Reproductive Health in Post-Emergency Refugee Camps

Linnea Zimmerman, Catherine Packer, Courtland Robinson UNHCR

A. INTRODUCTION

While it has been known for some time that 80% of refugees and internally displaced persons are women and children, and reproductive rights of refugees and displaced persons are established in international refugee, human rights and humanitarian law, several developments in the last 15 years have given new focus and attention to the reproductive health needs of displaced populations.[1,2] In 1994, the Women's Commission for Refugee Women and Children published a ground-breaking report, *Refugee Women and Reproductive Health Care: Reassessing Priorities*, which documented a lack of comprehensive reproductive health care services for refugee and displaced women, a lack of priority given to the issue by international and non-governmental organizations, and a "paucity of serious research"[3]. Soon after, the International Conference on Population and Development, held in Cairo in 1994, recognized the special reproductive health needs of migrant women, including refugees and other displaced populations. This was followed by establishment of the Inter-agency Working Group on Refugee Reproductive Health (IAWG), comprising more than 30 representatives from UN agencies, NGOs, and governments, with the United Nations High Commissioner for Refugees playing a coordinating role. An NGO organization, the Reproductive Health for Refugees Consortium (RHRC), also formed around this same time, to promote increased access by refugees to quality reproductive health services.[2,4]

In 1996, the IAWG produced the *Inter-agency Field Manual on Reproductive Health in Refugee Situations* (revised in 1999 and again in 2010) which set out a number of key components of reproductive health for refugee and displaced populations, including the Minimum Initial Service Package (MISP) for reproductive health; safe motherhood; gender-based violence (GBV), sexually transmitted infections (STI) including HIV/AIDS; family planning; adolescents; and surveillance and monitoring (including Health Information Systems).[5,6,7] The MISP for reproductive health, a set of priority activities to be implemented during the early stages of an emergency—with a focus on promoting coordination, preventing gender-based violence, reducing STIs and transmission of HIV,

preventing excess maternal and neonatal mortality and morbidity, and integrating comprehensive reproductive health services into primary health care—has been incorporated into the 2004 revision of the Sphere Humanitarian Charter and Minimum Standards in Humanitarian Assistance.[8]

In 2006, UNHCR launched a Health Information System (HIS) to enhance the quality and consistency of health information available in protracted refugee situations. The HIS was initially piloted in three countries in East Africa (Tanzania, Kenya, and Ethiopia) then expanded to 11 countries in 2007 and, by mid-2010, was operational in 87 refugee camps in 18 countries where HIS monitors health services provided to more than 1.5 million camp-based refugees by UNHCR and its partners.[9] There are ten technical sections, corresponding to ten core components of primary health care: population, mortality, morbidity, inpatient and referral, laboratory, disease control, EPI, nutrition, reproductive health, and HIV/AIDS. The reproductive health module is further sub-divided into 5 parts: antenatal care, delivery care, postnatal care, family planning, and gender-based violence. This paper examines the outputs of the HIS related to reproductive health, with a particular focus on mortality risk to infants and mothers, and on antenatal care and delivery care. We would note that this focus on maternal and child health is not meant in any way to suggest that other aspects of reproductive health—including postnatal care, family planning, and gender-based violence—are unimportant. It was our tentative conclusion, based on review of the data, that GBV indicators were perhaps significantly under-reported (certainly most camps in most months reported no GBV events). Other indicators were left out of the analysis due either to data concerns or reasons of space.

B. METHODS

HIS Data Collection and Reporting. Though reproductive health services differ between countries and between health partners, generally the HIS reproductive health report begins with health partners filling out antenatal registers (for each visit made during the antenatal period), daily antenatal tally sheets, delivery registers, IPD (pregnancy) registers, postnatal registers, family planning registers, and GBV registers. These tally sheets and registers are converted to numerical totals and submitted to the camp health manager in weekly reports, which are aggregated into monthly reports and submitted to the supervising

health agency, usually a non-government organization (NGO) implementing partner. Monthly report information is transferred by health agency staff to computerized reporting forms which are subsequently submitted to the local UNHCR sub-office, where they are uploaded into the HIS and made accessible to UNHCR branch offices and headquarters.[9]

RH Standards and Indicators. One of the core functions of HIS, at least as a starting point, has been to build consensus around a core set of standards and indicators for program data collection and performance tracking.[9] Indicators used to measure mortality and reproductive health program activities include (but are not limited to):

Table 1. Health Information System (HIS) Standards and Indicators[10]

Indicator	Description	Standard	Source
Mortality			
Infant Mortality Rate (IMR)	Number of deaths among under-ones/Total number of live births x 1000	<60 deaths /1000 live births	SPHERE
Maternal Mortality Ratio (MMR)	No. of pregnancy-related deaths /Total number of live births x 100,000	NA	
Antenatal Care			
Coverage of Complete Antenatal Care (ANC 4+)	No. of pregnant women who made at least 4 antenatal visits at time of delivery/Total number of live births x 100	100%	IAWG RH
Coverage of Tetanus Toxoid (Tetanus 2+)	No. of pregnant women who received 2 doses of TT during the antenatal period at time of delivery/Total number of live births x 100	100%	IAWG RH
Delivery Care			
Crude Birth Rate (CBR)	Number of live births in the camp/Total population x 1000	10-40/1000/year	UNHCR
Proportion of Births Attended by Skilled Health Worker (SBA)	Number of deliveries attended by trained health workers/Number of deliveries x 100	≥50%	UNHCR
Proportion of Deliveries in EmOC Facilities (Health Facility)*	Number of deliveries in an EmOC facility/Number of deliveries x 100	≥50%	UNHCR
Proportion of Low Birth Weight Newborns (LBW)	Number of live births <2500g/Number of live births x 100	<15%	IAWG RH
Proportion of All Births Performed by Caesarian Section (C-Section)	Number of live births performed by caesarian section/Number of live births x 100	>5% - <15%	IAWG RH

* The terms "EmOC Facility" and "Health Facility" seem to be used interchangeably. Health Facility "includes maternity wards in the camp and government hospitals defined as EmOC facilities"[10]

Data Analysis. Our first step was to review the data in order to assess the completeness and plausibility of records. We dropped several indicators from the analysis due to what appeared to be a high proportion of missing data, including indicators relating to gender-based violence and post-abortion care. We also dropped measurement of contraceptive prevalence rate (CPR) as the values reported—numbers of new users and discontinuing users—did not appear to account for continuing users and thus resulted in an artificially low CPR (in fact, many of the values were negative). Finally, we included only those indicators where we were able to calculate rates and proportions directly from the reported counts of events. Neonatal mortality rate was thus excluded as we did not have monthly counts of neonatal deaths, only an estimated proportion of infant deaths. We also excluded calculating the population of women age 15-49 as the counts provided by the database were consistently proportions calculated from the total population count.

Ultimately, we chose the following indicators for analysis: infant mortality rate, maternal mortality ratio, proportion of women receiving 4 or more antenatal care visits, proportion receiving 2 or more doses of tetanus toxoid, crude birth rate, proportion of births delivered by a skilled birth attendant, proportion of births delivered in a EmOC/health facility, proportion of low birth weight newborns, and the proportion of all live births delivered by C-section.

After reviewing the completeness of data for given indicators, we also reviewed the completeness of the reporting by camp time period. We excluded any camps that did not have at least 2 reports in a year (most had 3 or more). We also chose to include only data for the two full years, 2008-2009. Several camps had sporadic reporting in 2007 or began reporting midway through the year, therefore annualized estimates would have been based on relatively little information for several camps and countries. Additionally, several countries, including Burundi, Rwanda, and Thailand did not begin reporting until 2008. The final dataset consisted of 1,551 monthly reports from a total of 74 camps in 12 countries. Data were analyzed only for refugee populations and did not include data on national populations.

Mortality Rates (IMR and MMR).

As noted previously, we included only those indicators where we were able to calculate rates and proportions directly from the reported counts of events (neonatal mortality rate was excluded, as we did not have actual counts of neonatal deaths).

- Infant mortality rate (IMR) was calculated by summing the total number of reported deaths to children under one for all monthly reports in a given camp in a given year, dividing by the cumulative total of live births for all monthly reports per camp per year and expressing that as an annualized rate per 1,000 live births. Results for camp-level data and aggregated country-level data were compared to a Sphere standard of <60 deaths per 1,000 live births and also analyzed for regional (Africa and Asia) and temporal (2008 and 2009) trends.
- Maternal mortality ratio (MMR) was calculated by summing the total number of maternal deaths for all monthly reports per camp per year, dividing by the cumulative total of live births for all monthly reports per camp per year and expressing that as an annualized rate per 100,000 live births. Results for camp-level data and aggregated country-level data were analyzed for regional and temporal trends. We were not able to identify a standardized target for MMR in refugee camp contexts.

Antenatal Care (ANC 4+, Tetanus 2+).

- Coverage of complete antenatal care (ANC4+) was calculated by summing the total reported number of women who made at least 4 antenatal visits for all monthly reports in a given camp in a given year, dividing by the cumulative total of live births for all monthly reports per camp per year and expressing that as an annualized percent. Results for camp-level data and aggregated country-level data were compared to an IAWG-RH standard of 100% coverage and also analyzed for regional and temporal trends.
- Coverage of tetanus toxoid (Tetanus 2+) was calculated by summing the total reported number of pregnant women receiving at least 2 doses of TT for all monthly reports in a given camp in a given year, dividing by the cumulative total of live births for all monthly reports per camp per year and expressing that as an annualized percent. Results for

camp-level data and aggregated country-level data were compared to an IAWG-RH standard of 100% coverage.

Delivery Care (CBR, SBA, Health Facility, LBW, C-Section).

- Crude birth rate (CBR) was calculated by summing the number of live births in each camp over a year and dividing by the average total population of the camp. To estimate average camp population size for a given year, we summed the cumulative total of all monthly camp population reports and divided by the number of monthly reports for the year. Results for camp-level data and aggregated country-level data were compared to a UNHCR standard of 10-40 per 1,000 per year. It is not clear what this range is meant to imply, except perhaps that <10 may suggest incomplete reporting and >40 may suggest unnaturally high (i.e, unsustainable) fertility levels.
- Proportion of births attended by a skilled health worker/birth attendant (SBA) was calculated by summing the total reported number of deliveries attended by trained health workers (excluding traditional birth attendants) for all monthly reports in a given camp in a given year, dividing by the cumulative total of live births) for all monthly reports per camp per year and expressing that as an annualized percent. Results for camp-level data and aggregated country-level data were compared to a UNHCR standard of ≥50%.
- Proportion of deliveries in EmOC facilities/health facilities (Health Facility) was calculated by summing the total reported number of deliveries in a health facility (including maternity wards in camps and government hospitals) defined as EmOC facilities for all monthly reports in a given camp in a given year, dividing by the cumulative total of deliveries (including live births and still births) for all monthly reports per camp per year and expressing that as an annualized percent. Results for camp-level data and aggregated country-level data were compared to a UNHCR standard of ≥50%.
- Proportion of low birth weight newborns was calculated by summing the total reported number of live births of infants <2500 grams for all monthly reports in a given camp in a given year, dividing by the cumulative number of live births for all monthly reports

per camp per year and expressing that as an annualized percent. Results for camp-level data and aggregated country-level data were compared to a UNHCR standard of <15%.

- Proportion of all births performed by caesarian-section (C-Section) was calculated by summing the total reported number of live births performed by caesarian section for all monthly reports in a given camp in a given year, dividing by the cumulative number of live births for all monthly reports per camp per year and expressing that as an annualized percent. Results for camp-level data and aggregated country-level data were compared to an IAWG-RH standard of >5% to <15%, with <5% indicating lack of access to emergency obstetrical care and >15% representing over-usage of this procedure on an elective basis.

C. RESULTS

Results from the data analysis are presented in tables and graphs at the end of the paper. We examined HIS data at both the camp-level and country-level (pooling camp-level data for all camps in a given country) for nine RH indicators. These results were compared against UNHCR or other international standards as well as compared to host-country and home-country indicators. We also analyzed the various indicators for regional (Africa and Asia) and temporal (2008 and 2009) trends and patterns.

Mortality (IMR and MMR).

Tables 2a and 2b (end of paper) show camp demographic information and reproductive health indicator outcomes by country with host country comparisons (Table 2a shows African camp and country data and Table 2b shows Asian camp and country data). Table 3 shows (where available) corresponding indicators for main countries of origin for the refugee populations. Several trends and patterns bear noting:

Aggregating camp-level data at the country-level, the tables reveal that, in virtually all cases, the infant mortality rate (IMR) in the camps is dramatically lower—often by a magnitude of ten-fold or more—than national–level IMRs in both the host country and the country of origin (see also Graph 1). The most striking examples are in two African countries, Burundi (3 camps in 2008, 4 in 2009) and Chad (14 camps in 2008, 15 in 2009). In Burundi, the aggregated camp IMRs are 13.1 (95% CI: 4.6, 21.6%) in 2008 and 6.7 (95% CI: 0.9, 2.6%) in 2008 and 2009, respectively, compared to a national-level IMR of 109 for

Burundi and IMRs of 78 in Uganda, 97 in Rwanda, and 129 in the Democratic Republic of Congo (DRC), the main countries of origin for refugees in Burundi. Refugees in the Chad camps had IMRs of 4.3 (95% CI: 3.0, 5.7%) in 2008 and 5.0 (95% CI: 3.7, 6.4%) in 2009, compared to a host country IMR of 124 and country-of-origin IMRs of 69 in Sudan and 114 in the Central African Republic (CAR). The only exception is Thailand (9 camps in 2008 and 2009) where the aggregated camp IMR is 8.9 (95% CI: 6.1, 11.7%) in 2008 and 7.2 (95% CI: 4.7, 9.7%) in 2009, compared to an IMR (in 2006) for Thailand of 7, which has likely declined since then (See also Graph 1).

Looking at camp-level data (see Graph 10 and Table 5), the patterns are more heterogenous, with one camp in Africa (Shimelba in Ethiopia) and one in Asia (Ban Don Yang in Thailand) showing IMRs of 30- 50. Generally, however, the infant mortality rates remain well below the rates for host countries which, given that most of these camps reflect post-emergency populations living in protracted displacement (5 years or more), is a more plausible comparison for camp health indicators than countries of origin. A positive finding is that all camps in the analysis show IMRs well within the standard of <60 per 1,000 live births. More discouraging is the fact that infant mortality rates do not decline with any discernible pattern from 2008 to 2009 (of the 74 camps in the analysis, 33 showed a decrease in IMR, 23 showed an increase, and the remainder showed no change).

Overall, the low IMRs in camps (excepting the two outliers) suggest either that infant health in the camps has achieved a mortality benchmark comparable to that found in industrialized countries or that data collection is not yet capturing a full record of camp deaths among children under one. Both Sudan and Uganda, for example, show IMRs of 0.0 for most camps for most years and implausibly low rates (virtually all under 5.0) in the camps where any infant mortality is recorded. Closer, camp-level analysis of mortality recording systems would help to clarify the issues.

The Millennium Development Goals set a target in 2000 of reducing maternal mortality by 75% in 2015. The problems in measuring maternal mortality have led some to shift emphasis from health indicators to health service usage indicators (proportion of births attended by a skilled birth attendant, proportion of births in health facilities, C-section rates, etc.[11] Thus, it is not a surprise that neither UNHCR, the IAWG-RH, nor WHO

have set a standard for an MMR indicator. The difficulties of measuring MMR may be evident in the widely divergent rates and patterns of camp-based maternal mortality.

Overall, it could be observed that, at the country-level (Tables 2a and 2b, Graph 2), MMRs are much lower in camps than in the host country overall. For example, even the highest camp MMR (435 deaths per 100,000 live births in 2008 in Burundi camps) was lower than its host country MMR (1100 in Burundi) and its countries of origin (1100 in the DRC, 550 in Uganda, and 1300 Rwanda). The 2008 MMR of 435 for the 3 camps in Burundi is at least plausible, however. In 2009, however, the MMR was 0.0. Other countries—including Rwanda, Sudan, Uganda, and Nepal—have shown dramatic shifts from 2008 to 2009, and not always in a positive direction. Camp-level data (Table 5 and Graph 11) show even more dramatically how divergent MMR measures are within individual camps from one year to the next. While we present the MMR results for review, we are inclined to agree with the perspective that health service usage indicators, such as are presented below, may be more reliable measures of maternal risk.

Antenatal Care (ANC 4+, Tetanus 2+).

ANC 4+ Antenatal care (ANC) is one of the most widespread services and often receives the largest allocation of maternal and child health services in developing countries.[14] ANC is a key component of prenatal health and has been linked with greater use of skilled assistance during birth.[19] The WHO recommends four ANC visits during pregnancy, and the ANC indicator measures use of and access to services.[12] The main purpose of ANC is to screen for and detect signs of, or risk factors for disease, followed by timely intervention, with the goal of reducing maternal and perinatal mortality and morbidity.[13] Although there is not strong evidence that antenatal care directly prevents maternal mortality, it is seen as an important way of getting specific interventions to women such as tetanus toxoid and syphilis screening which have been shown to decrease maternal and infant mortality.[14]

Where there is host country comparison information, camps at the country level had much higher proportions of women making four or more ANC visits compared to their host country, except Rwandan camps in 2008 where 3.9% (95% CI: 2.8, 5.2%) of women in camps made four or more visits compared to Rwanda's national average of 13.3%. When camp data at the country level was compared to countries-of-origin, camps had higher

proportions of women making four or more ANC visits. However, Rwandan camps had lower proportions of women making four or more visits than one of its countries-of-origin, the DRC (3.9% (95% CI: 2.8, 5.2%) in 2008 and 17.8% (95% CI: 15.3, 20.4%) in 2009, compared to DRC's national average of 46.7%).

From 2008 to 2009, most countries had similar values reported for ANC visits. In Cameroon, Rwanda and Tanzania, Bangladesh, Nepal and Thailand the proportion increased from 2008 to 2009, whereas in Kenya, Sudan and Uganda, the proportion decreased from 2008 to 2009, and in Burundi, Chad and Ethiopia, it stayed the same or very similar in both years. Out of 50 camps in Africa that had data for both 2008 and 2009, the proportion reported making ANC visits increased in half of camps (25) and decreased in half of camps (25). Out of the 18 camps in Asia, the proportion receiving ANC increased in the majority of camps (13) and decreased in 5. In sum, Asia tended to have camps with higher reported proportions of women making four or more ANC visits and the proportion tended to increase more often from 2008 to 2009 compared to camps in Africa. Several camps, mostly in Sudan, Chad and Uganda reported that more than 100% of women were receiving these services. This could indicate false reporting, or women from the host country utilizing these services.

At the camp level, in general Asia had consistently higher proportions of women making four or more ANC visits than Africa, however Africa had very heterogeneous results. In Asia, when aggregated to the country level, all countries reported that the proportion making four or more ANC visits was 90% or more. In Africa, four of the countries reported over 90% coverage in at least one year. The countries with the lowest proportion of women making ANC visits were Rwanda (3.9% (CI: 2.8, 5.2) and 17.8% (95% CI: 15.3, 20.3) in 2008 and 2009), Burundi (48.4% (CI: 44.6, 52.1) and 48.4% (95% CI: 44.8, 52.0) in 2008 and 2009), Cameroon in 2008 (40.3% (95% CI: 32.5, 48.0)), and Uganda in 2009 (58.1% (95% CI: 56.5, 60.0).

The UNHCR standard for the proportion of women making four or more ANC visits is 100%. While a minority of camps met this standard, (see Table 4), a majority of camps reported at least 90% coverage. Countries with camps with the highest proportion of women making four or more visits were Sudan, Ethiopia and Tanzania and in Africa, and all

the countries in Asia (Bangladesh, Nepal and Thailand). However, it should be noted that Sudan reported implausibly high proportions (276% in 2008 and 137% in 2009).

In general, a limitation of the data for this indicator was that 31 camps (combined from 2008 and 2009) reported a value of either 100% (n=3) or more than 100% (n=28), making it difficult to interpret.

Tetanus 2+ Maternal and neonatal tetanus due to unhygienic delivery circumstances are significant causes of mortality, but highly preventable. One of the most successful interventions in reducing maternal and neonatal mortality resulting from infection at delivery is giving pregnant women tetanus toxoid vaccinations.[13] Since 1990, neonatal deaths from tetanus have dropped by 50% worldwide due to improved hygiene practices and immunization efforts.[15] Tetanus immunization for women who have not been vaccinated constitutes one of the priorities in antenatal care.[13] In spite of these efforts, about 7% of neonatal mortality worldwide is still attributed to tetanus.[15]

Overall camps and countries in Asia had higher proportions of women receiving tetanus than Africa. In Asia, when aggregated to the country level, the proportion receiving tetanus ranged from 91.7% (95% CI: 89.0, 92.4) in Bangladesh in 2009 to 100% in Bangladesh in 2008 and Nepal and Thailand in 2009. The range was larger and more heterogeneous in Africa, where 68% (95% CI: 64.8, 71.0) in Rwanda in 2009 received tetanus and Tanzania in 2008 and 2009 and Chad in 2009 reported 100% (or more). Overall, more women were reported receiving two or more doses of tetanus toxoid vaccination in camps than in host countries and countries-of-origin in all countries except Rwanda in 2009 (68% in 2009 in Rwandan camps compared to the Rwandan national average of 72.4%).

In Asia, from 2008 to 2009, the proportion of women receiving tetanus increased in Nepal and Thailand but decreased in Bangladesh. In Africa, from 2008 to 2009, the proportion receiving tetanus increased in Cameroon, Ethiopia, Sudan and Uganda, decreased in Burundi, Chad, Kenya, Rwanda and Tanzania. At the camp level in Asia, slightly more than half of the camps (10) saw an increase in proportion receiving tetanus and slightly less than half (8) saw a decrease from 2008 to 2009. In Africa, slightly less than half of the camps (24) saw an increase in the proportion receiving tetanus and slightly

more than half of the camps (26) saw a decrease from 2008 to 2009. Again, it should be noted that some of the proportions were over 100% in both regions.

Similar to ANC, the UNHCR standard for receiving two or more tetanus toxoid doses is 100%. While some camps reported 100% or more coverage (see Table 4), most reported over 90% coverage. All countries in Asia reported over 90% coverage and most countries in Africa reported coverage over 90%, but Rwanda in both years and Uganda in 2008 reported less than 75% coverage.

Interestingly, the proportion of women reported to receive tetanus tended to be higher than the reported proportion receiving four or more ANC visits. This was true in all countries in Asia and in five countries in Africa. This could indicate that most pregnant women receive fewer than four ANC visits, but are still getting one of the most important ANC services, tetanus immunization.

Similar to the ANC indicator data, a limitation of the data for this indicator was that 41 camps (combined from 2008 and 2009) reported a value of either 100% (n=9) or more than 100% (n=32), making it difficult to interpret.

Delivery Care (CBR, SBA, Health Facility, LBW, C-Section).

As the majority of maternal deaths occur during labor, delivery or within the first 24 hours postpartum, intrapartum-care is essential to reducing the number of maternal and neo-natal deaths. The location of women when they deliver and who attends the birth are critical factors in avoiding complications leading to morbidity and, possibly, mortality.

CBR Hill noted that "the effects of humanitarian crises on fertility are likely to depend to some extent on the stage of demographic transition reached by the population" of displaced. While noting that "humanitarian crises vary widely in crises and settings" and effects may vary equally widely, he suggested that "in the short run, effects through intercourse are likely to reduce fertility. A humanitarian crisis is likely to delay entry into a sexual union and to increase the risk of spousal separation or union dissolution." He conjectured that long-term effects are unclear, noting among other things that "effects through risk of conception are less clear cut."[16]

Crude birth rates (CBR) are lower in almost all camps as compared to the host country. The exceptions are two countries in Africa (Cameroon and Tanzania) and two in Asia (Bangladesh and Thailand) where the CBR is higher in the camps than the host country. In Bangladesh and Thailand, the camp CBRs are much higher than both host countries and country-of-origin (Myanmar).

All countries but two (Bangladesh and Tanzania) were within the UNHCR standard range for CBRs of 10-40 per 1,000 per year. As noted previously, it is not clear what this range is meant to imply, except perhaps that <10 may suggest incomplete reporting and >40 may suggest unnaturally high (i.e, unsustainable) fertility levels. The high birth rates in Bangladesh may be particularly noteworthy: 45.8 (95% CI: 43.4, 48.3) in 2008 and 39.0 (95% CI: 36.7, 41.2) in 2009, given that it achieved the lowest percentage of camps overall meeting UN standards for reproductive health indicators: 31.3% in 2008 (95% CI: 8.5, 53.9) though this improved significantly to 62.5% in 2009 (95% CI: 38.8, 86.2). Tanzania, on the other hand, scored the highest percentage of camps meeting UN RH standards, with 85.0% in 2008 (95% CI: 73.9, 96.0) and 83.3% in 2009 (95% CI: 68.4, 98.2) so high birth rates alone do not necessarily indicate a problematic reproductive health situation.

SBA Skilled birth attendant refers to a health care provider with midwifery skills who can manage normal deliveries and diagnose, treat, or refer complications, but does not include trained or untrained traditional birth attendants.[11] Although this indicator provides information on delivery care, it does not capture information on the location of births (home, facility), the skill of the provider, or the frequency of complications and referral to higher-level facilities. The UNHCR minimum standard of deliveries attended by a skilled birth attendant is 50%.

Every country met or exceeded the standard set by the UNHCR with the exception of Bangladesh in 2008. In Africa, six of the nine countries reported positive trends between 2008 and 2009, most notably Cameroon, which increased from 76.6% (95% CI; 69.9, 83.3) to 98.3% in 2009 and Kenya, which increased from 55.0% of births in 2008 (95% CI; 54.0, 56.1) to 84.3% in 2009 (95% CI: 83.5, 85.1). Tanzania and Uganda both recorded decreases in the proportions of births delivered by skilled birth attendants; Tanzania decreased from 95.9% in 2008 (95% CI: 95.4, 96.3) to 86.9% in 2009 (95% CI: 86.0, 87.9)

while Uganda decreased from 61.7% in 2008 (95% CI: 60.3, 63.2) to 56.4% in 2009 (95% CI: 54.8, 58.0), the lowest value among African camps in 2009. Burundi reported values exceeding 100% in both 2008 and 2009 and it is therefore difficult to assess trends across time. In Asia, both Bangladesh and Thailand recorded gains; in Bangladesh from 10.2% (95% CI: 8.5, 11.8) in 2008 to 54.3% (95% CI: 51.3, 57.2) in 2009 and in Thailand from 93.7% (95% CI: 93.0, 94.5) to 94.1% (95% CI: 93.4, 94.8) in 2009. Nepal reported 100% of births delivered by a skilled birth attendant in both 2008 and 2009.

In four of nine countries in Africa, Burundi, Cameroon, Ethiopia, and Rwanda, all camps meet or exceed the 50% standard in both 2008 and 2009. In 2008, three of four camps in Kenya met or exceeded the standard and all four camps did in 2009. Conversely, in Tanzania, all camps met or exceeded 50% of births attended by a skilled attendant in 2008 but one of three did not in 2009. Chad, Sudan, and Uganda did not have all camps meet or exceed the standard in either 2008 or 2009, although in all three countries, over half the camps exceeded the standard each year. In Asia, all camps were able to meet or exceed the standard in all countries and across both years except for the two camps in Bangladesh in 2008.

The percentage of births attended by a skilled birth attendant was higher among refugees than among host country populations in all countries and across all years except for Bangladesh in 2008. Again, this is likely due to increased access to care compared to host populations, due to both an increased concentration of populations around health facilities and an increased concentration of health services due to nongovernmental organizations. Interestingly, however a higher proportion of births were delivered in health facilities than were delivered by a skilled birth attendant in several countries. This was the case in Chad, Rwanda, Tanzania, and Uganda in both 2008 and 2009 and in Kenya in 2008. The largest differences were in Chad, where in 2008 approximately 91.9% of births were reported to have been delivered in a health facility but only 64.1% were delivered by a skilled birth attendant. These numbers were 96.9% and 66.0%, respectively, for 2009. Although part of the explanation for these discrepancies may be due to slightly different counts and denominators—the proportion of births in a health facility includes both live births and stillbirths while the proportion of births attended by a skilled birth attendant includes only live births—this is unlikely to account for such large differences.

This raises a question of either misreporting, either of attendant skill, location of births, or both, or the skill level of birth attendant available in health facilities. If the majority of health facilities are not staffed by a skilled birth attendant, this calls into serious question the quality of services available and the utility of the health facility indicator as a measure of availability of safe motherhood services.

Additionally, while previous studies have linked ANC care with higher use of skilled assistance during delivery, there were mixed results in this data. For example, in some countries, such as Uganda and Chad, the proportion of women making four or more ANC visits was higher than proportion of women using SBA (in Uganda, 84 and 58% of women got four ANC visits and 62 and 56% had SBA in 2008 and 2009, respectively; in Chad 77 and 76% had four ANC visits and 64 and 66% had SBA in 2008 and 2009 respectively). Conversely, in some countries SBA use was much higher than ANC use. When aggregated to the country level, 48% of women in Burundi camps in both 2008 and 2009 made four ANC visits, but over 100% of women were reported to have had a skilled attendant at birth in both years. In Rwanda, 4% of women in 2008 and 18% of women in 2009 were reported to make four ANC visits, but 79 and 86% were reported to have a skilled attendant at birth in 2008 and 2009, respectively.

Health Facility Evidence has demonstrated that the best way to lower maternal mortality is to increase the proportion of births delivered in a health center by skilled health personnel, preferably by midwives.[14]

According to our analysis, all countries with the exception of Sudan in both 2008 and 2009 and Bangladesh in 2008, had a percentage of births in a health facility over 50% at the country level, with the majority of countries exceeding 90%. In Africa, Sudan recorded the lowest levels of deliveries in a health facility in 2008 (41.8%, 95% CI; 39.8, 43.8) and in 2009 (45.1%, 95% CI; 43.0, 47.2). Seven of the nine African countries improved their coverage between 2008 and 2009, most notably Cameroon which improved from 67.9% (95% CI; 60.0, 75.3) of births in 2008 to 90.4% (95% CI: 85.1, 95.8) in 2009 and Kenya which improved from 59.5% (95% CI: 58.5, 60.6) in 2008 to 80.3% (95% CI: 79.5, 81.1) in 2009. Of the two countries that reported declines, neither Burundi nor Rwanda dropped below 90% coverage. In Asia, Nepal maintained levels of approximately

100% of births in health facilities in 2008 and 2009, while Thailand reported approximately constant levels of 88% in both years (88.8, 95% CI 87.9, 89.7 and 88.3, 95% CI: 87.4, 89.2). Bangladesh had the greatest increase in percentage of births born in a health facility among all countries, increasing from 9.9% (95% CI: 8.3, 11.5) in 2008 to 52.5 % (95% CI: 49.6, 55.5) in 2009.

At the camp level, almost all camps across all countries met or exceeded the UNHCR standard for 50% of deliveries in a health facility. The exceptions to this in Africa are Kenya in 2008, with one camp of 4 not meeting the standard, Sudan in both 2008 and 2009, with six of eight not meeting the standard in 2008 and seven of eight not meeting the standard in 2009, and Uganda in 2008 and 2009, with two of eleven and one of ten camps not meeting the standard in each year, respectively. In Asia, only Bangladesh in 2008 did not have all camps meet or exceed the standard; in 2008, neither of the two camps achieved 50% of births in a health facility. However, in 2009, bother camps met or exceeded the standard. All other camps in Asia met or exceeded the standard in both years.

The percentage of deliveries in a health facility met or exceeded the standard of 50% across almost all camps and countries for 2008 and 2009. Percentages were consistently higher in camps than among the host country populations. In fact, in only one instance, Bangladesh in 2008, was the aggregated country percentage lower than the host population percentage (9.9% and 16.0%, respectively). Although service availability statistics were not combined with this analysis and thus we cannot make a definitive argument, it is likely that these numbers are so much higher among refugee populations than among host populations because of access to health facilities and availability of services. McGinn found a similar relationship of higher EmOC rates among refugees in her review of reproductive health services; refugees had greater access to emergency services compared to host populations and transportation to facilities was often facilitated by nongovernmental organizations working in the camps.[17]

LBW Low birth weight is a major risk factor for neonatal mortality. It has been estimated that between 60-80% of neonatal deaths occur among low birth weight infants.[15] About 15% of babies born each year are born weighing less than 2500g, and half of these are in South Asia.[15]

The proportion of newborns that were low birth weight (LBW) (under 2500g) was lower in camps compared to host countries except Thailand where 9.7% (95% CI: 8.8, 10.6) of newborns were low birth weight in 2008 and 10.8% (95% CI: 9.9, 11.7) in 2009, compared to Thailand's national average of 9%. The Thailand camp LBW rates were more similar to Myanmar whose national LBW is 15%. Compared to countries-of-origin, camp LBW was lower for every country. The results reflect a larger proportion of LBW infants in Asia compared to Africa, which is consistent with the literature. In Bangladesh in 2008 the proportion LBW was 6.6% (95% CI: 5.2, 7.9) and in 2009 9.5% (95% CI: 7.8, 11.3) and in Nepal the proportion LBW was 6.9% (95% CI: 5.7, 8.2) and 7.1% (95% CI: 5.9, 8.3) in 2008 and 2009, respectively. In Africa the country with the highest proportion LBW was Tanzania which was 6.3% (95% CI: 5.7, 6.8) and 6.2% (95% CI: 5.5, 6.9) in 2008 and 2009. Rwanda in 2009, Sudan in 2009, Burundi in 2008 and Cameroon in 2008 reported less than 1% for proportion LBW.

The UNHCR standard for proportion LBW is less than 15%. Camp data aggregated to the country level showed that all countries had LBW well under 15%. Although at the country level, Asia had higher proportions of LBW, out of the four camps reporting that the proportion of deliveries of LBW infants was over 15%, three were in Africa and one was in Asia: Dosseye camp in Chad in 2008 (22.5%), Fau 5 camp in Sudan in 2008 (23.8%), Imvepi camp in Uganda in 2009 (45.5%), and Mae La camp in Thailand in 2009 (15.4%).

From 2008 to 2009, LBW increased in Burundi (0.7% (95% CI: 0.1, 1.3) to 3.5% (95% CI: 2.2, 4.8), Bangladesh (6.6% (95% CI: 5.2, 7.9) to 9.5% (95% CI: 7.8, 11.3) and Thailand (9.7% (95% CI: 8.8, 10.6) to 10.8% (95% CI: 9.9, 11.7), but decreased in all other countries. At the camp level, in Asia from 2008 to 2009, the reported proportion LBW increased in 12 countries and decreased in 6. At the camp level in Africa from 2008 to 2009, the reported proportion LBW increased in 20 camps and decreased in 29 camps and stayed the same in one. Overall, Asia had higher proportion LBW than Africa and camps in Asia were more likely to report an increase in proportion LBW than camps in Africa.

The decrease in LBW in the majority of African camps could be due to a variety of factors. A study of Bhutanese refugees in Nepal found a decrease in LBW rates and attributed it to increased quantity and micronutrient content of food as well as water and

sanitation, antenatal care and education.[18] In this data, there did not appear to be a correlation between increased ANC and decreased LBW from 2008 to 2009.

It is possible that some of the increases or decreases or general differences are artificial due to underreporting or measurement issues because 12 camps in Africa reported zero for this indicator, whereas no camps in Asia reported zeros for this indicator.

C-Section Caesarian sections are used to treat major obstetrical emergencies such as placenta previa, obstructed labor, and placental abruption. At the population level, in areas with low caesarian section rates, the rate may reflect the extent to which women are able to access emergency obstetric care.[11] As caesarian sections rates rise, they may no longer be an accurate representation of access to EmOC since more operations will be done without maternal indication. The UNHCR standard is between 5% and 15%, representing insufficient access to emergency services at the low level and unnecessary procedures at the highest level.

In 2008, the percentage of births delivered by C-section in all African countries except Burundi was below the 5% standard. Burundi had the highest percent of births delivered by c-sections at 5.9% (95% CI; 4.9,7.6) while Cameroon reported no c-sections and Sudan, Ethiopia, and Chad all reported that fewer than 1% of live births were delivered by C-section. Percentages rose in all countries between 2008 and 2009, with Tanzania having the highest percentage, 9.6% (95% CI; 8.7, 10.4). Burundi, Rwanda, and Tanzania all had rates between 5 and 15%, while Kenya and Uganda approached 5%. Ethiopia was the only African country in 2009 to have fewer than 1% of births delivered by C-section. In Asia, Nepal had the highest rates of C-sections, recording 14.4% of live births (95% CI: 12.7, 16.0) in 2008 and 15.1% (95% CI: 13.4, 16.8) of live births in 2009. Thailand had approximately the same rate between 2008 and 2009, increasing slightly from 4.2 (95% CI: 3.6, 4.8) to 4.7 (95% CI: 4.0, 5.3). Bangladesh reported the lowest rates of c-section in both years in Asia, rising from 0.1% (95% CI: -0.1, 0.2) of births in 2008 to 1.7% (95% CI: 1.0, 2.5) in 2009.

Few countries reported that all of its camps fell within the 5-15% range in either 2008 or 2009. In 2008, no countries in Africa had 100% of camps meet the standard and Chad, Cameroon, Ethiopia, Kenya, Sudan and Uganda reported that no camps met the

standard. In 2009, only Cameroon and Ethiopia reported that no camps met the standard. Burundi, Rwanda, and Tanzania all had 100% of camps meet the standard in 2009. In Asia, Bangladesh had no camps meet the standard for C-section rates in either 2008 or 2009, all camps in Nepal met the standard both years, and in Thailand, four of nine camps met the standard each year.

Overall, there is a positive trend toward meeting the standard of C-section rates, a proxy for availability of EmOC. However, some countries, namely Bangladesh and Ethiopia had consistently low rates which may signify a lack of available and timely emergency services. In the case of Bangladesh, this may be partly explained by a relatively high rate of home deliveries; however, Ethiopia recorded that over 90% of births were delivered in a health facility in 2008 and 2009. These high rates of facility delivery coupled with low rates of c-section raise questions about the quality of birthing facilities available to Ethiopian women. Comparison of the percentages of births delivered by caesarean section in camps versus host country and country-of-origin were very mixed. In four countries, camp percents were lower than host country percents. In four countries, at least one year of camp percentages was higher than host country percentages. In three countries, there were no data for host country comparison. Similarly compared to country-of-origin, the percent of live births delivered by c-section was higher in six countries compared to individual countries-of-origin and lower in five countries compared to individual countries-of-origin.

D. CONCLUSIONS

In the introduction to the HIS Annual Factsheets 2008, UNHCR offered this disclaimer:

> *Whilst all efforts are made to ensure data quality, this data is subject to three known limitations:*
> 1. *All the figures presented are crude indicators. They have not yet been corrected to replace missing data or to account for known biases.*
> 2. *Health-facility based data have potentially limited coverage, as they exclude those who are unable to reach health services.*
> 3. *The accurate estimation of population figures in refugee settings can be difficult. Challenges include:*

- *Rapid in and out-migration (e.g. influx following recent displacement, outflux during repatriation or resettlement).*
- *Presence of non-registered refugees in a camp who are not recorded in UNHCR population figures but are entitled to receive health care.*
- *Difficulties distinguishing between nationals and refugees at the point when beneficiaries access health services.*

Despite these cautions and caveats, UNHCR suggested that "assuming that they are subject to a systematic bias, the monitoring of trends in these values can still be useful." This is a strong assumption, as bias can enter in many ways systematic and otherwise. Wary of these limitations and the difficulty of drawing too many conclusions due to incompleteness of reporting, there are some observable trends:

- For 5 out of 9 reproductive health indicators, a majority of camps in the 12 represented countries achieved the UN standards. Scoring a perfect 100% was Infant Mortality Rate <60 per 1000 live births, though, for reasons mentioned previously, many camp rates seem implausibly low. More than 97% of camps in both years achieved a standard of LBW<15%. The standards of SBA≥50% and Health Facility≥50% were also met by more than 80% of camps in both years.
- The two ANC indicators (ANC4+=100% and Tetanus2+=100% were met by fewer than one-third of camps (though many achieved a coverage rate of 90% or more). Though a standard of 100% is certainly ambitious, improvement of results for these two indicators should be a focus for the future, particularly in the African countries.
- A standard of C-sections between 5-15% was also met in a minority of camps, though there was substantial improvement from 22.2% in 2008 (95% CI: 12.6, 31.8) to 40.0% in 2009 (95% CI: 28.5, 51.5).
- Overall, it would be appear that there are at least modest improvements in reproductive health indicators from 2008 to 2009. As mentioned previously, IMR declined in more camps than it increased. Likewise, in 36 of 68 camps for which there were two years of measurement, the crude birth rate declined (though it increased in 32 camps). C-section rates did increase markedly from 2008 to 2009, suggesting improvement in availability of/access to emergency obstetric care.

In 2000, McGinn reviewed the literature on reproductive health among displaced and war-affected populations, examining the data on fertility and family planning, safe motherhood, sexually transmitted diseases, and gender-based violence.[17] The literature suggested that "no common fertility pattern emerges among refugees," though a 1998 UNHCR review of reproductive health data from 8 refugee settings revealed that, in 7 of the 8 sites, birthrates in camps were lower than those in both home and host countries, although it was noted that "inaccuracies in population size estimates or in health reporting systems may have affected the precision of the compiled data."[20]

In terms of safe motherhood, McGinn commented that "the general assumption that refugee status worsens the risks and outcomes of pregnancy may not be supported by the available data:" the 1998 study found a wide range of low birthweight (from 3% in Uganda to 22% in Tanzania) but, except for Tanzania, low birthweight rates were lower in camps than in home or host countries. Similarly, neonatal mortality rates and maternal mortality ratios were lower than in home or host countries and antenatal care coverage was higher than the World Health Organization estimate of 68% worldwide.[17]

A retrospective review of reproductive health indicator data from 52 post-emergency phase camps in 7 countries during the period August 1998 to March 2000 found a more heterogenous set of outcomes relative to home and host countries, though in the majority of camps, CBR, NNMR, MMR, and LBW were lower in the camps than in countries of origin and in host countries.[21]

Results from this analysis of reproductive health indicators continues to support the general view that vital rates like crude birth rate, infant mortality rate and maternal mortality rate are lower in refugee camps than in countries of origin and in host countries. We would repeat McGinn's caution, however, that inaccuracies in population size estimates or in health reporting systems can affect data precision and also emphasize that vital rates are also subject both to wider variation in smaller populations (like refugee camps) but also to sensitive to age composition. It is for these reasons that we would place greater confidence in service coverage data such as are provided by the antenatal and delivery care indicators.

There are some indicators left out of this analysis—including family planning (contraceptive prevalence rates) and gender-based violence—the former due to questions

about how the rates were calculated and the latter due to the paucity of events included and the possibility of under-counting. By leaving them out, we do not wish to suggest that these indicators are in any way less important than those included. Reproductive health has moved well beyond the old notions that women were only of concern when they were having (or preventing having) babies to include a broad range of issues affecting sexual and reproductive health. This analysis suggests that most refugee camps, at least in the post-emergency phase as most of those in the HIS represent, are meeting most of the standards for adequate reproductive health care, though concerns remain about both underperformance and under-measurement, particularly of infant and maternal mortality.

Endnotes

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Tables and Graphs