Interpreting and using mortality data in humanitarian emergencies

Francesco Checchi, Les Roberts
ODI, 22 November 2005

Rationale

- Mortality data increasingly queried in emergencies and conflict settings
- End users are not epidemiologists
- High potential for incorrect interpretation or manipulation
- Proper interpretation and use can save lives

Contents of paper

- Explanation of mortality indicators and terminology
- Applications of mortality data
- Methods (surveys and surveillance)
- Interpretation
  - Evaluating a mortality report
  - Working with bias and imprecision
- Political implications

Potential uses of mortality data

- Quantify magnitude of crisis
- Monitor effectiveness of relief
- Advocate for action (by describing impact on health)

What is a mortality rate?

- How frequently are deaths occurring in a given population over a given period?

$$\text{Crude Mortality Rate} = \frac{\text{deaths during the period}}{\text{(population present during period x time in the period)}}$$

- Unit: per n persons per unit time
  - Emergencies: deaths per 10 000 per day
  - Alternatives: deaths/1000/month, deaths/1000/year

Emergency thresholds

- "Non-crisis" CMR in Sub-Saharan Africa: 0.3 to 0.6 per 10 000 per day (Sphere: 0.44), approximately double for U5MR

- **Fixed thresholds**: CMR 1 per 10 000 per day, U5MR 2 per 10 000 per day

- **Context-specific thresholds** (Sphere, 2004): doubling from pre-crisis values
  - SSA: CMR 0.9, U5MR 2.3
  - Latin America: CMR 0.3, U5MR 0.4

- Everyone agrees CMR should rapidly fall below 1!

Which thresholds should we use?

Fixed (1 per 10 000 per day everywhere)

- Based on old estimates of non-crisis MR
- If pre-crisis MR is <0.5, threshold is insensitive to spikes
- If acute increase when MR is already >1, no further trigger for action

Context-specific (doubling of pre-crisis MR)

- Pre-crisis MRs very often unknown (when did crisis begin anyway?)
- Inequitable response: more people have to die before an emergency is declared in a setting of high pre-crisis MR (ex. Burundi) than in one of low pre-crisis MR (ex. Eastern Europe)

CMR versus excess death tolls

Context (year)	CMR (deaths per 10,000 per day)
Famine-affected communities in Baidoa, Somalia (1992)	16.8
Malnutrition and diarrhoeal disease epidemics among Rwandan Hutu refugees in Goma area, Zaire (1994)	34.1 to 54.5
Population under armed siege in Tubmanburg, Liberia (1996)	14.3
Famine and conflict-affected populations in Bahr el Ghazal, southern Sudan (1998)	9.2 to 26.1
Famine in Gode, Ethiopia (2000)	3.2
Famine and repeated displacement, Angolan IDPs in UNITA areas (2002)	2.3 to 3.6
Armed attacks against civilians in West Darfur, Sudan (2003–2004)	5.9 to 9.5

Iraqi Kurds (CDC, 1991):

- CMR peak 10.4
- 3 months, population 400,000
- 6,200 excess deaths

DRC (IRC, 2004):

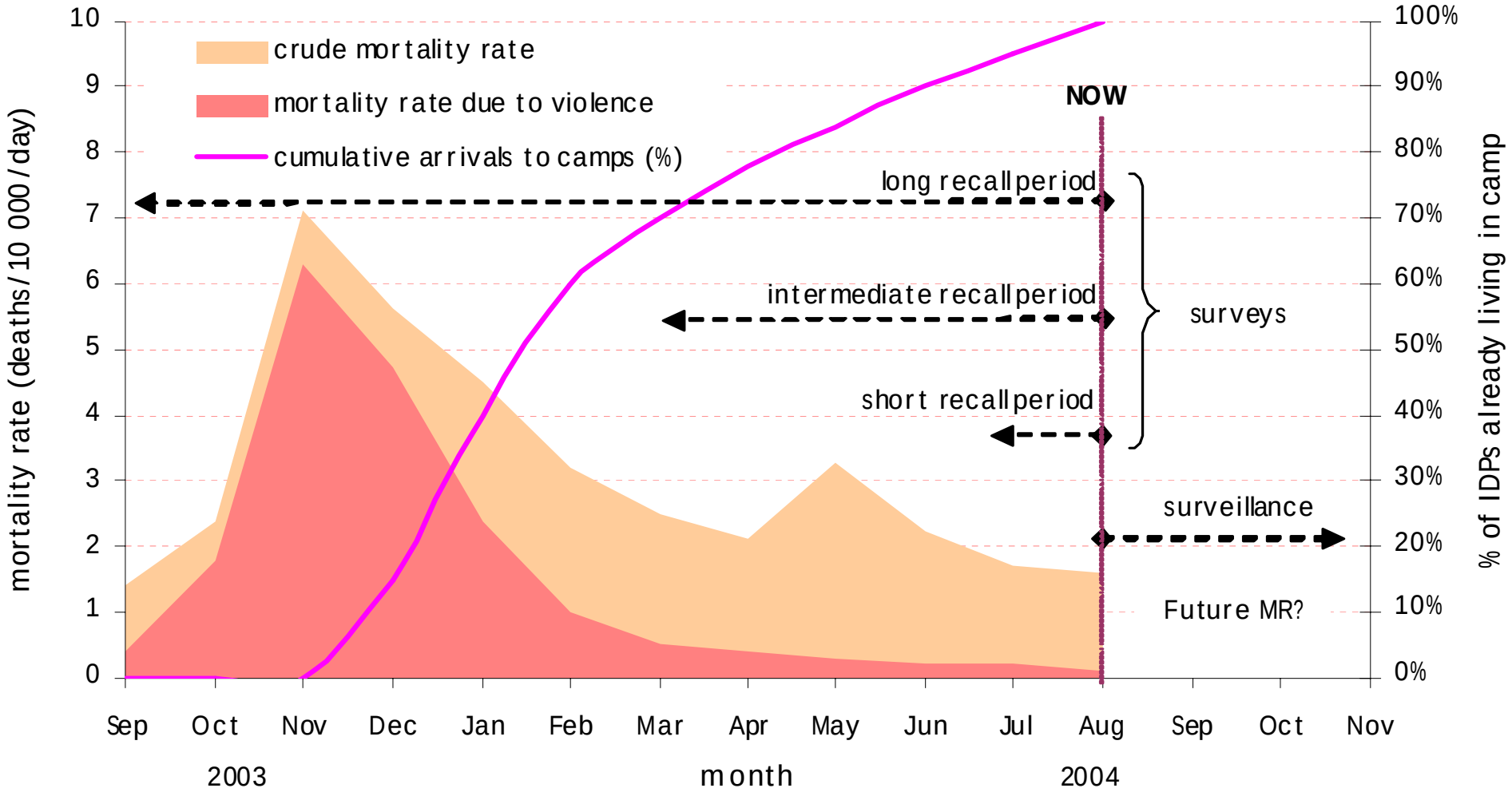
- CMR 0.7
- 16 months, population 64 million
- 500,000 excess deaths (3.8m since 1998)

Challenges of mortality surveys

- Recall period
- Representative sampling
- Questionnaire
- Bias (non-sampling error)
- Imprecision (sampling error)

- Surveys mostly done in insecure, unstable settings

What period should we investigate?



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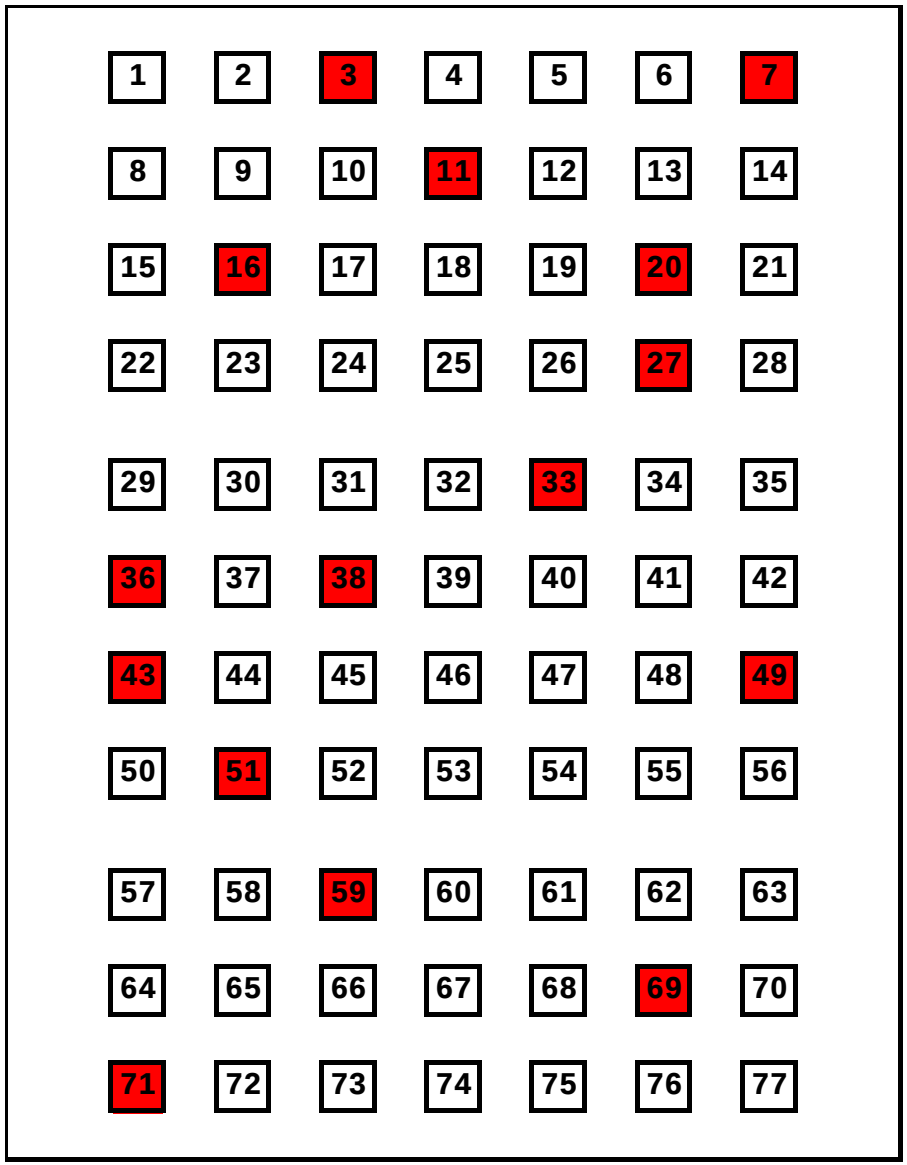
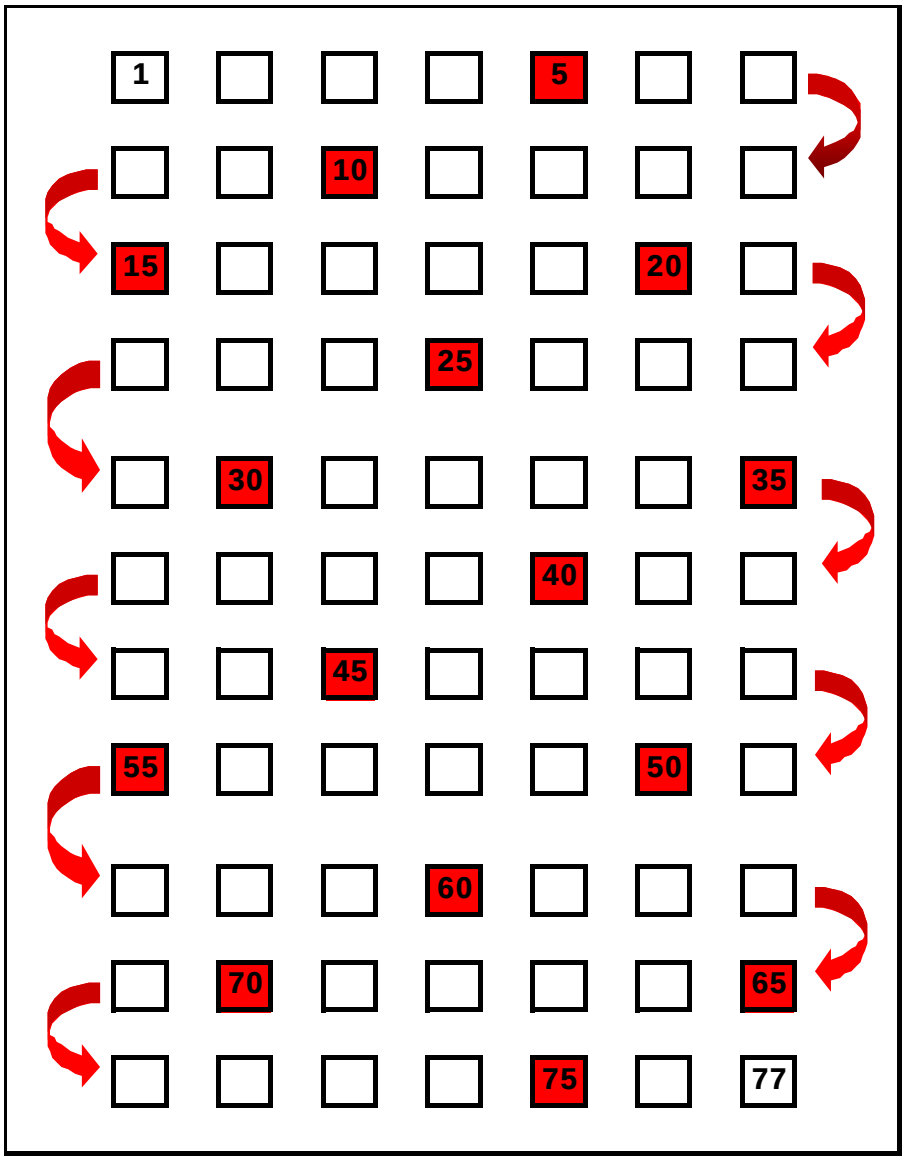
How should we select our sample?

Simple random sampling



Systematic random sampling



Cluster sampling

Challenges of mortality surveys

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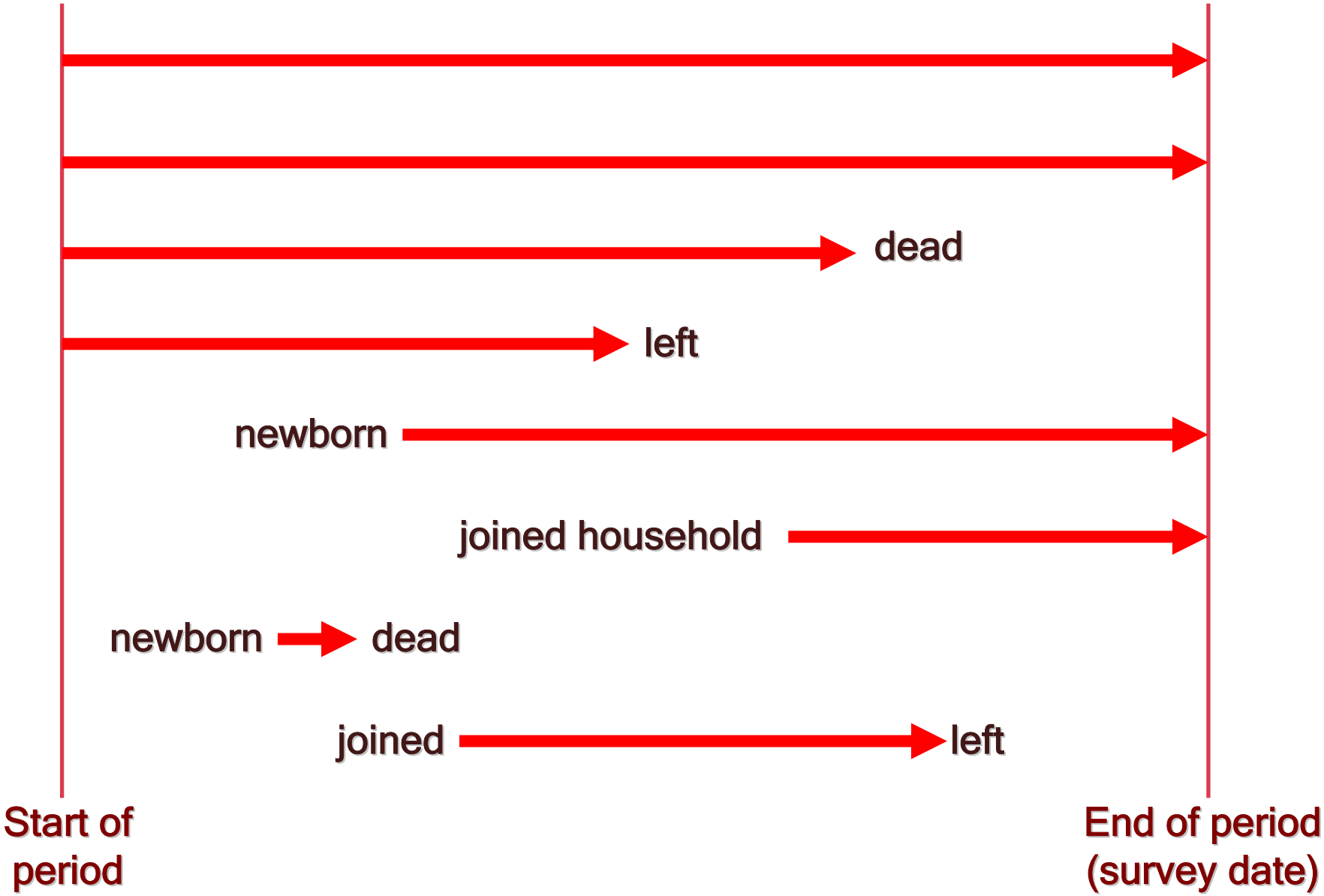
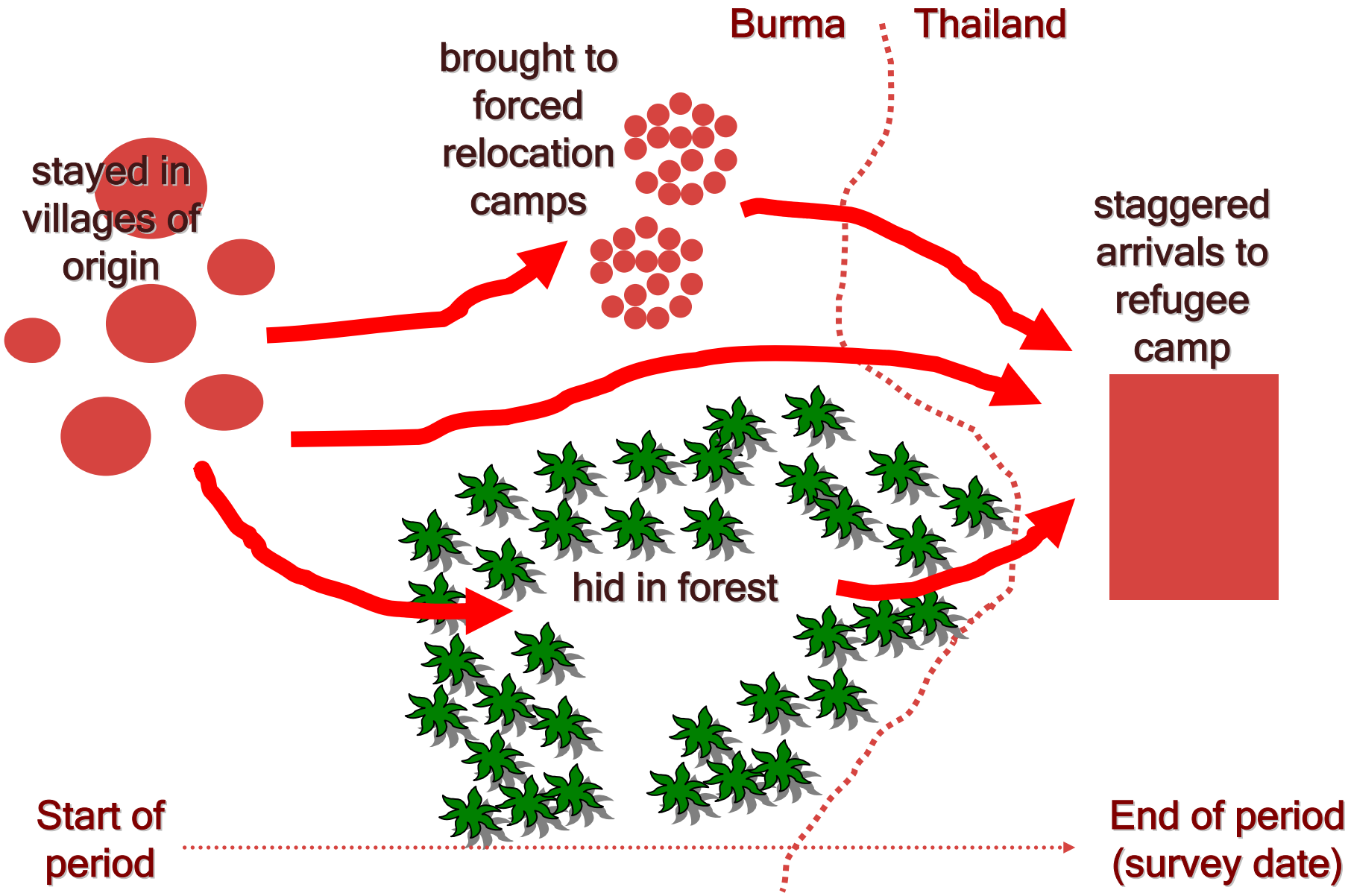
How to structure the questionnaire?



Population movements and separations

(Checchi et al., Lancet 2003)



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Most important sources of bias

- Selection biases
  - Some camps not surveyed because of insecurity
  - Abandoned shelters: has household extinguished itself?
- Response biases
  - Involuntary: people forget exact month of events
  - Voluntary: household sizes are inflated, deaths are hidden

Challenges of mortality surveys

- Recall period
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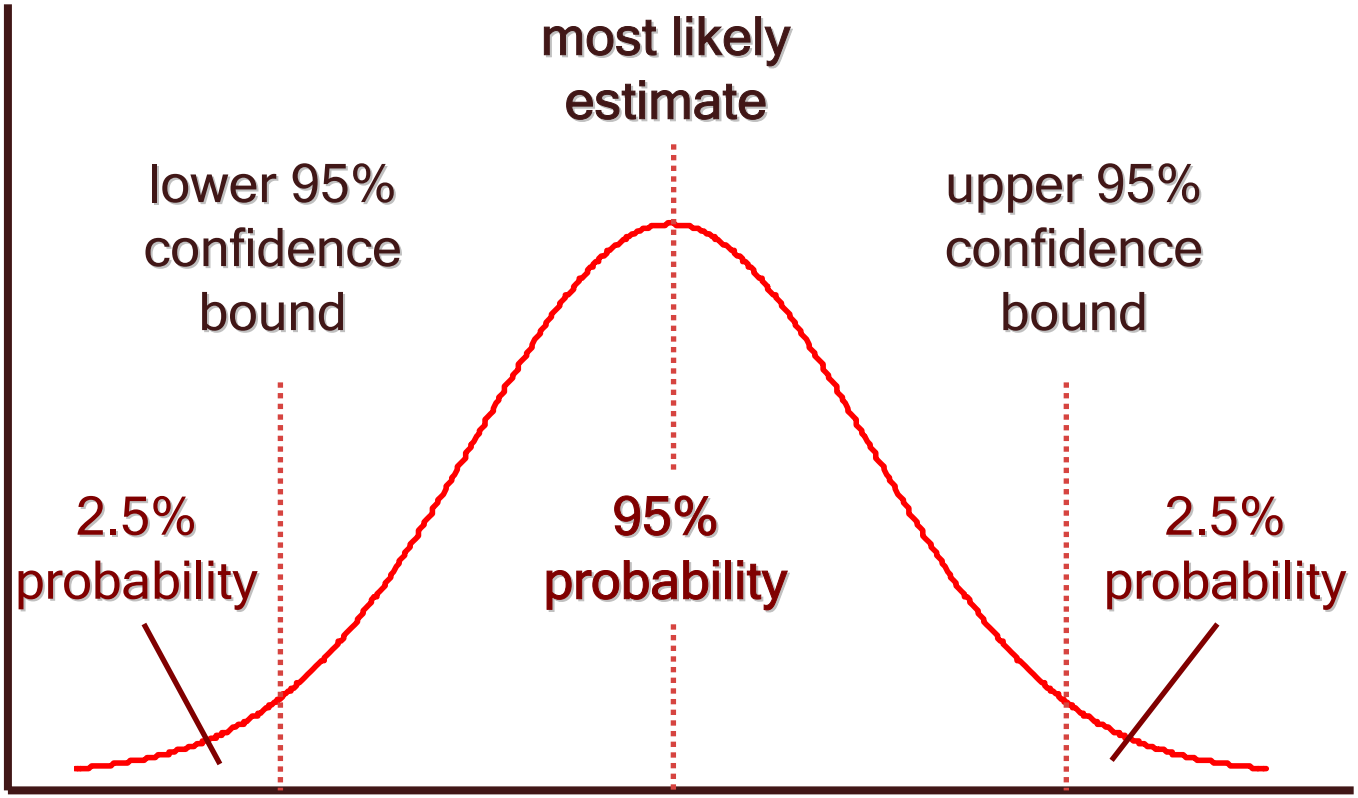
Imprecision: confidence intervals

(Roberts et al., Lancet 2004)



Post-invasion deaths/1000/year	5.6	7.9	10.2
excess mortality	8000	98 000	194 000

- "This isn't an estimate. It's a dart board" (F. Kaplan, Slate, 2004)
- 80%CI: 44 000 to 152 000

What do we do if...

- CMR = 2.3, 95%CI 1.3 to 3.1
- CMR = 1.1, 95%CI 0.6 to 1.6
- CMR = 0.8, 95%CI 0.4 to 1.3

Bias versus imprecision

A survey can be…

- Very precise but also very biased
- Relatively bias-free but far too imprecise

Challenges of mortality surveys

- Recall period
- Representative sampling
- Questionnaire
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Prospective surveillance

What is the policy impact?

- Iraq (2003-present)
  - Lancet and other “high” estimates sidelined
  - no apparent change in Coalition tactics
  - no improvement in civilian protection
- Darfur (2003-present)
  - significant scaling up of relief
  - very little improvement in protection outside camps
  - intimidation of relief workers
- Democratic Republic of Congo (1998-present)
  - modest increases in aid spending
  - feeble peacekeeping effort
  - almost zero political intervention

Epidemiological testimony

- **Comprehensive:**
  - Biafra, Bangladesh, Somalia
  - DRC (IRC, 1998-2004; Lancet, in press)
  - Kosovo (Spiegel et al., Lancet 2000)
- **Partial view:**
  - Violence in Darfur (Depoortere et al., Lancet 2004; WHO, 2004; Grandesso et al., JAMA 2005; CRED, 2005) – still no good data for South Darfur
- **Small window into an impenetrable crisis:**
  - North Korea (Robinson et al., Lancet 1999)
- **Almost zero epidemiological information:**
  - Sierra Leone, Liberia, Republic of Congo, CAR, Ethiopia-Eritrea
  - Zimbabwe, Chechnya

World Health Organization

War and mortality among internally displaced persons in northern Uganda: a stratified cluster survey

July 2005

unicef

WFP United Nations World Food Programme

UNFPA

IRC International Rescue Committee

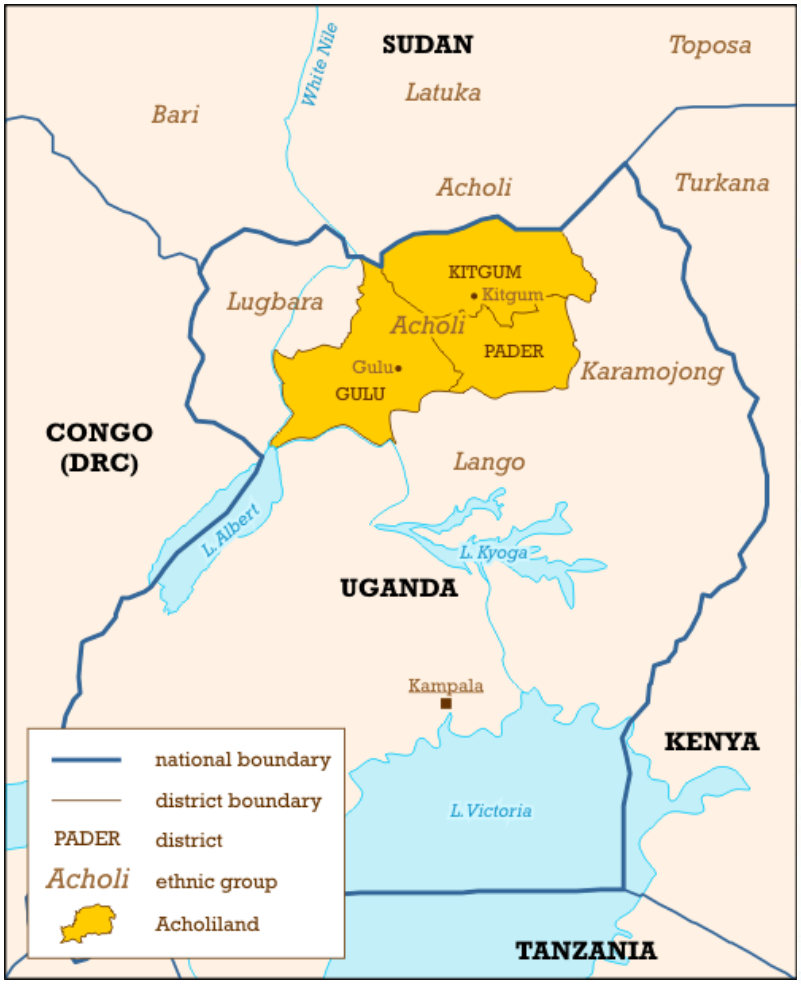
Background

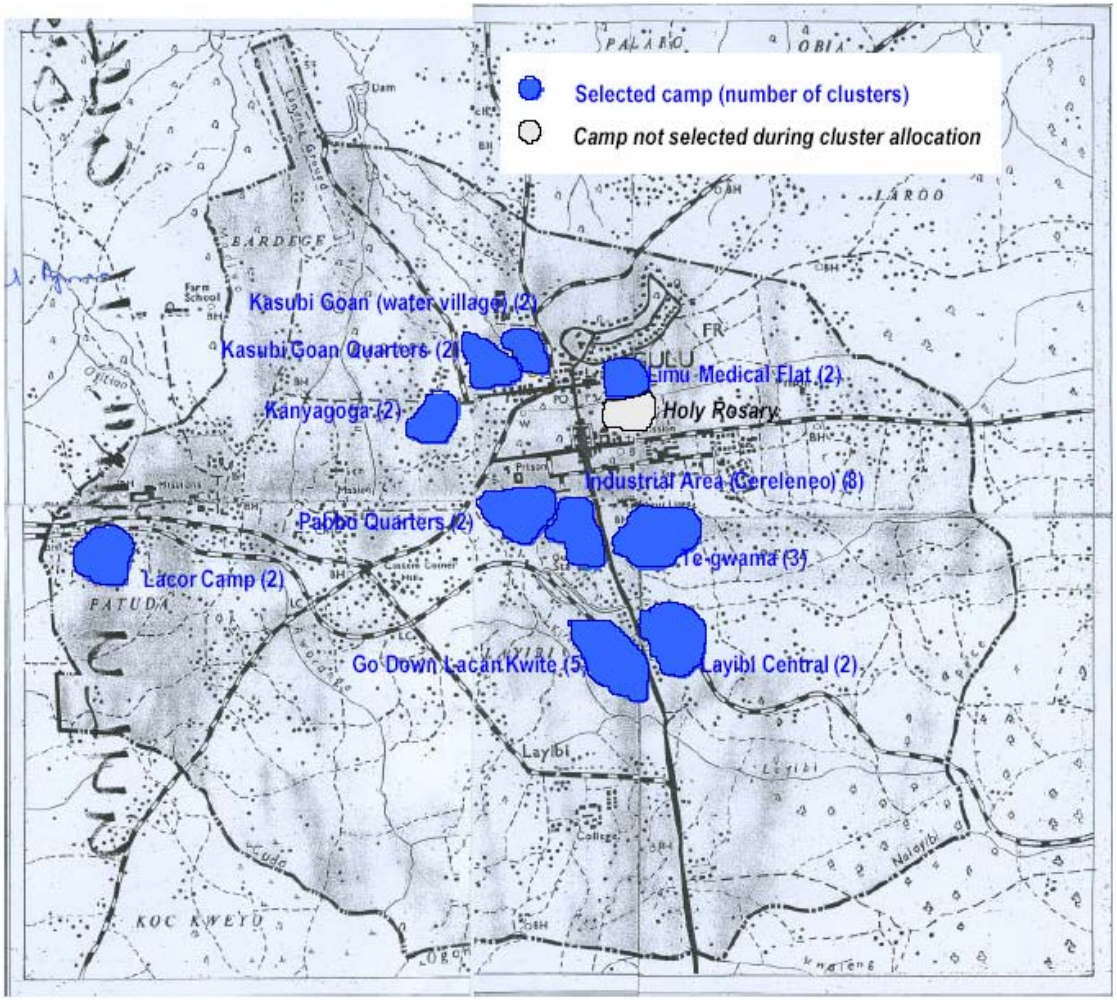
- Present phase of conflict in Acholi sub-region of northern Uganda since 1989
- Lord's Resistance Army rebellion
  - led by spirit medium (Joseph Kony)
  - unclear goals (Ten Commandments?)
  - supplied by Sudanese army
- Direct and indirect death toll unknown
  - 26 000 children abducted?
- Since 2002: UPDF Operation Iron Fist, greatly increased LRA attacks
- UN Consolidated Appeal 2005 46% funded (mid-year)

Acholi IDP camps

- 114 camps in Gulu, Kitgum and Pader districts
- Camp registration needed for humanitarian aid
- Camp population in range 400 to 57 000 (WFP, 2005)
  - No census
  - Malfunctioning vital registries
- Limited movement, curfews from 4 pm to 9-10 am
- Decongestion process

Four survey strata





- Gulu district (pop. 462 580)
- Gulu municipality (99 535)
- Kitgum district (310 111)
- Pader district (319 506)

Findings versus targets

Indicator	Acholi IDPs, July 2005	Target/standard (proponent)
CMR	1.54/10 000/day	<1.00 (Sphere, UNHCR, MSF, academia)
HBMF coverage	19.8%	Majority (MoH, UNICEF)
Measles vaccination coverage	max. 91.7%	100% (Sphere) >95% (MSF)
U5 Bednet coverage	28.0%	>60% (Roll Back Malaria)
Water quantity	10.3 L/p/day	≥ 15 L (Sphere)
Water queuing time	2.7 hours	<15 min (Sphere)
Latrine coverage	12 (Gulu) to 80 (Pader) persons per latrine	<20 (Sphere)

Mortality rates

	Deaths (n)	Person-time (days)	CMR (deaths/10 000 persons/day)	95% CI
Gulu District	154	1 263 753	**1.22**	1.00-1.44
Gulu Municipality	178	1 383 006	**1.29**	1.04-1.53
Kitgum District	239	1 249 563	**1.91**	1.45-2.37
Pader District	246	1 321 966	**1.86**	1.53-2.19
Acholi region total	817	5 218 288	**1.54**	1.38-1.71

	under 5 deaths (n)	under 5 person-time (days)	U5MR (deaths/10 000 children under 5 years/day)	95% CI
Gulu District	61	264 032	**2.31**	1.76-2.86
Gulu Municipality	63	253 484	**2.49**	1.79-3.18
Kitgum District	99	245 089	**4.04**	3.17-4.91
Pader District	111	261 741	**4.24**	3.40-5.08
Acholi region total	334	1 024 346	**3.18**	2.81-3.56

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Estimate of excess mortality

- **Assumption**: non-crisis CMR 0.44/10 000/day
- Period: January to July 2005

	excess CMR (95% CI)	**estimated IDP population** (n)	**average recall period** (days)	**excess deaths** (95% CI)
Gulu District	0.78 (0.56-1.00)	462 580	188	**6783** (4870-8697)
Gulu Municipality	0.85 (0.60-1.09)	99 535	197	**1667** (1177-2137)
Kitgum District	1.47 (1.01-1.93)	310 111	196	**8935** (6139-11 731)
Pader District	1.42 (1.09-1.75)	319 506	201	**9119** (7000-11 239)
Acholi region total	1.10 (0.94-1.27)	1 191 732	196	**25 694** (21 956-29 665)

- Under 5 excess deaths: **10 054** (95%CI 8231-11 927)

Excess mortality: alternatives

- Assuming CMR 0.46 (Uganda non-crisis areas, DHS 2001):

  25 227 excess deaths (95%CI 21 489 to 29 197)

- Assuming CMR from min. 0.24 to max. 0.73 (districts neighbouring Acholi and no longer insecure; ACF, MSF-H, CNC 2005):

  from 15 183 to 34 336 excess deaths

- Poisson regression?

Violence and abduction

- **Violent deaths:**
  - 70.1% (54/77) males 15 years or above, 13.0% (10/77) among females, 16.9% (13/77) among children under 15 years
  - 68.8% (53/77) outside camps and 93.5% (72/77) outside health facilities
  - Rate: 0.17 persons per 10 000 per day (95% CI 0.12 to 0.21)

  Estimate: **3971(95%CI 2803-4905) killed** (January-July 2005)

  Passive media surveillance: 1450 killed in same period (K. Madit, 2005)

- **Abductions:**
  - 71.4% (20/28) outside camps, 57.1% (16/28) in Pader
  - All below 35 years, 46.4% (13/28) below 15 years
  - Rate: 0.05 per 10 000 per day (95% CI 0.03 to 0.08)

  Estimate: **1168 (95%CI 701-1869) abducted** and not returned

Daily Monitor, 5 September 2005

Govt contests report on IDP deaths

ALEX B GITA
& IZAMA ANGELO
KAMPALA

THE government is contesting a United Nations report, which revealed that up to 1,000 people die every week from disease and hunger in camps for the internally displaced people in conflict-hit north.

The Health and Mortality Survey, as the report is called, was compiled by the World Health Organisation (WHO), the UN Children's Fund (Unicef), World Food Programme (WFP), UN Population Fund (UNFPA), the International Rescue Committee as well as the UK Department for International Development (DFID).

The Minister of State for Northern Uganda Reconstruction, Ms Grace Akello, told *Daily Monitor* on Friday, the survey did not represent the whole of northern Uganda.

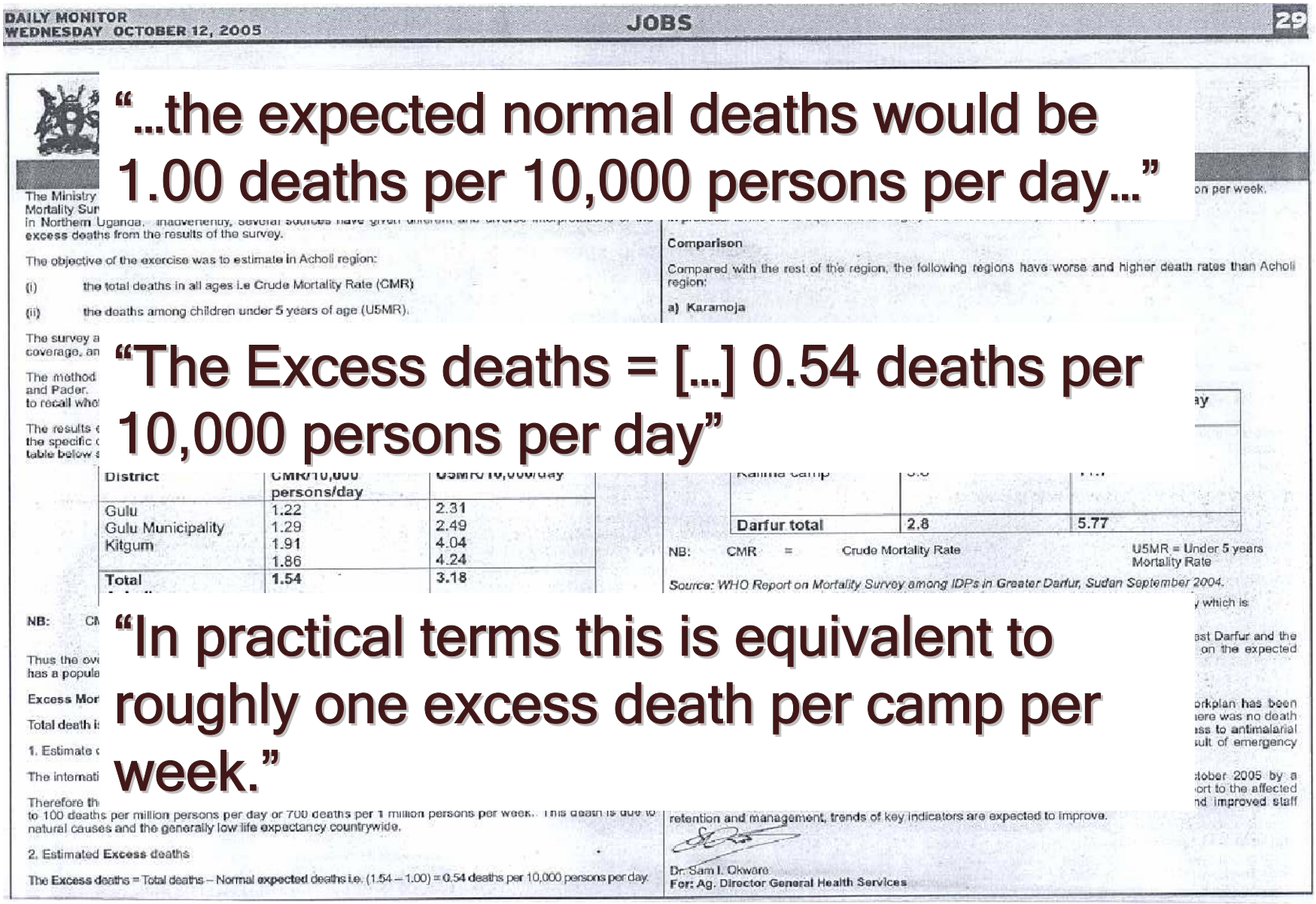
"They carry out surveys in one or two camps and compile reports, I am very uncomfortable with that figure, I want another survey although the Ministry of Health and Acholi local governments seem to have endorsed the report," she said.

The government spokesman and Minister of State for Information, Dr James Nsaba Buturo, called the report an exaggeration.

"It's true we have a problem but not to that level. It is an exaggeration we can't accept. It's not the pandemic it has been painted. They (NGOs) have got to justify the funding they receive from outside, exaggerating simply to sustain funding," he said.

The report is based on a survey of health and mortality in Internally Displaced People's camps of the Acholi sub region (made up of Gulu, Kitgum and Pader districts).

Daily Monitor, 12 October 2005



DAILY MONITOR
WEDNESDAY OCTOBER 12, 2005

JOBS

29

"...the expected normal deaths would be 1.00 deaths per 10,000 persons per day..."

"The Excess deaths = [...] 0.54 deaths per 10,000 persons per day"

"In practical terms this is equivalent to roughly one excess death per camp per week."

The Ministry
Mortality Sur
in Northern Uganda, inadvertently, several sources have given different and diverse interpretations of the excess deaths from the results of the survey.

The objective of the exercise was to estimate in Acholi region:

(i) the total deaths in all ages i.e Crude Mortality Rate (CMR)

(ii) the deaths among children under 5 years of age (U5MR).

The survey a
coverage, an

The method
and Pader.
to recall whe

The results
the specific
table below

District	CMR/10,000 persons/day	U5MR/10,000/day
Gulu	1.22	2.31
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Kitgum	1.91	4.04
	1.86	4.24
Total	1.54	3.18

NB: CM

Thus the ov
has a popula

Excess Mor

Total death i

1. Estimate

The internati

Therefore th
to 100 deaths per million persons per day or 700 deaths per 1 million persons per week. This death is due to natural causes and the generally low life expectancy countrywide.

2. Estimated Excess deaths

The Excess deaths = Total deaths – Normal expected deaths i.e. (1.54 – 1.00) = 0.54 deaths per 10,000 persons per day.

on per week.

Comparison

Compared with the rest of the region, the following regions have worse and higher death rates than Acholi region:

a) Karamoja

Kalma camp	3.6	11.7
Darfur total	2.8	5.77

NB: CMR = Crude Mortality Rate U5MR = Under 5 years Mortality Rate

Source: WHO Report on Mortality Survey among IDPs in Greater Darfur, Sudan September 2004.

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st Darfur and the on the expected

orkplan has been ere was no death ss to antimalarial ult of emergency

tober 2005 by a ort to the affected nd improved staff

retention and management, trends of key indicators are expected to improve.

Dr. Sam I. Okware
For: Ag. Director General Health Services

Chairman of Attiak camp (19 Sep 2005)

OFFICE OF L.C.III CHAIRMAN,
ATTIAK SUB-COUNTY,
GULU.

19/09/2005

The District Director Health Service,
Gulu.

RE: HIGH INCREASE OF DEATH RATES

With effect from the 1st to 15th of September, 2005 a total of 54 cases of death have been recorded from Attiak IDP in the seven Zones. However, the mortality death rate of Children are at 31 and adult at 23.

The following listed factors might have contributed to the high death cases.

01. Lack of qualified doctor(s) to effectively carry out management system in the H/CIV.
02. Understaffing.
03. Constinous absence of Ambulance from the H/CIV.
04. Delay in delivering essential drugs/medicines.
05. Ignorance (delay in taking a Patient to H/CIV).
06. Poverty (Refenal cases, People can't afford taking Patient to a more equiped medical facilities like Lacor, Gulu Hospital, Gulu Independence Hospital.
07. Inadequate food nutrients in the body.
08. Political instability.
09. Intended death.
10. Lack of Health Education to the Public.
11. And so on.

I do therefore, sincerly urged all stakeholders to immediately have a helping hands in rescuing the Plight of the destitute, vulnerable Camp residents.

This information/data was compiled by the zonal and Block Leaders.

Yours Sincerely

ATTIAK SUB-COUNTY

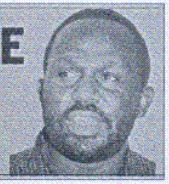
Odong William George
CHAIRMAN ATTIAK

c.c. Population Office.
c.c. DDMC
c.c. L.C.V Gulu
c.c. WHO Gulu
c.c. RDC Gulu
c.c. SDMC.

The Nation (Nairobi, 20 Sep 2005)

Why 2,000 IDP deaths are 'better' than 1,000

EAR TO THE GROUND
CHARLES ONYANGO-OBBO



A report finds that 1,000 people die in the camps for internally displaced persons (IDPs) in northern Uganda. Deputy Premier Moses Ali goes ape, and comes out swinging saying the figure is a fabrication.

Not so quickly, Sir. One way to make sense of the accuracies of these numbers, is to look at what happens in desperate conditions caused by war such as in northern Uganda. We don't have to travel far - evidence is in eastern DR Congo, where Uganda was embroiled as one of the occupying armies backing a myriad of militias in the jungles of the vast central African nation.

Various international human rights groups and the UN estimate that between 1998 and 2003, more than 2.5 million were killed both as a direct and indirect (disease, hunger etc) result of the war.

On average, at least 500,000 people were dying a year. If 1,000 people are dying in northern Uganda, it means just over 4,000 perish a month, and about 50,000 a year.

'Fair' figure

That is much lower than in the five-year period in the Congo. So the northern toll of 1,000 is a fairly "good" figure by the standards of death in African civil wars.

However, conservative estimates have it that 500,000 people could have died in the north in the last 19 years of the war, and a liberal count puts the number at over one million.

Everything remaining constant, at 50,000 deaths a year, it means about 1 million people would have died in the north - a figure that some, as we have just reported, have already offered as the body count for the conflict. It would seem, then, the number of 1,000 deaths has historical data to back its accuracy.

But, ultimately, numbers in the northern conflict have been more than just about figures. According to the government, the LRA has been beaten deep inside the Sudan toward Juba and, UPDF would take only a few minutes to finish off Kony and his forces if Uganda was allowed by Khartoum to pursue them further inland.

If that's the case, why have the squalid IDPs camps not been dismantled? This suggests one of the problems with the revelation that 1,000 people die every week in the camps is the timing. It helps the LRA, because it can only draw questions about why the camps still exist, and puts the deaths squarely on the government's back. It also suggests that the LRA is still a real danger out there.

Otherwise if this was even just five years ago, and the LRA had attacked the camps and killed 250 people and abducted 100, Kampala would have been eager to say the rebels had brutally murdered 600 people and abducted 400 innocent women and children. That would have helped consolidate the image of the LRA as an evil band of killers and abductors, and brought further international condemnation of the rebels. Otherwise, neither the government nor the LRA care about the fate of the IDPs.

Maintaining unity

The point has also been made by northern leaders and others that the northern war has helped NRM maintain "southern" unity around the regime, and the IDP horrors discourage other parts of the country from opposing the government militarily. If they did, the fate of the north would befall them.

I think we might have moved beyond that point. With Uganda opening up to multiparty politics, and with the recent amendment to create a president-for-life, that is no longer tenable. Three realities have been developing in the north in the last two years.

First, some LRA commanders used the appalling conditions to jerk up the price of their surrender. The worse things got, the better the deal the government was willing to offer them.

Secondly, the suffering in the north is becoming a point around which the perpetrators in the government and LRA (the ones surrendering) are building a new constituency of people who are opposed to a change in government, because they all want to avoid prosecution for war crimes.

Thirdly, I think the northern war is going to the next political gold mine. If you add the various pledges and promises made for the rehabilitation of the war-ravaged area in the last 10 years, it's more than the money that Uganda has got to fight Aids.

> "The IDP camps aren't about to be dismantled because they are probably being kept as the donor cash cow for the period after the 2006 elections"

Aid will flow

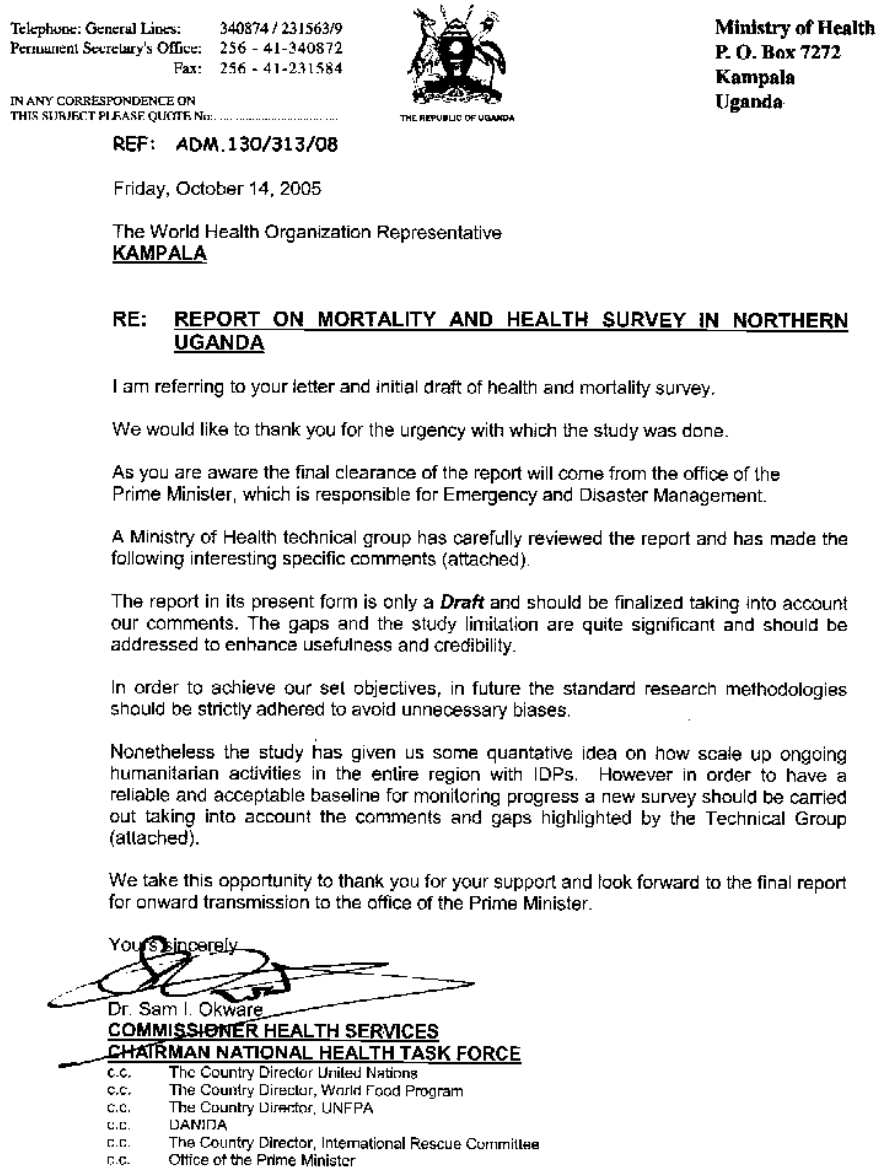
If the leeches in government have eaten the Global Fund money meant to fight Aids, you can only imagine what will happen with the cash for northern reconstruction. While the aid givers might cut off money for Aids and other things, the north is too emotional an issue; it will get its money when the time comes.

At that point we shall be told that 2,000, not 1,000 people are dying every week in the camps in order to open up a bigger aid tap for reconstruction funds, most of which will end up in Kampala on Naguru Hill and such places.

That might also explain why the IDP camps aren't about to be dismantled. They are probably being kept as the donor cash cow for the period after the 2006 elections.

Contact: cobbo@nation.co.ke

Letter to WHO, 14 October 2005



Telephone: General Lines: 340874 / 231563/9
Permanent Secretary's Office: 256 - 41-340872
Fax: 256 - 41-231584

IN ANY CORRESPONDENCE ON
THIS SUBJECT PLEASE QUOTE No:.....

THE REPUBLIC OF UGANDA

Ministry of Health
P. O. Box 7272
Kampala
Uganda

REF: ADM.130/313/08

Friday, October 14, 2005

The World Health Organization Representative
KAMPALA

RE: REPORT ON MORTALITY AND HEALTH SURVEY IN NORTHERN UGANDA

I am referring to your letter and initial draft of health and mortality survey.

We would like to thank you for the urgency with which the study was done.

As you are aware the final clearance of the report will come from the office of the Prime Minister, which is responsible for Emergency and Disaster Management.

A Ministry of Health technical group has carefully reviewed the report and has made the following interesting specific comments (attached).

The report in its present form is only a ***Draft*** and should be finalized taking into account our comments. The gaps and the study limitation are quite significant and should be addressed to enhance usefulness and credibility.

In order to achieve our set objectives, in future the standard research methodologies should be strictly adhered to avoid unnecessary biases.

Nonetheless the study has given us some quantative idea on how scale up ongoing humanitarian activities in the entire region with IDPs. However in order to have a reliable and acceptable baseline for monitoring progress a new survey should be carried out taking into account the comments and gaps highlighted by the Technical Group (attached).

We take this opportunity to thank you for your support and look forward to the final report for onward transmission to the office of the Prime Minister.

Yours sincerely

Dr. Sam I. Okware
COMMISSIONER HEALTH SERVICES
CHAIRMAN NATIONAL HEALTH TASK FORCE

c.c. The Country Director United Nations
c.c. The Country Director, World Food Program
c.c. The Country Director, UNFPA
c.c. DANIDA
c.c. The Country Director, International Rescue Committee
c.c. Office of the Prime Minister

- "The report in its present form is only a Draft"
- "A new survey should be carried out"

Iraq, 2004 - Uganda, 2005

UK Prime Minister's spokesperson:

- "The survey appeared to be based on an **extrapolation** technique, rather than a detailed body count"
- "The technique in question appeared to treat Iraq as if every area was one and the same"

The Observer:

- "The report's authors admit it [the estimate] drew heavily on the rebel stronghold of Falluja, which has been plagued by fierce fighting. Strip out Falluja, as the study itself acknowledged, and the mortality rate is reduced dramatically."

Ugandan MoH, letter to WHO:

- "The sampling procedures should have been followed strictly, instead of getting "*willing*" respondents as a substitute, being driven by the desire to just to complete the study on time"
- "***convenient sampling*** was used"
- "There appear to be many confounding variables in the study"
- "In addition significant assumptions to the study should be highlighted and discussed e.g. role of empathy"

Our conclusions

- A right to good data
  - Unfettered access to populations in crisis
- Mechanisms for collection
- Standardised methods and reporting (SMART)
- Preserving the sanctity of scientific evidence
  - Who will draw the line when manipulation occurs?
  - Who will follow-up to make sure something gets done?

Thank you

- Jacqui Tong, Jo MacRae, Tom Muller, Alison Prescott, ODI
- Comments from J. Darcy, N. Ford, P. Harvey, A. Griekspoor
- Epicentre, Paris (FC)