 11. Stata Corp.; College Station, TX, USA STATA v. 11. Stata Corp.; College Station, TX, USA

All respondents were informed of the purpose of the study, that their participation was completely voluntary, and that their responses would be kept confidential. They were informed that they were free to skip any uncomfortable questions and to end the interview at any time. Participants were provided with contact information of local research assistants in case they had any future questions.

This study received IRB exemption from the Office of Human Research Administration at the Harvard School of Public Health (#19124-101). We collected no identifiable information (name or address) about respondents. All questionnaires were kept in a locked cupboard, and computer data were password protected.

RESULTS

Background characteristics of households

Composition. The homestead is formed around the nuclear family⁴⁰. On average, households on Idjwi are made up of 5.2 people (compared to 5.0 in rural DRC overall⁴¹). 15 percent are made up of seven or more people, while 24 percent are made up of three people or fewer. 6.7 percent of households had no adult men (18+), and in the majority of these a woman had taken on the role of head of the household.

Ownership. 88 percent of households own their houses, while 9 percent are renting. However, less than a third of households (31%) own any agricultural land. A minority of households owned a radio (40%), mobile phone (39%), solar panel (20%), generator (9%), or motorcycle (5%). Only 5 percent of households maintain a bank account.

40 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

41 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

Construction. The majority of households live in separate houses or huts (72%). Most roofs are made of metal sheeting (49%) or thatch (36%). Most houses have 1 room (20%), 2 rooms (25%), 3 rooms (24%), or 4 rooms (18%), usually with between 0-4 windows. Nearly half of all households rely on kerosene lamps for light, while 14 percent rely on solar. 29 percent have no independent source of lighting.

Water. Half of households collect water using a pipe that channels river or well water to their house or community. Other common water sources are rivers (22%) and boreholes (13%). The mean and median total times to go, get water, and come back are 31 minutes and 15 minutes, respectively. Virtually all houses do nothing to make their water safer to drink.

Sanitation. The majority of households (82%) use a pit toilet, the same proportion as the rural DRC population as a whole⁴². On Idjwi, 6 percent of households have access to improved sanitation. Two thirds of households have their own toilet facility, while the rest typically share with 2 or 3

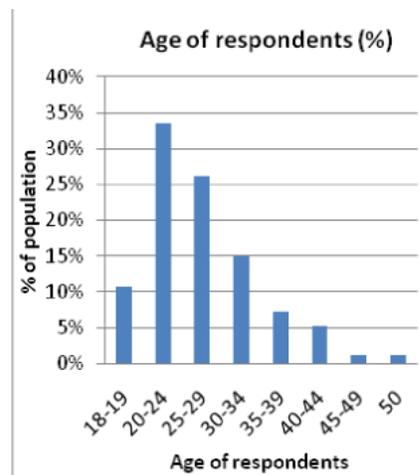


FIGURE 7
Age structure of respondent population.

42 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

additional households. A third of households use the lake for bathing, while 14 percent use their own facilities and the remainder use another household's or shared facility.

Cooking. 9 out of 10 households use wood for cooking, and the remainder using charcoal, the same proportions of the rural DRC population as a whole⁴³. On Idjwi, a third of households cook indoors, 73 percent of which have neither a chimney nor a hood to direct smoke outside.

Waste disposal. 18 percent of households dump their trash in a public dump, while half of all households dump elsewhere. The remainder have it collected (22%), burn their garbage (5%), or bury it (3%). Most liquid waste is thrown in a gutter or creek running near the house.

| Background characteristics of respondents

We interviewed 2100 women across 2100 households. 22 of these women reported ages outside of the eligible range of 18-50 years. These women may have been selected due to miscommunication between interviewer and respondents at the onset of the interview. We have excluded these 22 women from the analysis, yielding a total respondent population of 2078 women age 18-50.

Age. Figure 7 depicts the age distribution of our respondent population, showing a steady decline in the proportion of respondents with age. This matches our expectations for the age distribution of a growing population with low life expectancy, as well as our population pyramid (Figure 10).

Location and birthplace. Of the 2100 women interviewed, 1000 (48%) live in northern half of the island (Rubenga Chiefery), while 1100 (52%)

live in the southern half of the island (Nkambusa Chiefery). 97.5 percent of respondents were born on Idjwi, 1.5 percent were born elsewhere in the DRC, and 1 percent were born in Rwanda.

Ethnicity and language. Nearly all respondents (97%) identified as ethnically Havu, while 2.5 percent identified as Bambuti (the indigenous people of the African Great Lakes). These figures match previous estimates of the proportion of Idjwi's population in each ethnic group⁴⁴. Virtually all respondents reported that Ki'Havu—the language in which the questionnaire was written—was their best spoken language. 2 percent reported that Swahili was their best spoken language, while less than 1 percent preferred French.

Religion. Christianity was the dominant religion among respondents, being 52 percent Catholic and 39 percent Protestant. Nine percent were of other religious affiliations, such as Islam (2%).

| Education, employment, and income

Education. On Idjwi, school fees are a significant deterrent to seeking education, particularly among pygmy children⁴⁵. The majority of respondents (53%) never attended school and only 3 percent were still in school at the time of the survey. Of those that attended school, 80 percent had completed primary school, 35 percent had completed secondary school, and less than 1

43 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo. MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

44 Bideri, C & HP Hergum. The Pygmies of the Great Lakes: An assessment of the Batwa/Mambuti Situation in Burundi & Eastern part of the Democratic Republic of Congo and Batwa/Bambutu Organizations in Bukavu (DRC) and Bujumbura (Burundi). Norwegian Church Aid Occasional Paper Series No. 02/2004.

45 Bideri, C & HP Hergum. The Pygmies of the Great Lakes: An assessment of the Batwa/Mambuti Situation in Burundi & Eastern part of the Democratic Republic of Congo and Batwa/Bambutu Organizations in Bukavu (DRC) and Bujumbura (Burundi). Norwegian Church Aid Occasional Paper Series No. 02/2004.

percent had pursued higher education. School life expectancy among women was 6 years, compared to 7 years among women in the DRC as a whole⁴⁶.

Among heads of households, 27 percent had never attended school, 40 percent had some primary education, 31 percent had some secondary education, and 2 percent had some higher education. 9 percent of currently eligible children were enrolled in secondary school, half of whom were female.

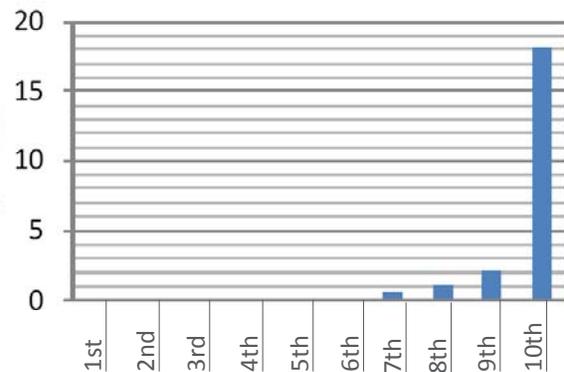
Literacy. Only 20 percent of women can easily read and understand a newspaper and 40 percent reported being completely illiterate. In the DRC as a whole, 59 percent of women are able to read a simple statement about everyday life⁴⁷. Although there is some difficulty in comparing these indicators, it appears that female literacy on Idjwi is no better than in the DRC as a whole, and possibly quite worse. Still, this represents a substantial improvement in female literacy on Idjwi since 1983, when another study found only 1 percent of women able to read⁴⁸.

Employment. Idjwi is mostly without industry or other sources of cash income⁴⁹. The wife does most of the work in the fields, which typically takes 24-40 hours per week⁵⁰. Two thirds of women are non-paid, living as a subsistence farmer and housewife. 31 percent of women generate some form of income through a private business, usually selling cultivated goods at market or along

the roadside. 2 percent of women had paid government jobs.

Only one quarter of respondents reported an occupation for the male head of household. In this sample, the majority of heads of household work as subsistence farmers (61%). Other occupations for adult men include vendor/shopkeeper (16%), teacher (7%), hunter/fisherman (2%), student/apprentice (1%), carpenter/mason (1%), and miscellaneous labor (1%). A handful of men were employed as tailors, health care providers, policemen, motorcycle drivers, and religious or

Women age 18-50 average income on Idjwi by income decile (US\$ PPP)



Women age 18-50 average income on Idjwi by income decile (US\$ PPP)

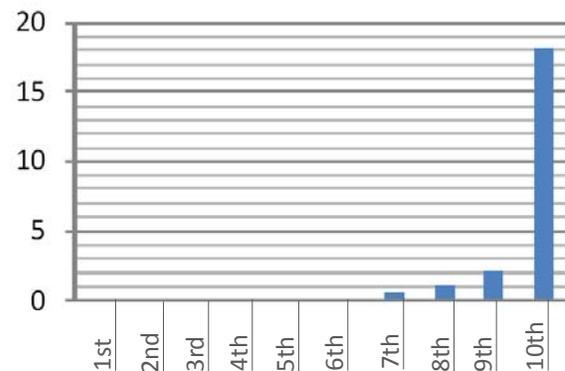


FIGURE 8
Women's average income by income decile.

FIGURE 9
Per capita income by income decile.

46 CIA World Fact Book (2011). <https://www.cia.gov/library/publications/the-world-factbook/>

47 Female literacy on Idjwi appears to be worse on Idjwi

48 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

49 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

50 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

government officials. 10 percent were unemployed or too sick to work. Focus groups during questionnaire testing revealed that non-response on this question was likely to occur when the head of household worked as a farmer or was unemployed. This suggests that the true proportion of men who are unemployed or working as farmers may be higher than that reported here. Likewise, the true proportion of men with occupations other than subsistence farming may be lower than that reported here.

Income. Focus groups revealed that our question about monthly household income was interpreted as “how much hard currency did your household take in over the last 30 days?” 58 percent of respondents were willing and able to answer this question. For this group, median and mean monthly household income was US\$36 PPP and US\$370 PPP, respectively⁵¹. Median and mean daily per capita income was US\$0.24 PPP and US\$2.38 PPP, respectively. Mean income figures are misleading for this population, since 91 percent live on less than the mean. Indeed, 83 percent of households took in less than US\$1 PPP per capita.

These disparities are illustrated in Figure 8, which depicts average income per capita within each income decile. The top income decile accounts for 81 percent of all income. This disparity is worse than that in DRC as a whole, where the top income decile accounts for 35 percent of all income⁵². Disparity also exists between Idjwi and the DRC as a whole. 59 percent of the Congolese population lives on less than US\$1 PPP, compared

51 Using an exchange rate of 902.66 Franc Congolais per US dollar and PPP adjustment of 5.32X. See Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 7.0, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, March 2011.

52 CIA World Fact Book (2011). <https://www.cia.gov/library/publications/the-world-factbook/>

to 82 percent on Idjwi⁵³.

Respondents also were asked about their personal income. 74 percent of women had incomes of less than US\$1 per day PPP, and 87 percent of women had incomes of less than US\$2 per day PPP. Median and mean income among women was US\$0 PPP and US\$2.20 PPP, respectively. Again, the mean income figure is misleading for this population given the enormous income disparity among women (Figure 9).

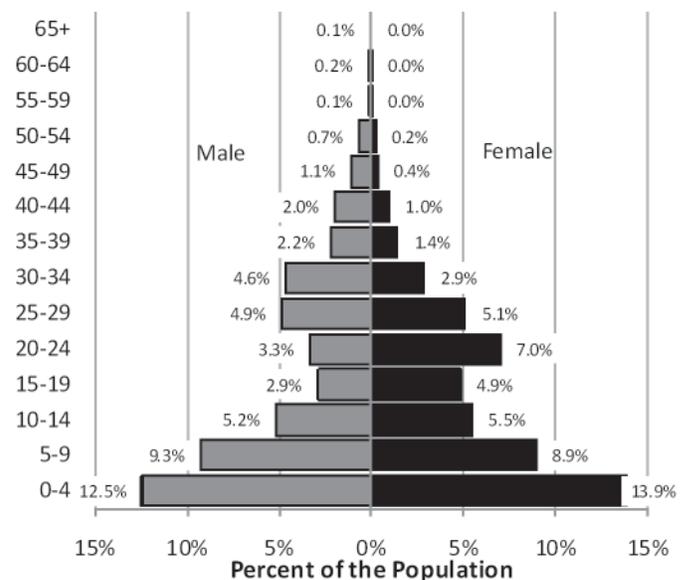


FIGURE 10

Age structure of Idjwi Island, from rosters of households containing at least one woman age 18-50.

Age Structures

We collected age and gender information on 10,868 individuals across 2,100 households on Idjwi. This provides an unusual population pyramid (Figure 10). As expected, the broad base and steep taper suggest a rapidly growing population and high child mortality. The low

53 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

proportion of individuals above age 40 (5.7%) suggests a short life expectancy, particularly among women. Median age is 12 years, and 55 percent of the population are below age 15 years. This is similar to the rest of the DRC, in which 48 percent of the population are below age 15 years⁵⁴.

Interestingly, age structure appears to have changed little in the past 40 years⁵⁵. A 1970 study of the northern half of the island found that about 50 percent of residents were less than 15 years old, compared to 55% here. The same study found that women of reproductive age comprised 21 percent of the population, compared to 22.3% in our study.

On the population pyramid, we see a surprisingly small proportion of men age 10-24 and women age 10-19. We hypothesize that this pattern results from a confluence of the following factors:

1. There is temporary out-migration of adolescents for education and employment opportunities on the mainland. Travel is especially common during the dry season when we conducted the survey and Idjwi's schools are out of session and trade across the lake is at its peak⁵⁶. Conversations on the island revealed that young men in particular may seek temporary employment off the island to build assets before marriage. Indeed, it is very rare to find an older man who has never worked off the island, either on plantations or in mines, or in the urban centers as craftsman, laborer, or domestic help⁵⁷. This same trend was observed in 1970, when a survey of the

northern half of the island revealed a dip in the proportion of males ages 20-29 as a result of temporary emigration of men to in search of employment⁵⁸.

2. The Rwandan genocide caused an influx of children to the island, followed by a period of instability, food insecurity, and lower birth rates. Approximately 46,000 refugees fled to Idjwi across the narrow straight separating the island from Rwanda, increasing the island's total population by roughly 40%⁵⁹. The majority of these refugees were women and children, many of whom integrated into the Idjwi community and were never repatriated. These refugee children may now constitute some of the bulge in the population pyramid between ages 20 and 34. The mid-1990s were also a period of intense instability on Idjwi. Many men of Idjwi were conscripted into military service or forced labor under the utu regime⁶⁰. Concurrently, Hutu military groups used Idjwi as a hit-and-run base for strikes against the Rwandan mainland. Food shortages, relocation by UNHCR, and partner separation were frequent⁶¹. These factors would contribute to a lower birth rate and higher infant mortality, which we may see reflected in the dip in the population pyramid among ages 10-19.

3. Our survey is restricted to households with at least one woman age 18-50 (due to IRB regulations). However, 45 percent of women in our study reported that they began living with their current husband or partner before age 18. Such young, married women and their households were excluded from this study, although the exact number of such households is unknown. This may

54 World Health Organization. World Health Statistics 2010.

55 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

56 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

57 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

58 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

59 http://www.africa.upenn.edu/Hornet/irin_8696.html

60 Newbury, DS. *Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840*. U of WI Press (1991).

61 http://www.africa.upenn.edu/Hornet/irin_8696.html

explain much of the dip in the population pyramid for females age 10-19. Additionally, these young women's partners, who are on average 6 years older, were also excluded from the study. This may explain some of the dip in the population pyramid for males age 15-24.

|Mortality

Crude death rate. Idjwi's crude mortality rate is 28.7 deaths per 1,000 people over the last 12 months. This is more than twice the DRC's overall mortality rate of 11.1⁶². In the past 12 months, 9 percent of households on Idjwi had experienced the death of one or more of their usual members. We did not collect age-specific mortality data, so we present no estimate of life expectancy. For reference, life expectancy in the DRC as a whole is 53.9 years for men and 56.8 years for women⁶³.

Care and symptoms for deceased adults (age 18-60): In 56 percent of cases, the deceased adult was too sick to do normal activities for at least 3 of the 12 months before he or she died. Many deceased individuals had severe (58%) or mild (25%) pain in the 30 days before death. A third were unable to stop the pain. In the 30 days before death, most individuals suffered from severe (41%) or mild (35%) nausea, coughing, diarrhea, or constipation. 40 percent were unable to reduce or stop these symptoms. 37 percent of households received medical support at least once a month while the deceased individual was sick. In one third of cases, the household received free medical care or supplies.

Infant and under-5 mortality rates. We calculated mortality using information collected from birth histories. Infant mortality rate (IMR) was calculated using deaths to children under age 12

months in 2009 divided by the number of births in the same year⁶⁴. Similarly, under-5 mortality rate (<5MR) was calculated using deaths to children under age 60 months in 2009 divided by the number of births in the same year⁶⁵. (Note, this method produces rates, not probabilities). Mortality rates were lower than those of any country in sub-Saharan Africa⁶⁶ (IMR=34.5/1000 and <5MR=56.0/1000). The DRC, for example, has an infant mortality rate of 78.4/1000⁶⁷.

This surprising result is due most likely to substantial underreporting of deaths on the pregnancy histories. Underreporting of deaths by mothers is common in surveys⁶⁸, particularly on Idjwi where when children die at a young age, "the mother is held responsible and is scorned and considered lazy"⁶⁹. Therefore, we should ignore these mortality rates. Future research must better capture child death.

|Fertility and its determinants

Birth and fertility rates. TFR on Idjwi is 6.14 births per woman, as calculated using age-specific fertility rates (ASFRs) from reported births in the last 36 months⁷⁰. This is somewhat higher than

62 CIA World Fact Book (2011). <https://www.cia.gov/library/publications/the-world-factbook/>

63 CIA World Fact Book (2011). <https://www.cia.gov/library/publications/the-world-factbook/>

64 Rutstein, SO & G Rojas. Guide to DHS Statistics. Demographic and Health Surveys, ORC Macro (2006).

65 Rutstein, SO & G Rojas. Guide to DHS Statistics. Demographic & Health Surveys, ORC Macro (2006).

66 <http://www.prb.org/Datafinder/Topic/Bar.aspx?sort=v&order=d&variable=28>

67 CIA World Fact Book (2011). <https://www.cia.gov/library/publications/the-world-factbook/>

68 Rutstein, SO & G Rojas. Guide to DHS Statistics. Demographic and Health Surveys, ORC Macro (2006).

69 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

70 Thomson, Dana. Fertility and Unmet Need for Contraception on Idjwi Island, D.R. Congo. Master's Thesis, Department of Global Health & Population, Harvard School of Public Health.

the DRC's overall TFR of 5.24⁷¹. Still, true fertility may be even higher on Idjwi, since the birth of dead infants was probably under-reported. The crude birth rate was 65 births per 1000 individuals (averaged over two years prior to the survey), which is higher than the crude birth rate of 38/1000 in the DRC overall⁷².

Fertility preferences. Carael and Stanbury found that on Idjwi, a fertile woman can look forward to social integration and respect, while an infertile woman may be treated as an outsider and rejected⁷³. Additionally, children are needed to work in the fields and can act as social insurance⁷⁴, since male offspring can extend a family's agricultural domain through patrilineal succession and female offspring receive a large dowry upon marriage.

We found that women on average desire 6.1 children (3 boys and 3 girls), which matches the current TFR. Desired total fertility on Idjwi was lower than rural DRC as a whole, where women on average desire 7.0 children over their reproductive years⁷⁵. Note, however, that questions about fertility preferences may have been abstract for women who have very little control over their fertility. Still, the majority of women reported desiring a number of children different than the number they currently had.

Determinants of fertility. The following four

factors are widely accepted as the proximate determinants of fertility⁷⁶. In pre-fertility-transition societies, marriage patterns and breastfeeding are the primary determinants⁷⁷. Both of these factors were found to be closely related to fertility on Idjwi. In addition to these factors, female literacy was found to be associated with lower fertility.

1. Age at first intercourse: Age at first intercourse is significantly associated with fertility on Idjwi⁷⁸. Women becoming sexually active at age 10 have on average 1-2 more children than a woman who becomes sexually active at age 20⁷⁹. Median age of first birth on Idjwi was 18 years, compared with 19.6 years in rural DRC⁸⁰.

2. Post-partum infecundability: Virtually every woman breastfeeds on Idjwi, on average for 6 months. This is a typical duration for breastfeeding in developing countries, and suggests that most women do not use breastfeeding to delay pregnancy⁸¹. Moderate maternal malnutrition and heavy agricultural activity also may extend the duration of post-partum infecundability⁸². Mean birth spacing on Idjwi was 21 months,

71 CIA World Fact Book (2011). <https://www.cia.gov/library/publications/the-world-factbook/>

72 CIA World Fact Book (2011). <https://www.cia.gov/library/publications/the-world-factbook/> CIA World Fact Book (2011). <https://www.cia.gov/library/publications/the-world-factbook/>

73 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

74 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

75 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

76 Bongaarts, J. 1982. The fertility-inhibiting effects of the intermediate fertility variables. *Stud in Fam Planning*, 13(67):179-189.

77 Bongaarts, J. 1987. The proximate determinants of exceptionally high fertility. *Pop and Development Review*, 13(1):133-139.

78 Thomson, Dana. Fertility and Unmet Need for Contraception on Idjwi Island, D.R. Congo. Master's Thesis, Department of Global Health & Population, Harvard School of Public Health.

79 Thomson, Dana. Fertility and Unmet Need for Contraception on Idjwi Island, D.R. Congo. Master's Thesis, Department of Global Health & Population, Harvard School of Public Health.

80 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

81 Lucas, D & P Meyer. *Beginning Population Studies*. National Center for Development Studies (1994).

82 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

compared with 30 months in rural DRC⁸³.

3. Contraceptive use: Unmet need for contraception is 56.3 percent, higher than rural DR Congo (24%)⁸⁴. A similar percentage (47.5%) have an unmet need for birth spacing. The Catholic Church is the primary funder of most of Idjwi’s health centers and provides no funding for contraceptives. Only 6.5 percent of women reported ever having used a modern method of contraception, and even fewer reported ever using withdrawal (2.5%) or the calendar method (3.7%). Of the few women who have used a modern method, most have used male condoms (50.6%) or injectables (40.3%), which are the most preferred modern methods in DRC overall⁸⁵. The most common reasons given for not using contraception were cost (17%), no knowledge of a contraceptive method (16%), opposition from husband or partner (15%), use of breastfeeding (14%), fatalism (14%), and fear of side effects (11%). A previous attempt to introduce contraceptives on Idjwi found that women accepting family planning tended to be from elite sectors. Three years after that study, only 6 percent of women continued to contracept⁸⁶.

4. Abortion: Nearly 7% of pregnancies are lost to spontaneous or induced abortion. However, abortion is illegal and highly stigmatized on Idjwi, so our estimate may be unreliable. Previous research found that several traditional procedures for accomplishing abortion were known by all, but that induced abortion was practiced rarely

on Idjwi⁸⁷.

Population growth

Idjwi’s population was estimated to be 15,400 people in 1929⁸⁸. Following an influx of Rwandan refugees to the island, the population was estimated to be 158,000 in 1995 and 180,000 in 2001^{89,90}. In 2010, the island’s administration

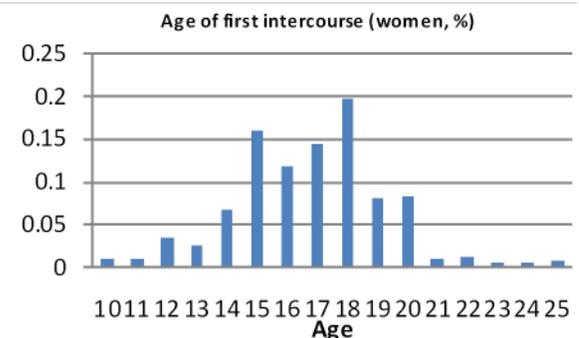
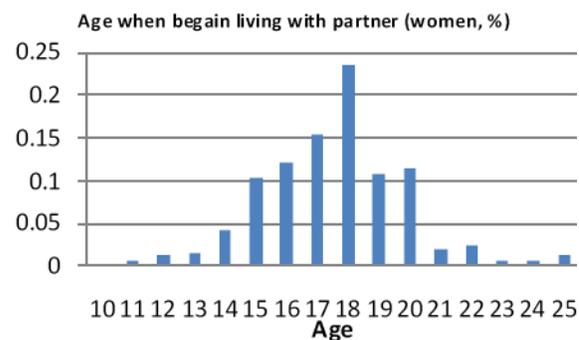


FIGURE 11 Women’s age when began living with partner.

FIGURE 12 Women’s age of first intercourse.

83 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

84 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

85 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

86 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

87 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

88 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

89 Integrated Regional Information Network (IRIN), Department of Human Affairs, United Nations. 1996. Zaire: IRIN Situation Report on Idjwi Island, South Kivu, 8/6/96. Accessed Apr 17, 2011. http://www.africa.upenn.edu/Hornet/irin_8696.html

90 LandScan 2001 Global Population Database. Oakridge, TN: Oak Ridge National Laboratory. Available at ornl.gov/sci/gist/

calculated a total population of approximately 220,000. This suggests a population growth rate of 2.2 percent both from 1995 to 2001 and again from 2001 to 2010. This is slightly smaller than the 2.61% population growth rate observed in the DRC as a whole⁹¹. We calculate Idjwi's natural rate of increase to be 3.6 percent (crude birth rate minus crude mortality rate). Combining this with the population growth rate, we estimate the net rate of emigration from Idjwi to be 1.4 percent. This rate seems feasible, considering that many residents leave, often permanently, for education and employment opportunities on the mainland.

| Marriage and sexual behavior

Marital status. Marriage is the major social event in the life of the individual⁹². Divorce in recent years has been relatively frequent, but does not usually sever social networks⁹³. 91 percent of women age 18-50 are currently married and 4 percent have never been married. Of those who were formerly married, 3 percent are widows and 1 percent each are divorced and separated.

Age of marriage. There is significant social pressure to marry during adolescence, as an unmarried woman at age 23 may become an object of ridicule⁹⁴. Additionally, many children may marry early in order to escape sexual restrictions imposed in the parents' household⁹⁵. Median age of first marriage is 18.3 years on Idjwi

(Figure 11), the same as rural DRC overall⁹⁶. For women who are currently married, 94 percent are living with their partner. 18 percent began living with their partner before age 16. The majority (69%) were living with a partner before age 19. After age 20, fewer than 10 percent remain unmarried. On average, men are six years older than their female partners. 22 percent of women marry a man at least 10 years her senior.

Polygamy. 15 percent of married women are in polygynous relationships, which typically consist of the husband and 2-3 wives. This is a slightly lower rate of polygyny than rural DRC as a whole, where 20 percent of women are in polygynous unions⁹⁷. This also represents a decrease in polygynous unions on Idjwi since 1983, when a study found 28 percent of women in polygynous unions⁹⁸. Wives usually have different households on different parts of the island⁹⁹.

Sexual behavior. Median age of sexual debut was 16.7 years (Figure 12), which is identical to that reported in the DRC as a whole¹⁰⁰. This suggests that on Idjwi most women have intercourse before marriage. 18 percent of women age 18-24 reported that they had their first intercourse before age 15. Nearly all women (94%) reported that the man with whom they currently have sexual intercourse is older.

One third of women reported having had more than one sexual partner in their life. 15 percent of

91 CIA World Fact Book (2011). <https://www.cia.gov/library/publications/the-world-factbook/>

92 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

93 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

94 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

95 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

96 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

97 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

98 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

99 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

100 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

all women, and 11 percent of married women, reported having more than one sexual partner in the last 12 months. 86 percent of women believe that men have sex with multiple partners, regardless of the man’s marital status.

A previous study found that sexual relations on Idjwi are “subordinate to social events and do not constitute a private sphere of activity. They are subject to the rhythms of the agricultural life, to plantings, to harvests, and most of all to family events, such as births, deaths, illnesses, and marriages”¹⁰¹.

Women’s disempowerment and gender-based violence

Informants expressed concern about the inequality between men and women on Idjwi. Few informants could identify any mechanism for redress. As one respondent expressed, “We ask, what can we do, us women, because we are always behind?”

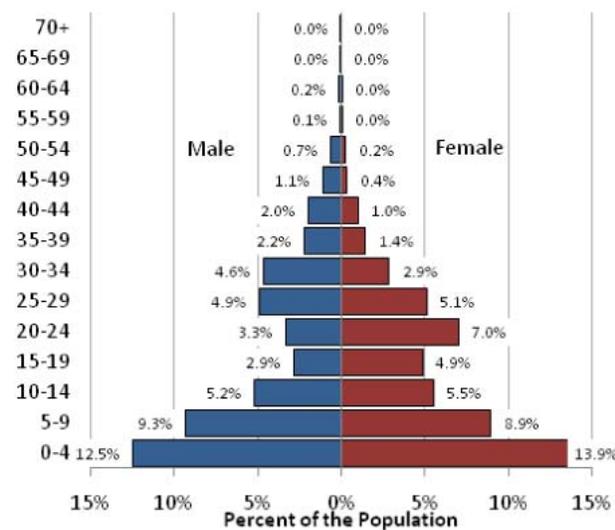


FIGURE 13
Population pyramid of children about which information was collected..

Earnings and decisions. Women earn less than their husbands in 80 percent of households. In the same proportion of households, husbands decide exclusively how to spend any income, compared to 40 percent in rural DRC as a whole¹⁰². Only one third of women can say no to their husband/partner if they do not want to have intercourse. Decisions about health care for the respondent are made by their partner in 85 percent of households. Only 7 percent of respondents reported that they could make decisions independently about their health care.

Intimate partner violence. A significant proportion of women reported that in their community it is common or very common for a woman to be beaten by (52%), verbally threatened by (48%), or forced to have sex with (40%) with her husband or partner. All informants responded that there is no current mechanism for redress or victim care. Current systems have failed women and forced many victims to accept high levels of gender-based violence as the community norm. Indeed, a majority of women believe that a husband is justified in hitting or beating his wife if she goes out without telling him (80%); neglects the children (76%); argues with him (68%); refuses to have sex with him (70%); or burns the food (58%).

Ethnographic research confirmed that violence is a major problem impacting women’s daily lives. Many informants had visible bruising and other injuries from intimate partner violence. Respondents expressed that “many women are beaten to the point where they needed medical attention,” sometimes so badly that they “risk miscarrying their fetus.” According to some respondents, the best way to reduce domestic violence would be to provide employment for their husbands, granting them with dignity and daily activities away from home.

101 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

102 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

Extramarital rape. Over one third of women (36%) reported that it is common or very common in their community for a woman to be forced by someone other than her husband or partner to have sexual intercourse against her will. All women of Bambuti ethnicity who participated in ethnographic research reported rapes and forced pregnancies by Bantu men (mostly land owners). Some women reported kidnappings for the purposes of being raped. Overall, Idjwi presents different scenario from the mainland, where rape at the hands of paramilitary groups is more common.

Self-reported health concerns

Respondents were asked an open-ended question about their greatest health concerns (non-response <2%). Illness and disease (les maladies) was a great concern for 78 percent of respondents. 253 women reported specific illnesses. Of these, the most common were uterine or maternal illnesses (36%), stomach/belly illnesses (25%), head illnesses (15%), malaria (9%), and the illnesses of their children (5%). Other reported great concerns around STDs, oral pain, witchcraft, psychological illnesses, and illnesses affecting the eyes, joints, bones, and heart. (Note that respondents may have different perceptions and labels for illnesses; for example, ‘stomach illness’ may refer to hunger or helminthes.)

After illness and disease, poverty was a critical health concern among respondents (18%). Concerns related to poverty included lack of education, employment, land, and crop yield. Other critical concerns expressed by a small proportion of women included hunger, pain, intimate partner violence, sex, lack of a partner, bad medicine, and crisis (la crise).

Maternal health

The following findings reflect responses from the 2,054 women in our sample who were currently pregnant or who had been pregnant in the past. Respondents were asked about their most recent pregnancy. We did not have sufficient resources to collect information on maternal mortality. For reference, maternal mortality ratio for the DRC as a whole is estimated to be 670 per 100,000 live births¹⁰³.

Antenatal care. 62 percent of respondents had received some form of antenatal care from trained health personnel, either a nurse/midwife (52%) or physician (10%). One quarter of pregnant women received four or more antenatal care checkups. On antenatal care measures, Idjwi performs worse than DRC as a whole, where 85 percent of mothers received antenatal care from skilled health personnel, and 47 percent received four or more antenatal checkups¹⁰⁴.



FIGURE 14

Proportion of households experiencing different levels of food insecurity.

103 World Health Organization. DRC Country Statistics. 2008 interagency estimate. <http://apps.who.int/ghodata/?theme=country>

104 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

On Idjwi, women reported receiving a variety of medications during pregnancy, including tetanus vaccine (61%), deworming medications (43%), antimalarials (40%), and an average of two doses of iron supplements (52%). Immunization of mothers against tetanus was similar to rural DRC as a whole, where 59 percent of pregnant women received tetanus vaccination¹⁰⁵.

Intrapartum care. 60 percent of women gave birth in a health facility, compared to 61 percent in rural DRC¹⁰⁶. For those not delivering in a health facility, the most common reasons were distance to the health facility or lack of transportation (43%) and cost (34%). Two thirds of deliveries were assisted by trained health personnel (57 percent by a nurse/midwife and 11 percent by a physician), the same proportion as in rural DRC overall¹⁰⁷. The remainder relied on traditional birth attendants or community support.

Postnatal care. Although almost all women received some form of check-up an hour or more after delivery, less than one quarter (24%) received a check-up more than 24 hours after delivery. Check-ups were typically performed by nurses/midwives (55%), doctors (11%), or traditional birth attendants (26%).

Risk factors. Two thirds of women reported some difficulty with vision during pregnancy, particularly night blindness. This suggests that nutritional deficiencies are common during pregnancy. Menses interfered with daily tasks for 69 percent of women. In the past year, 43 percent of women had experienced a bad smelling, abnormal genital

discharge, typically soon after birth. Two thirds of women had some form of genital sore or wound in the past year.

Child Health

Respondents were asked about their youngest child. For 1,839 households, the youngest child currently living with them was under 10 years of age. The age structure of this child population is shown in Figure 13. Curiously, the population of female children was 25% larger than that of male children. We collected the following information about this sample.

Vulnerability. One third of households are home to a child whose mother and/or father has died, disappeared, or is too sick to live with the child. 18 percent of all children had at least one deceased parent, compared to 25 percent in the DRC as a whole¹⁰⁸. Among children ages 4-9, two thirds had more than one set of clothing, less than half (45%) had their own pair of shoes, and only one fifth had their own blanket.

Vaccinations & nutrition. Two thirds of the youngest children in the household had received vaccinations to common infectious diseases. Nearly all had eaten the day before the interview, but only half had more than one meal. Two thirds had received a vitamin A dose in the last six months and 18 percent had received an iron supplement in the last 7 days. A previous study noted that many children on Idjwi cannot attend school because of lack of sufficient food and subsequent hunger¹⁰⁹. 7 percent of all neonates were underweight at birth, compared to 8.7 percent in rural DRC as a whole¹¹⁰.

105 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

106 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

107 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

108 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

109 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

110 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

Gastrointestinal problems. Over one third (38%) of the youngest children in the household had had diarrhea in the last two weeks, compared to 22 percent in rural DRC overall¹¹¹. (Note: this difference may be partially explained by the underrepresentation of 4-year-olds in our sample, who are less likely than younger ages to experience diarrhea). Blood was reported in stools in one third of cases of diarrhea on Idjwi. Nearly all children with diarrhea were given something for their condition. One third were given a home remedy, 28 percent were given a form of ORS or RHS (compared to 47 percent in the DRC as a whole¹¹²), 20 percent were given a pill or syrup, and 11 percent were given an injection. Half of children had received medication for intestinal worms in the last six months.

Fever & cough. In the two weeks prior to the interview, over half (59%) of the youngest children in the house had a high temperature, and a similar amount (62%) had suffered from coughing. Nearly half (49%) had suffered from both fever and coughing, compared to 37 percent in rural DRC overall¹¹³. In 90 percent of cases, coughing was associated with some difficulty breathing, caused by blockage of the nose (17%), chest (25%), or both nose and chest (56%). Conversations with locals suggest that for many young children these symptoms are associated with hay fever common during the dry season when we conducted the survey. 42 percent of children took some form of medication for their illness. We did not collect information on the prevalence of specific interventions for specific conditions.

111 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

112 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

113 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

Health infrastructure

Health system. There are usually six physicians staffed across Idjwi's three hospitals. This suggests that there are approximately 2.7 physicians per 100,000 people on Idjwi, compared to 10 per 100,000 in DRC as a whole¹¹⁴. Additionally, there are approximately 20 health posts (centres de santé) distributed across the island, supplied irregularly with basic medications and staffed by a nurse or other trained professional several days of the week. The majority of health posts are inaccessible by vehicle. Areas served by no health facility include the northern and southern tips of the island, as well as the central highlands (see Appendix 1 for map). Patients far from a health facility are often transported by canoe around the island.

Health-seeking behavior. When sick or seeking advice on their health, three fifths of respondents visit their closest Centre de Santé, a small rural health post. Of the remainder, 11 percent visit a local pharmacy or shop, 6 percent travel to one of the island's three hospitals, and 2 percent each visit a traditional healer or family member.

15 percent of women go nowhere for health care. For this subpopulation, the limiting factors were distance or lack of transportation (58%), cost (39%), or the facility being closed (6%). Similar problems in accessing health care are present in rural DRC as a whole, the most prohibitive being cost (83%), transportation problems (59%), and distance to health facility (54%)¹¹⁵.

In the last year, three quarters of respondents visited a health center, clinic, or hospital. The most common reasons for seeking health care was a medical condition, followed by reproductive health care needs.

114 World Health Organization. World Health Statistics 2010.

115 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

Table 1: Indicator comparisons between Idjwi Island and DRC. When possible, statistics from rural DRC are used.

Demographics	Idjwi	DRC (*rural only)
Percent of population under age 15	55%	48% ^a
Total fertility rate	6.14	5.24 ^b
Crude birth rate (per 1000 per year)	65.0	38.0 ^c
Crude mortality rate (per 1000 per year)	28.7	11.1 ^d
Population growth rate	2.2%	2.61% ^b
Household		
Percentage of population using pit toilets	82% [*]	82% ^c
Percentage using solid fuel for cooking	90%	*89% ^c
Percent of households with at least one insecticide-treated bed net	17%	*7% ^c
Education & income		
School life expectancy among women (years)	6	7 ^b
Percentage living on less than US\$1 PPP per day	82%	59% ^a
Income accounted for by top income decile	81%	35% ^b
Marriage		
Median age of first marriage	18.3	*18.3 ^c
Percent of women age 18-50 in polygynous unions	15%	*20% ^c
Household decisions about money made exclusively by husband	80%	*40% ^c
Maternal health & family planning		
Median age of first intercourse	16.7	16.8 ^c
Median age at first birth	18	*19.6 ^c
Desired total number of children	6.1	*7.0 ^c
Unmet need for contraception	56.3%	*24% ^c
Mean birth spacing (months)	21	*30 ^c
Percent of mothers who received four or more antenatal care checkups	25%	47% ^c
Percentage of births attended by skilled health personnel	67%	*67% ^c
Percentage of births delivered in a health facility	60%	*61% ^c
Child health		
Percent of births underweight	7%	*8.7% ^c
Percent of children less than age 18 with at least one deceased parent	18%	25% ^c
Percent of children age 0-11 months protected against tetanus through immunization of mother	61%	*59% ^c
Percent of children under 5 who had diarrhea in two weeks prior to the survey	39%	*22% ^c
Percent of children under 5 with diarrhea in the previous 2 weeks who were given ORS or RLS	28%	47% ^c
Percent of children under 5 suffering from both fever and coughing in the past two weeks	49%	*37% ^c
Health System Physicians per 100,000 population	2.7	10 ^a

^aWorld Health Organization. World Health Statistics 2010.

^bCIA World Fact Book (2009). <https://www.cia.gov/library/publications/the-world-factbook/>

^cMEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

^dUnited Nations Department of Economic and Social Affairs. World Population Prospects : The 2006 Revision.

Two-thirds of respondents (68%) expressed that there are actions they should take to further improve their health. Religion and praying are the most common action (28%), followed by medical treatment (26%), change in diet or eating habits (16%), learning to manage stress (8%), herbs (7%), vitamins (5%), reducing stress (5%), and increasing drinking water (4%). 54% of women have taken one or more of these actions in the last 3 months.

Mothers seek advice or treatment for their youngest child for one 32 percent of cases of diarrhea, fever, or cough. Of these, two-thirds seek help from a trained health professional and one fifth visit a pharmacy or shop.

| Infectious diseases

Malaria. Malaria is endemic to Idjwi, and most respondents (92%) reported contracting the disease at some point in their life. Half of respondents reported that there are puddles or places of open water near their house.

17 percent of all households were observed by interviewers to have an insecticide-treated bed net (ITN). This is somewhat higher than the 7 percent of households with ITNs in DRC as a whole¹¹⁶. In most households with mosquito nets on Idjwi, respondents reported that someone had slept under the ITN the night before the interview. However, nearly all respondents (95%) reported that they took no personal precautions to protect themselves from malaria or mosquito bites. One third of all respondents did not know that mosquitoes were the primary vector, often attributing the disease instead to dirty water.

Diagnosis was made by trained health care personnel for only 54 percent of respondents reporting malaria. Only 59 percent of respon-

dents completed a full course of prescription medication, and 27 percent received no prescription medication whatsoever.

HIV/AIDS. 95 percent of women age 18-50 had heard of AIDS. A majority of women believe they could reduce chance of HIV infection by using a condom during sex (74%), having sex with just one partner (87%), or practicing abstinence (71%). Still, a substantial fraction believe it possible to contract AIDS via mosquito (24%), shared food (19%), or sorcery (15%). Also, a quarter of respondents believe it is impossible for a healthy-looking person to have AIDS.

80 percent know that it is possible for a mother to transmit AIDS to her baby. However, less than half (45%) have been educated about AIDS during their last antenatal care visit. Roughly a third (29%) know of a place where they could get tested, and the same amount are aware of the existence of drugs that can help infected individuals live longer.

AIDS is stigmatized on Idjwi. The majority of women (53%) would not buy fresh vegetables from a shop keeper known to have the AIDS virus. 30 percent responded that if a member of their family contracted AIDS, they would want it to remain a secret.

Tuberculosis. Almost all respondents (95%) had heard of tuberculosis. Mechanisms of transmission were fairly well understood: 88 percent knew that the disease could be spread through the air when coughing or sneezing. However, only three-fifths knew that tuberculosis is curable, and 17 percent expressed that it was incurable. 24 percent responded that if a member of their family contracted tuberculosis they would want it to remain a secret.

Oral Infections. Over half (54%) of respondents have had a problem with oral pain at some time in their life, and 42 percent are currently experi-

116 MEASURE DHS (Macro Int). Demographic & Health Survey 2007 - Democratic Republic of the Congo.

encing oral pain. Of those with current pain, 82 percent report that their suffering has prevented them from doing a normal activity at least once in the past 3 months. For those with current pain, one third seek care from a health professional, 11 percent seek care from a traditional healer, 33 percent attempt self-remedy, and a quarter do nothing.

Respondents clean their teeth either more than once a day (37%), about once a day (47%), every few days (8%), every few weeks (4%), or never (4%). For those cleaning their teeth, the preferred methods are toothbrush alone (35%), toothbrush and toothpaste (30%), or chewstick (29%).

| Food security and nutrition

Previous studies. Interventions in the 1960s and the subsequent introduction of iodized salt eliminated Idjwi’s pandemic of myxoedematous cretinism, a form of severe growth and mental retardation¹¹⁷. In 1983, a survey of several hundred individuals in four villages found that one fifth of nursing mothers were demonstrably malnourished and at least 10 percent of children ages 1 to 5 were suffering from protein calorie malnutrition¹¹⁸. Moderate maternal malnutrition, combined with considerable agricultural activity, may contribute to the unusual duration of amenorrhea observed among the Havu people¹¹⁹. More recently, severe malnutrition has been observed among children, particularly among

Bambutu populations¹²⁰.

Diet. The typical Idjwi diet consists of cassava, beans, lengalenga (green leafy vegetable), sambaza (tiny fish), mandazi (fried dough), and cooking oil. A variety of crops are grown year round in Idjwi’s rich soils, including beans, bananas, sweet potatoes, maize, sorghum, plantains, groundnuts, gourds, peas, pineapples, taro, coffee, tobacco, yams, and cassava^{121,122}. Locals raise cattle, goats, sheep, pigs, chickens, and turkeys. Fishing is also important, but not a primary source of food¹²³. Additionally, many locals, particularly men, drink banana wine or beer when it can be afforded. As Newbury describes, “Beer is a social good par excellence. It is a required element of all formal visits—by those seeking land, cattle, wives, reconciliation, or to express thanks, pleasure, or social bonding”¹²⁴.

Food insecurity. Over half of the population sometimes or often do not have enough to eat (Figure 13). 87 percent of households have to skip or cut the size of meals because there wasn’t enough money; for two-thirds of households, this occurs almost every month. Virtually all children (98%) receive at least one meal per day, but half of children get no more food than this. Given Idjwi’s rich soils and crop variety, food insecurity

117 Ngo, DB, L Dikassa, W Okitolonda, TD Kashala, C Gervy, J Dumont, N Vanovervelt, B Contempere, AT Diplock, S Peach, J Vanderpas. Selenium status in pregnant women of a rural population (Zaire) in relationship to iodine deficiency. *Tropical Medicine and International Health* (1997); 2,6: 572-581.

118 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

119 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

120 Bideri, C & HP Hergum. The Pygmies of the Great Lakes: An assessment of the Batwa/Mambutu Situation in Burundi & Eastern part of the Democratic Republic of Congo and Batwa/Bambutu Organizations in Bukavu (DRC) and Bujumbura (Burundi). Norwegian Church Aid Occasional Paper Series No. 02/2004.

121 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

122 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

123 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

124 Newbury, DS. Kings & Clans: Ijwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

is likely a result of overpopulation, rather than climate.

Indicator comparisons

We have presented an assortment of indicator comparisons in the text above. These comparisons are summarized below and in Table 1, using data from rural DRC when possible. Comparisons are not possible for indicators about which we collected no information (eg. maternal mortality).

Indicators on which Idjwi performs worse than the DRC. The DRC is by many estimates the poorest country in the world¹²⁵. But Idjwi is still poorer than the DRC as a whole: an additional 23% of Idjwi's population lives on less than US\$1 PPP per day. Wealth inequality is also greater on Idjwi than in the DRC, with over twice the proportion of total income (in hard currency) passing to the top income decile.

Certain risks to maternal health appear to be greater on Idjwi than in the DRC. Only 25 percent of women on Idjwi receive four antenatal care checkups, compared to 47 percent in the DRC. On Idjwi, unmet need for contraception is over twice as high as in the DRC. The median age of first birth is 1.6 years less than in rural DRC. And mean birth spacing is only 21 months on Idjwi, compared to 30 percent in rural DRC. Women on Idjwi may also be less empowered in their relationships, since twice as many women as in rural DRC reported that household decisions about money were made exclusively by their husband.

On most indicators, child health is worse on Idjwi than in rural DRC. In the two weeks prior to the survey, 49 percent of children under 5 suffered from fever and cough, compared to 37 percent in rural DRC. Likewise, in the two weeks prior to the survey, 39 percent of children under 5 suffered

from diarrhea, compared to 22 percent in rural DRC. Whereas nearly half of all Congolese children with diarrhea receive ORS/RHS, only 28 percent receive treatment on Idjwi.

Overall, Idjwi has higher fertility, mortality, and rate of natural increase than the DRC. The island may have less capacity to address these problems than rural DRC, given that there are only 2.7 physicians per 100,000 population on Idjwi, compared to 10 per 100,000 in the DRC.

Indicators on which Idjwi and the DRC perform similarly. Women on Idjwi are married at the same median age as in rural DRC, and have their sexual debut at the same median age as DRC as a whole. Idjwi and rural DRC also have a similar percentage of polygynous unions.

Comparing maternal health indicators, Idjwi and rural DRC perform equivalently in the percentage of births attended by a skilled health personnel, the percentage of births delivered in a health facility, and the percentage of women receiving tetanus vaccine during pregnancy. Additionally, a similar proportion of births are underweight.

As in rural DRC, the great majority of Idjwi households use pit toilets and solid fuel for cooking.

Indicators on which Idjwi outperforms the DRC. More than twice as many households on Idjwi have insecticide-treated bed nets, although it remains unclear what proportion of bed nets on Idjwi are used regularly. Idjwi also has a slightly lower percentage of orphaned children, possibly because of its isolation for the past ten years from the conflicts in eastern DRC.

DISCUSSION

Key findings

Our results reveal miserable health and economic conditions on Idjwi, which tend to be even worse than those in the DRC as a whole. The people of

125 World Economic Outlook Database. IMF (2010). <http://imf.org/external/pubs/ft/weo/2011/01/weodata/index.aspx>

Idjwi are extremely poor. More than four-fifths of households live on less than US\$1 PPP hard currency per person per day. Although most locals are subsistence farmers, less than a third of households own their own land. 15 percent of people have nowhere to go for health care, the most common limiting factors being cost and distance to an open facility.

Infectious diseases are rampant. Nearly all respondents have had malaria, and a third are unaware that mosquitoes are the vector. Half of respondents have had an oral infection at some point in their lives. One third of children have not been vaccinated against common diseases. Over a third of children had diarrhea in the two weeks prior to the survey, often with blood in their stools, and only 28 percent of diarrhea cases were given ORS or RLS. The fact that almost all households have no access to improved sanitation or treated water may explain the high prevalence of diarrhea. Nearly half of children had suffered from cough and fever in the two weeks prior to the survey, usually with some difficulty breathing. The fact that the vast majority of households cook with solid fuels, often indoors, may partially explain the prevalence of respiratory illnesses.

Women on Idjwi experience severe disempowerment and violence. Half as many women as men attend primary school, and nearly half of women report being completely illiterate. The majority of women marry before age 19 to a man at least 6 years her senior. Married men frequently have multiple sexual partners and sometimes multiple wives. The husband usually makes decisions about how to spend household income and what sorts of health care his wife receives. A third of women report that extramarital rape is common in their community. Also, wife beating has become the norm in the majority of communities. Indeed, most women believe that wife beating is usually justified.

Women are most concerned about illnesses related to reproduction. Most women will have their first child before age 18. Also, birth intervals are less than two years for the majority of pregnancies. Only one quarter of women receive four or more antenatal care visits for their last pregnancy. One third of deliveries receive no assistance from trained personnel. Slightly more than half of women have unmet need for contraception. As a result of these various factors, total fertility on Idjwi is over six children per women.

Fertility and mortality are both very high on Idjwi, suggesting that the island has not yet entered the demographic transition¹²⁶. Mortality is more than twice as high on Idjwi compared to the DRC as a whole. Deaths among adults are often painful, involving symptoms of nausea, diarrhea, constipation, or coughing. Simultaneously, high fertility fuels overpopulation and environmental destruction. Hunger and malnutrition have increased as the amount of arable land per head has decreased. Over half of households report that they sometimes do not have enough to eat, and half of children receive no more than one meal per day.

Limitations

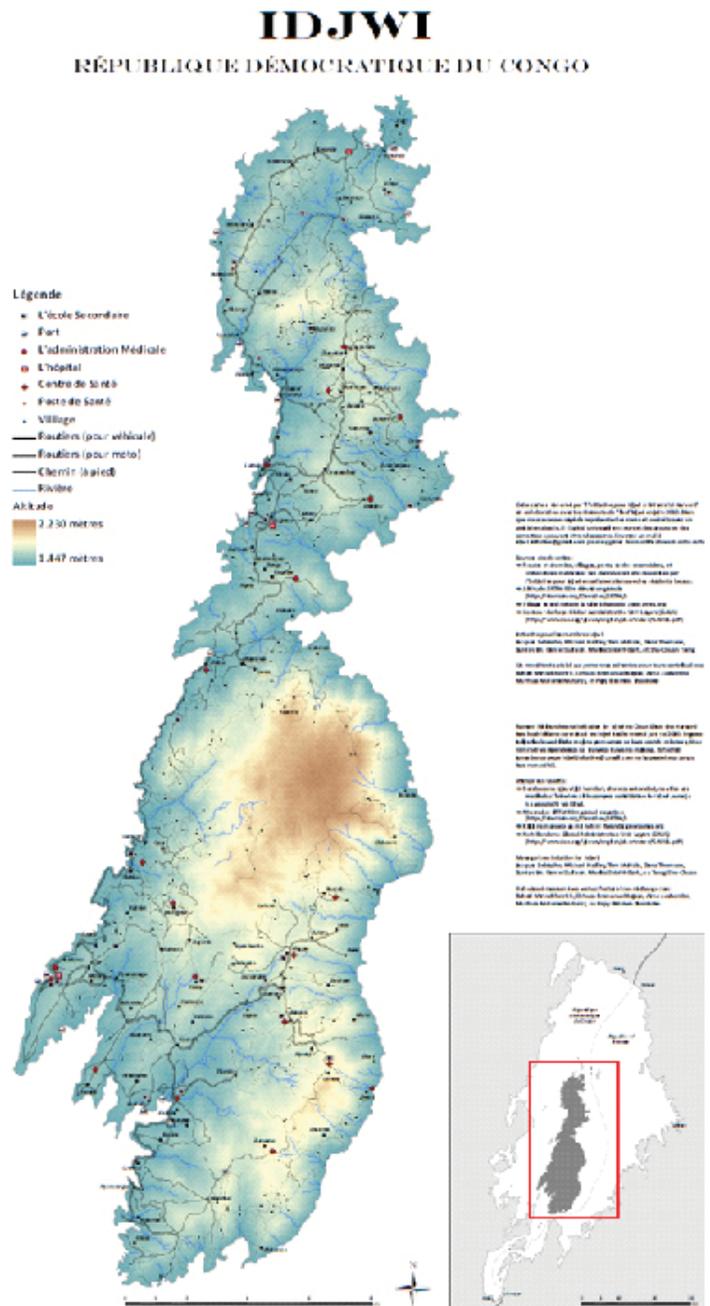
Our study has several limitations. First, we were required by IRB to interview no one younger than age 18, which is the legal age of adulthood in the DRC. Consequently, we only collected representative information on households home to at least one woman 18-50. Our sample is not representative of households headed by women under 18. Since women under age 18 and their children often have greater reproductive health needs and

126 Kirk, D. Demographic transition theory. *Population Studies: A Journal of Demography* (1996). 50;3: 361-387.

orer health outcomes¹²⁷, health needs on Idjwi may be even greater than those reported here. We chose not adjust for this using information collected on unmarried women under age 18, since doing so would require the false assumption that married and unmarried women do not differ systematically on health conditions.

Second, there appears to be significant under-reporting of infant and child death. This is not particularly surprising, since when young children die on Idjwi, the mother is held responsible, scorned, and considered lazy¹²⁸. Under-reporting of deceased children makes the calculation of infant and child mortality very difficult. Additionally, if dead children are not recorded on the birth history, fertility rates may be underestimated.

Third, respondents appear to have had difficulty with our subjective measures of health from the World Health Survey¹²⁹. In many cases, respondents provided the exact same rating of their health across dimensions ranging from mobility to vision to affect. The most common rating across all responses was “severe difficulty,” even for dimensions, such as vision, which appeared not to be severely impaired for the majority of respondents. Although apparently extreme responses might be explained by response category cut-point differences, such differences do not explain blanket response patterns. Instead, these patterns might be better explained by a projection of respondents’ general dissatisfaction or desire for support, or their frustration with the length of the survey. Due to these uncertainties,



127 Sunmola, A.M., M. Dipeolu, S. Babalola, O.D. Adebayo. 2003. Reproductive knowledge, sexual behavior, and contraceptive use among adolescents in Niger State of Nigeria. *African J of Repro Health*, 7(1): 37-46.

128 Carael, M & JB Stanbury. Promotion of Birth Spacing on Idjwi Island, Zaire. *Studies in Fam. Planning* (1983); 14,5: 134-142.

129 <http://www.who.int/healthinfo/survey/instruments/en/index.html>

FIGURE 15

we've chosen to exclude this section from this report. The absence of this section clearly makes it more difficult to take a rights-based approach to designing community-tailored interventions.

Fourth, individuals on Idjwi that are more similar to each other are likely to live closer to each other. As Newbury reports, "Homesteads are increasingly clustered by marriage or kinship to make room for crops"¹³⁰. Therefore, given our cluster sampling framework, we are likely to underestimate the true variance in responses.

Future research

The health and economic issues revealed in this report are likely to be the tip of the iceberg. More research is needed to understand Idjwi's health burdens, address the limitations of the current study, and form a solid basis for action. We suggest the following:

1. A representative survey focused on maternal and child health, including information from women ages 15-17. This survey should prioritize estimates of maternal, infant, and child mortality, possibly using the techniques described by Taylor et al for conducting mortality surveys in rural Zaire¹³¹. The survey also should include a vaccination history and biometric measurements of malnutrition and disease prevalence.
2. A survey of Idjwi's hospitals and health posts, covering financing, equipment, medications, procedures performed, patient satisfaction, and interviews with health care providers about their needs and concerns.
3. A baseline health assessment targeting only

the Bambuti (Pygmy) people, Idjwi's most marginalized population.

4. Focus groups with community members to understand local priorities and clarify the results of the current study (eg. Why did respondents have difficulty with the WHS subjective measures of health?).

Helping Idjwi

More than 80 internationally-funded development organizations currently operate out of the mainland cities of Goma and Bukavu, which look across the lake to Idjwi. These organizations specialize in a variety of health and development programs, from environmental sustainability to women's empowerment, all of which are relevant to Idjwi.

Our team is taking several actions to encourage the participation of these organizations. Firstly, the results from this survey will be translated and disseminated as widely as possible, particularly to community leaders on Idjwi and to organizations operating out of Goma and Bukavu. Special attention will be placed on advocacy organizations, which have greater capacity to leverage our findings to recruit assistance. Current partners in advocacy include HEAL Africa and Amani Global Works.

It would be imprudent in this report to prioritize a select handful of interventions. For, we do not yet have sufficient understanding of the intricacies of the existing health system or the stakeholders involved. Additionally, all nearby governmental, religious, and aid organizations are potential partners in Idjwi's future, and none should be deemed to specialize in non-'priority areas'¹³². Instead, we hope each organization can use the information herein to implement the interven-

130 Newbury, DS. Kings & Clans: Idjwi Island and the Lake Kivu Rift: 1780-1840. U of WI Press (1991).

131 Taylor, WR, A Chahnazarian, J Weinman, M Wernette, J Roy, AR Pebley, O Bele, M Ma-Disu. Mortality and Use of Health Services Surveys in Rural Zaire. *Int. J. Epidemiol.* (1993). 22 (Supp 1): S15-S19.

132 Farmer, P. Pathologies of Power: health, human rights, and the new war on the poor. U of CA Press (2005)

tions on Idjwi that they can operate most successfully.

CONCLUSION

At the request of community leaders, the Idjwi Island Health Assessment provides the first broad, representative portrait of health conditions on Idjwi Island, DRC. Following standard practices for survey design and implementation, our team uncovered a range of basic human rights violations on the island. Health and economic conditions on Idjwi are often worse than the DRC as a whole. Fertility and mortality are both extremely high. Hunger and infectious diseases are rampant, particularly among children. And women experience severe disempowerment, violence, and lack of reproductive health services. Although further research and analysis are needed, the results described in this report fulfill our objective of providing a tool for community leaders and aid organizations to advocate for Idjwi, recruit resources, and design community-tailored interventions.