City mouse, country mouse

The trauma experience in a rural African environment

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Disclosure

- No conflict of interest to declare

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- Trip also supported by the attending surgeons, my co-fellow and my family…

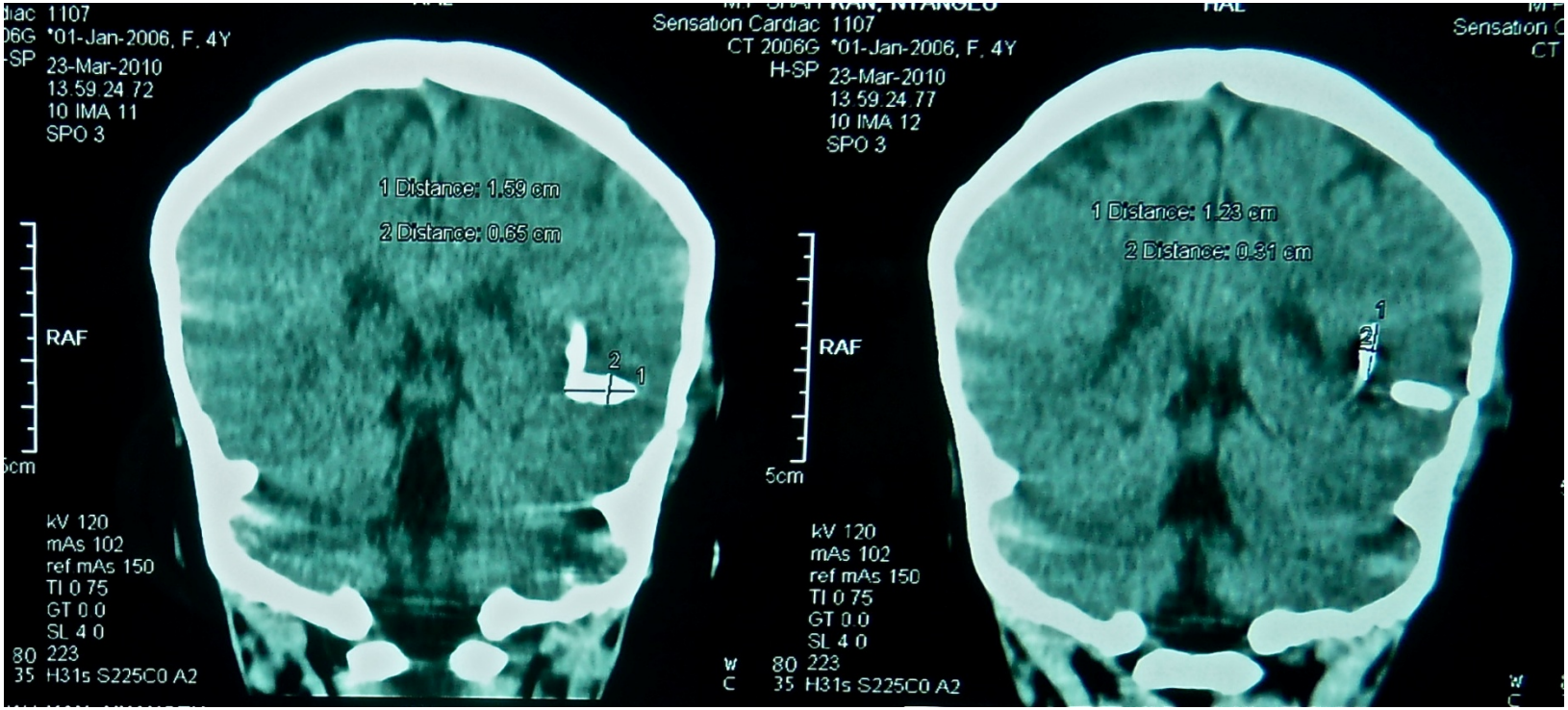
Outline

- Comparison of Canada and Kenya
  - Demographics
  - Geo-Politics
  - Trauma statistics
- Comparison of the delivery of trauma care at the MCH and BKKH
  - Tour of Kijabe
  - Tour of BKKH
- Review of a Kenyan refugee camp

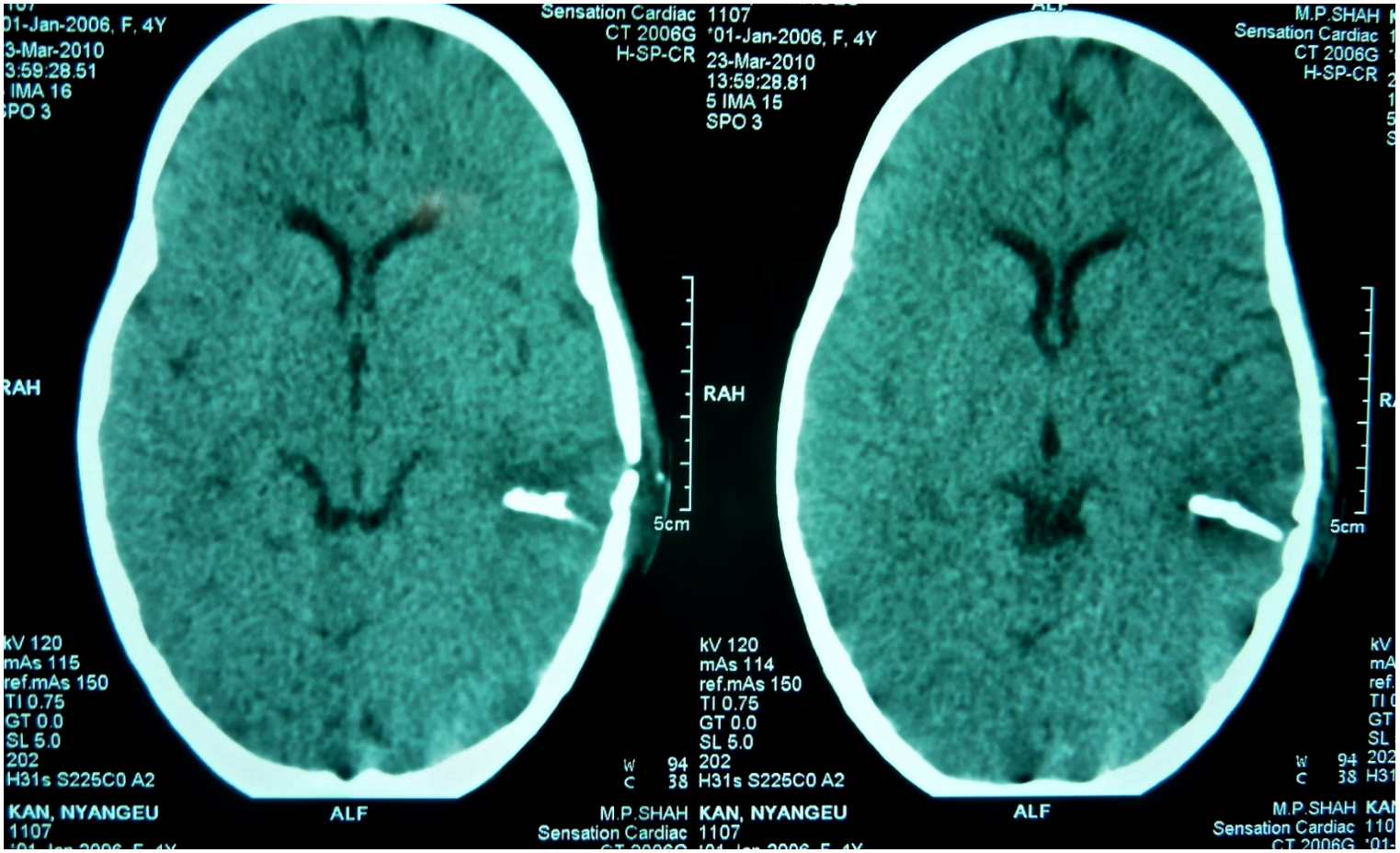
Patient X

- 3 year old ♀ transferred with GSW
  - Ø PMHx
  - Village attacked by cattle raiders (carry AK-47s)
  - 6 family members killed
    - Thru-&thru L temporal wound
    - Fractured R humerus + Tib/Fib (open)
  - Wounds 36 hours old, all closed w 0-Silk
  - Given ABX, arrived by bus with villager with note in hand:

Patient X

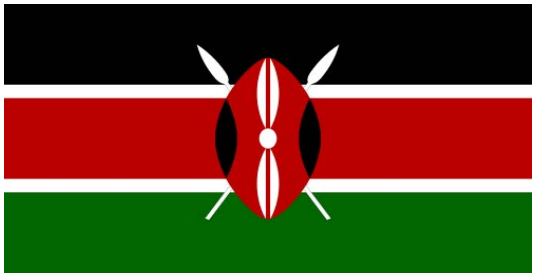

1107
*01-Jan-2006, F, 4Y
23-Mar-2010
13.59.24 72
10 IMA 11
SPO 3
1 Distance: 1.59 cm
2 Distance: 0.65 cm
RAF
5cm
kV 120
mAs 102
ref mAs 150
TI 0.75
GT 0.0
SL 4.0
80 223
35 H31s S225C0 A2
Sensation Cardiac 1107
CT 2006G *01-Jan-2006, F, 4Y
H-SP 23-Mar-2010
13.59.24 77
10 IMA 12
SPO 3
1 Distance: 1.23 cm
2 Distance: 0.31 cm
RAF
5cm
kV 120
mAs 102
ref mAs 150
TI 0.75
GT 0.0
SL 4.0
W 80 223
C 35 H31s S225C0 A2

Patient X


Sensation Cardiac 1107
CT 2006G *01-Jan-2006, F, 4Y
H-SP-CR 23-Mar-2010
13:59:28.81
5 IMA 15
SPO 3
RAH
5cm
kV 120
mAs 114
ref.mAs 150
TI 0.75
GT 0.0
SL 5.0
W 94
C 38
202
H31s S225C0 A2
M.P.SHAH KAN, NYANGEU
Sensation Cardiac 1107
ALF
M.P.SHAH
Sensation Cardiac
CT 2006G
H-SP-CR
RAH
5cm
ALF

Background

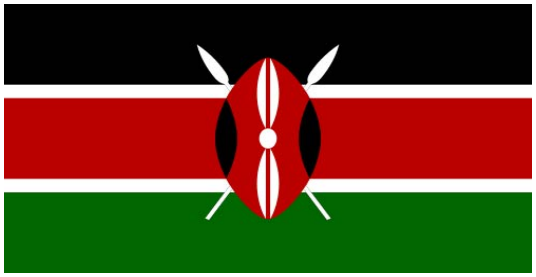
Background



- **Kenya:** *(Swahili):* “God's resting place”
- ***Motto:*** *"Harambee" (Swahili): "Let us all pull together"*

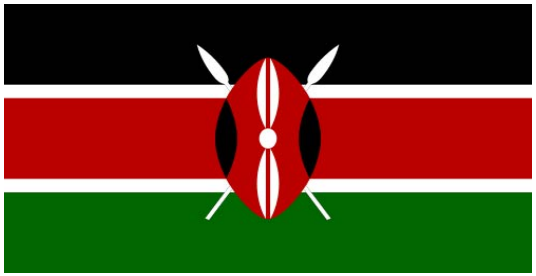
- Lies directly on the equator
- Home to Homo habilis (1.8 and 2.5 million years ago) and Homo erectus (1.8 million to 350 000 years ago)

Background



- On the Arab trade route (slaves, spices)
- German then British Colony (1880-1960s)
- 50s-60s: Rebellion
- 1964: the Republic of Kenya was proclaimed (Kenyatta)

Background

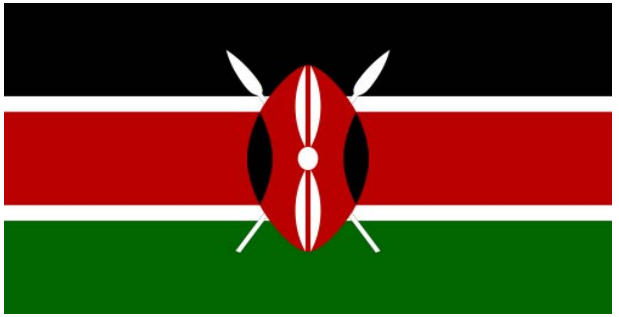


- Extreme religious and tribal diversity
  - Kikuyu 22%, Luhya 14%, Luo 13%, Kalenjin 12%, other African 15%, non-African 1%
  - Kikuyu President Mbaki (2007)
  - Elections contested: 800–1,500 killed 180,000-250,000 displaced

Background

9 mill km^2
34 mill pop
Literacy: 99%
GDP per capita: $38,4
Unemployment: 6%
Life expectancy:81 yrs

WDI

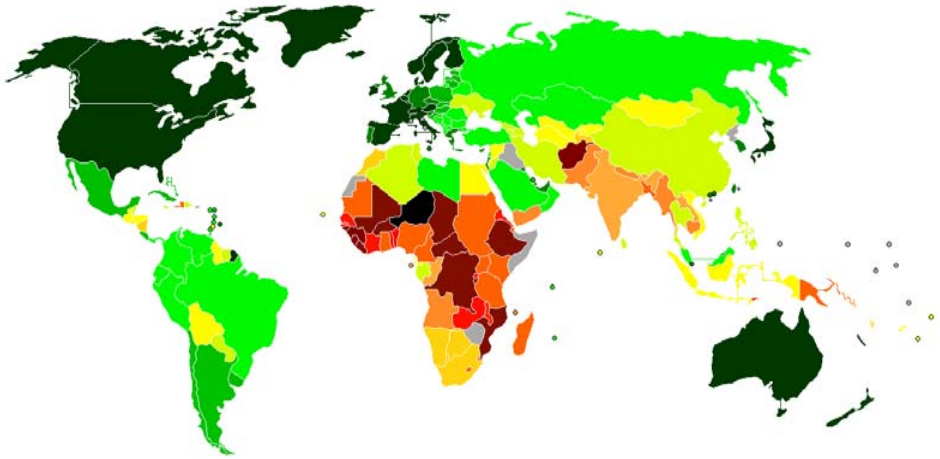


0.5 mill km^2
38 mill pop
Literacy: 85%
GDP per capita: $1,7
Unemployment: 40%
Life expectancy: 47-55 yrs.

LOC

HDI

– Composite statistic used as an index to rank countries by level of "human development"



3	—	Iceland	0.969	▲ 0.002
4	—	Canada	0.966	▲ 0.001
5	—	Ireland	0.965	▲ 0.001

146	▲ (2)	Bangladesh	0.543	▲ 0.008
147	—	Kenya	0.541	▲ 0.006
148	▼ (2)	Papua New Guinea	0.541	▲ 0.005

Kijabe

– *Swahili:* “place of the wind”

Kijabe

Kijabe

The town

A.I.C.
Kijabe
Hospital
Health Care To God's Glory
AIC - CURE International
Children's Hospital
P.O Box 52, Kijabe 00220, Kenya
KIJABE HOSPITAL
CASUALTY
OUTPATIENTS
BUSINESS OFFICE
MORTUARY
MOFFAT
BIBLE
COLLEGE
Preach The Word!
2 TIM. 4:2

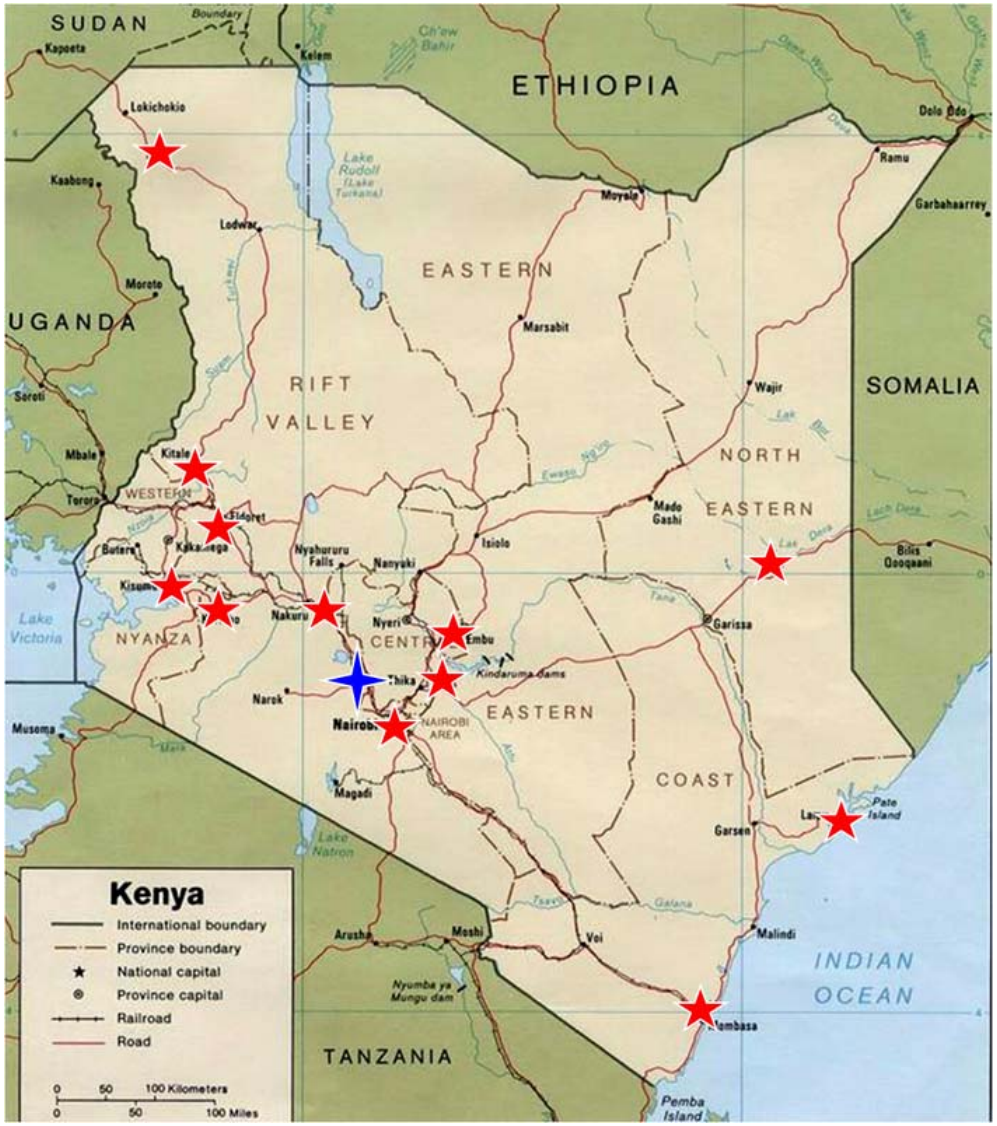
BKKH

Background

Founded 1904
144 beds
12 bed PICU
Lang: Eng, Fre + translators

Whole Hospital founded 1915
BKKH: 2001
36 beds
? PICU ?NICU
Lang: Eng, Kiswahili, etc…

BKKH and clinics



BKKH – a tour

PAEDIATRICS
Bethany Kids
at KIJABE HOSPITAL
- TWO RELATIVES ONLY TO GO TO THE WARD AT ONE GIVEN TIME.
- WATU WAWILI PEKEE KUJUMUA KWA WAPI KWA WAKATI MMOJA.

BKKH – a tour

BKKH – a tour

BKKH – a tour

4-0 MAXON
5-0 ETHILON
3-0 CHROMIC GUT
APOLLO
SH 202
Micropore
KENDALL
MONOJECT PREFILL ADVANCED
Flush Syringes
5-0 DEXON PLUS
VICRYL
4-0 ETHIBOND EXCEL
PDS II
Dermabond Dressings

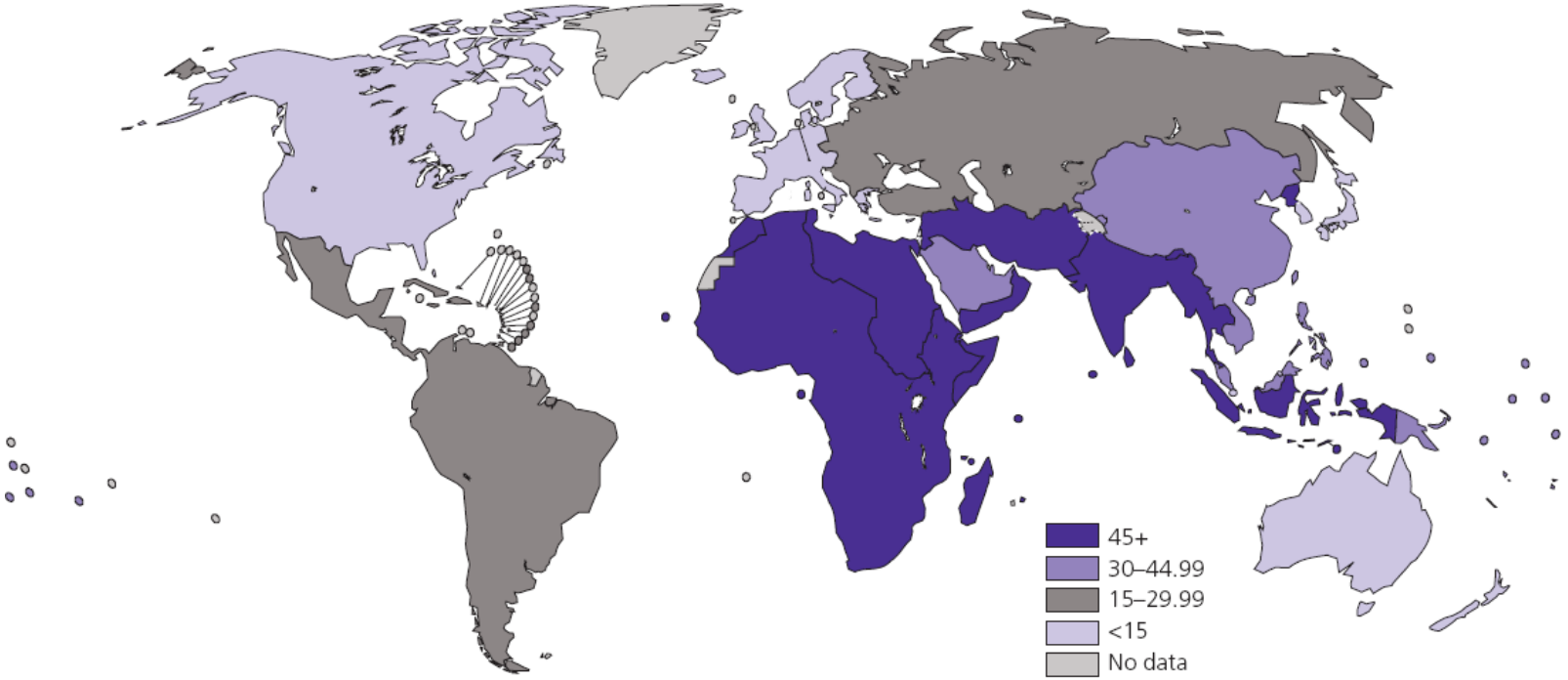
BKKH – a tour

BKKH – a tour

BKKH – a tour

The town

Rate of unintentional injuries per 100 000 children[a], by WHO region and country income level, World, 2004



Africa	Americas		South-East Asia	Europe		Eastern Mediterranean		Western Pacific	
LMIC	HIC	LMIC	LMIC	HIC	LMIC	HIC	LMIC	HIC	LMIC
53.1	14.4	21.8	49.0	7.9	25.4	41.6	45.7	7.8	33.8

[a] These data refer to those under the age of 20 years.
HIC = High-income countries; LMIC = low-income and middle-income countries.

Source: WHO (2008), Global Burden of Disease: 2004 update.

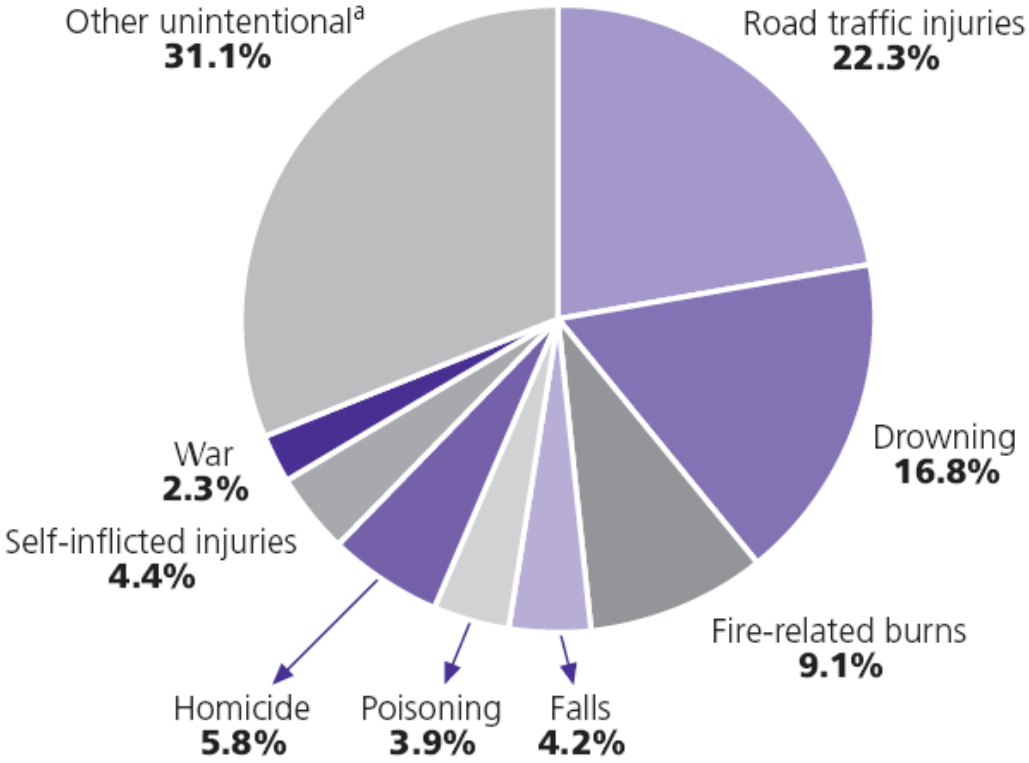
Background

Rank	Under 1 year	1–4 years	5–9 years	10–14 years	15–19 years	Under 20
1	Perinatal causes	Lower respiratory infections	Lower respiratory infections	Lower respiratory infections	Road traffic injuries	Perinatal causes
2	Diarrhoeal diseases	Diarrhoeal diseases	Road traffic injuries	Road traffic injuries	Self-inflicted injuries	Lower respiratory infections
3	Lower respiratory infections	Measles	Malaria	Drowning	Violence	Diarrhoeal diseases
4	Malaria	Malaria	Diarrhoeal diseases	Malaria	Lower respiratory infections	Malaria
5	Congenital anomalies	HIV/AIDS	Meningitis	Meningitis	Drowning	Measles
6	Pertussis	Congenital anomalies	Drowning	HIV/AIDS	Tuberculosis	Congenital anomalies
7	HIV/AIDS	Protein–energy malnutrition	Protein–energy malnutrition	Tuberculosis	Fire-related burns	HIV/AIDS
8	Tetanus	Drowning	Measles	Diarrhoeal diseases	HIV/AIDS	Road traffic injuries
9	Meningitis	Road traffic injuries	Tuberculosis	Protein–energy malnutrition	Leukaemia	Pertussis
10	Measles	Meningitis	HIV/AIDS	Self-inflicted injuries	Meningitis	Meningitis
11	Protein–energy malnutrition	Fire-related burns	Fire-related burns	Leukaemia	Maternal haemorrhage	Drowning
12	Syphilis	Pertussis	Falls	Fire-related burns	Falls	Protein–energy malnutrition
13	Endocrine disorders	Tuberculosis	Congenital anomalies	War	Poisonings	Tetanus
14	Tuberculosis	Upper respiratory infections	Epilepsy	Violence	Abortion	Tuberculosis
15	Upper respiratory infections	Syphilis	Leukaemia	Trypanosomiasis	Epilepsy	Fire-related burns

Source: WHO (2008), Global Burden of Disease: 2004 update.

Background

Distribution of global child injury deaths by cause, 0–17 years, World, 2004



[a] "Other unintentional" includes categories such as smothering, asphyxiation, choking, animal and venomous bites, hypothermia and hyperthermia as well as natural disasters.

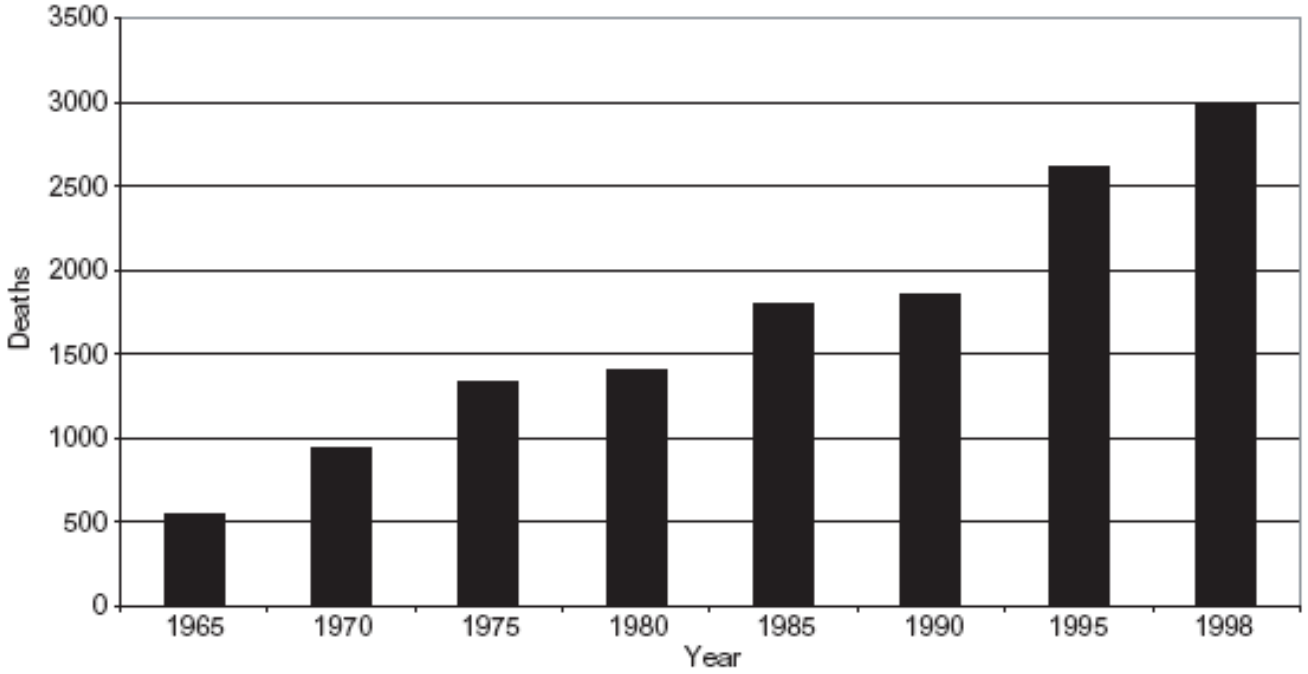
Source: WHO (2008), Global Burden of Disease: 2004 update.

Background

- In Africa:
  - 830,000 children die every year as a result of unintentional injury
  - Leading cause of death for children over 9 years
  - Road traffic injuries and drowning account for half of all unintentional child injuries
  - Tens of millions of children require hospital care every year for non-fatal injuries
  - Road traffic injuries and falls are the main causes of injury-related child disabilities
  - 95% of child injuries occur in low-income and middle-income countries

WHO 2008

MVAs - Kenya



Source: Based on data from NRSCK, 1992; Central Bureau of Statistics, 1995, 1999.

Figure 1. Road traffic fatality trends in Kenya, 1965–1998.

MVAs-Canada

Highlight statistics from *deaths* among motor vehicle collision injury cases in the 2007–2008 NTR CDS (Appendix G, Table 5):

- There were 416 deaths (representing 36% of all injury deaths). These represented cases who died in the emergency department or who were admitted and later died in hospital.
- The mean age was 46 (median = 45).
- The mean LOS was 10 days (median = 1).
- The mean ISS was 38 (median = 38).
- All had a blunt injury as the most serious injury.

CIHI 2010

Note
Includes data from 39 hospitals across 6 jurisdictions.

Source
National Trauma Registry Comprehensive Data Set, 2007–2008, Canadian Institute for Health Information.

Heartache…

Hope…

Burns -Kenya

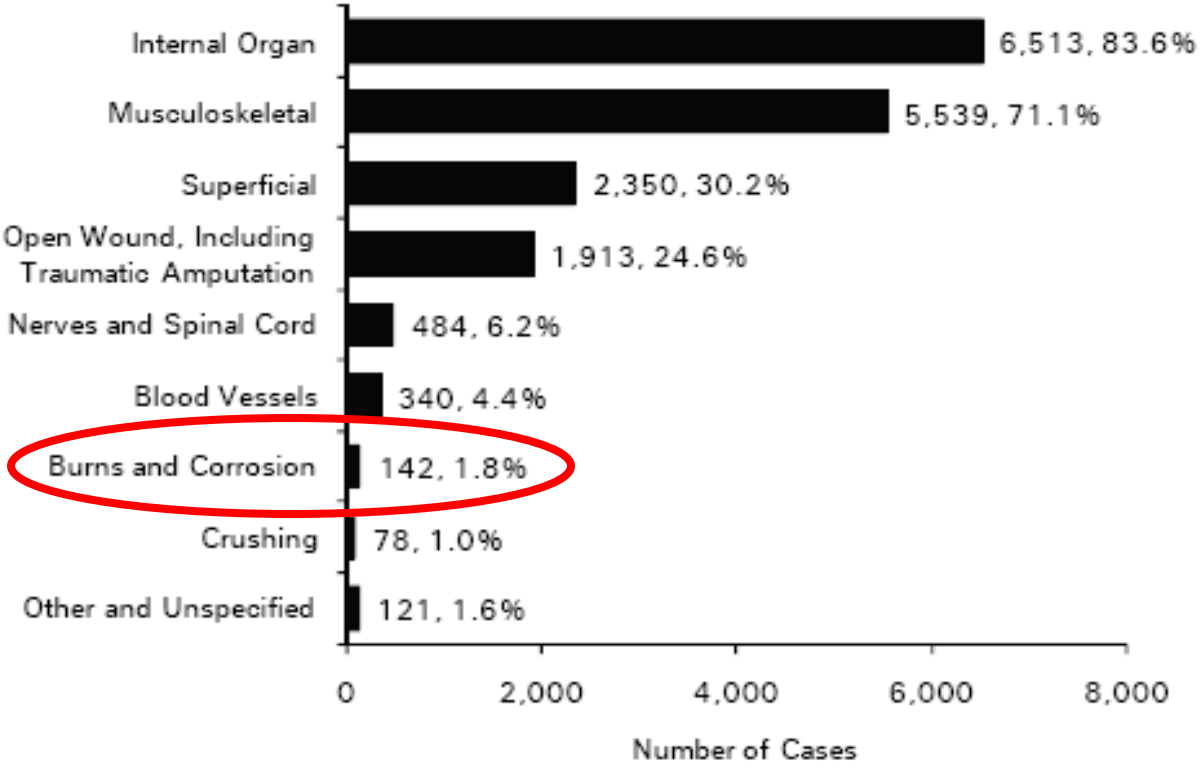
Pattern of burn injuries at a Kenyan provincial hospital

A. Haq
Department of Surgery, Kenyatta National Hospital, Nairobi, Kenya

The complications also depended upon the extent of TBSA and depth of burn. For TBSA of 30 per cent and above, the incidence of complications was:

– Contractures	100%
– Dermal changes	80%
– Sepsis	60%
– Delayed healing	40%
– Anaemia	20%

Burns - Canada



Note
Includes data from 39 hospitals across 6 jurisdictions.

Source
National Trauma Registry Comprehensive Data Set, 2007–2008, Canadian Institute for Health Information.

Burns

Burns

Trauma as a chronic disease

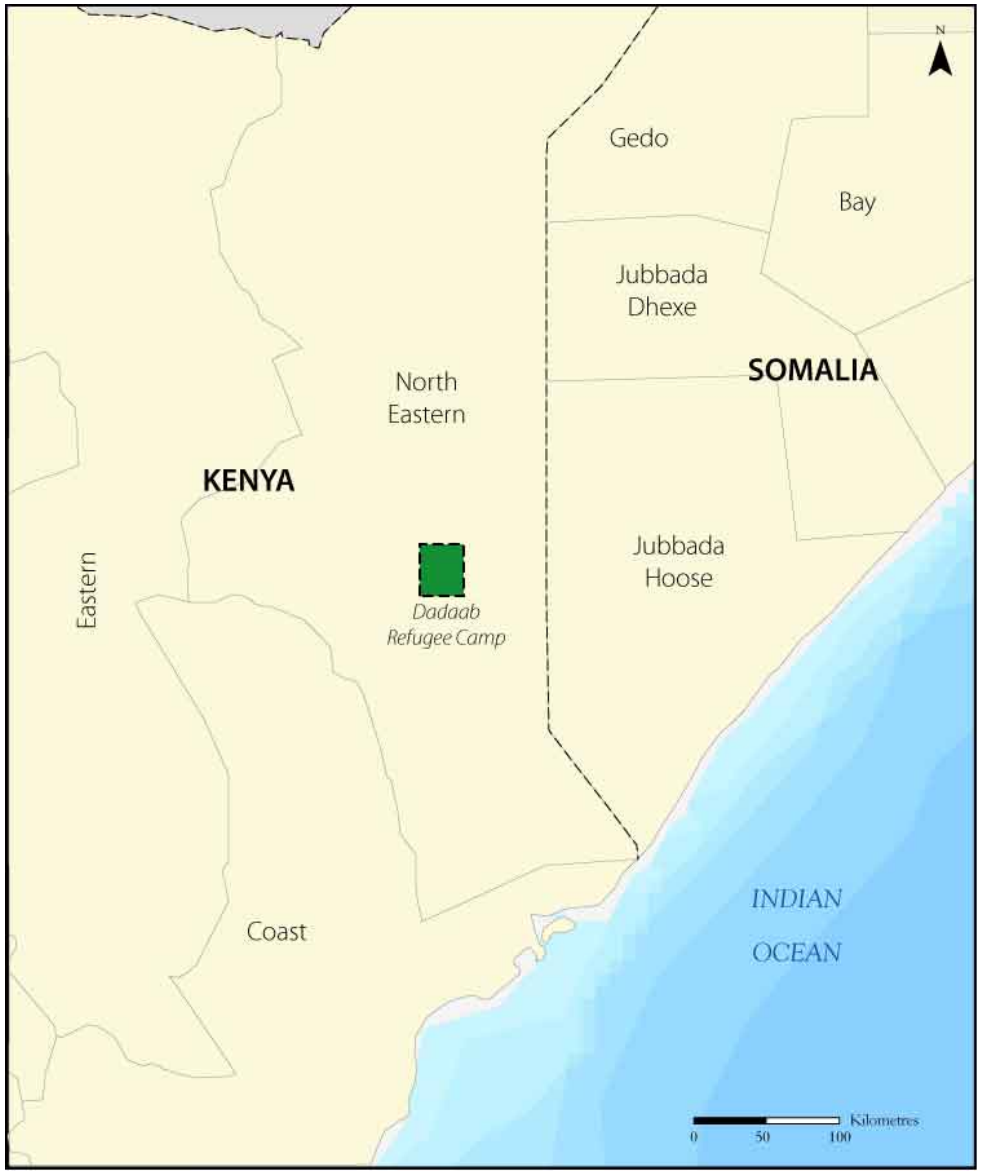
- Delay in care is multi-factorial:
  - No established EMS Service
  - Roads considered unsafe for driving at night
  - Long distances between Villages
  - Low SES barrier to seeking medical attention

- ∴ Patients present with survivable injuries and chronic disabilities

Trauma as a chronic disease

- Other Challenges:
  - Lack of human resources and expertise
    - No Radiologist
  - Lack of equipment and supplies
    - No Central Access/ TPN
  - Blood Products :
    - Blood Gas
    - Biochem
    - Hematology
    - Micro
    - Blood Bank (Donors+Testing)

Dadaab


N
Gedo
Bay
Jubbada
Dhexe
SOMALIA
North
Eastern
KENYA
Eastern
Dadaab
Refugee Camp
Jubbada
Hoose
Coast
INDIAN
OCEAN
Kilometres
0
50
100

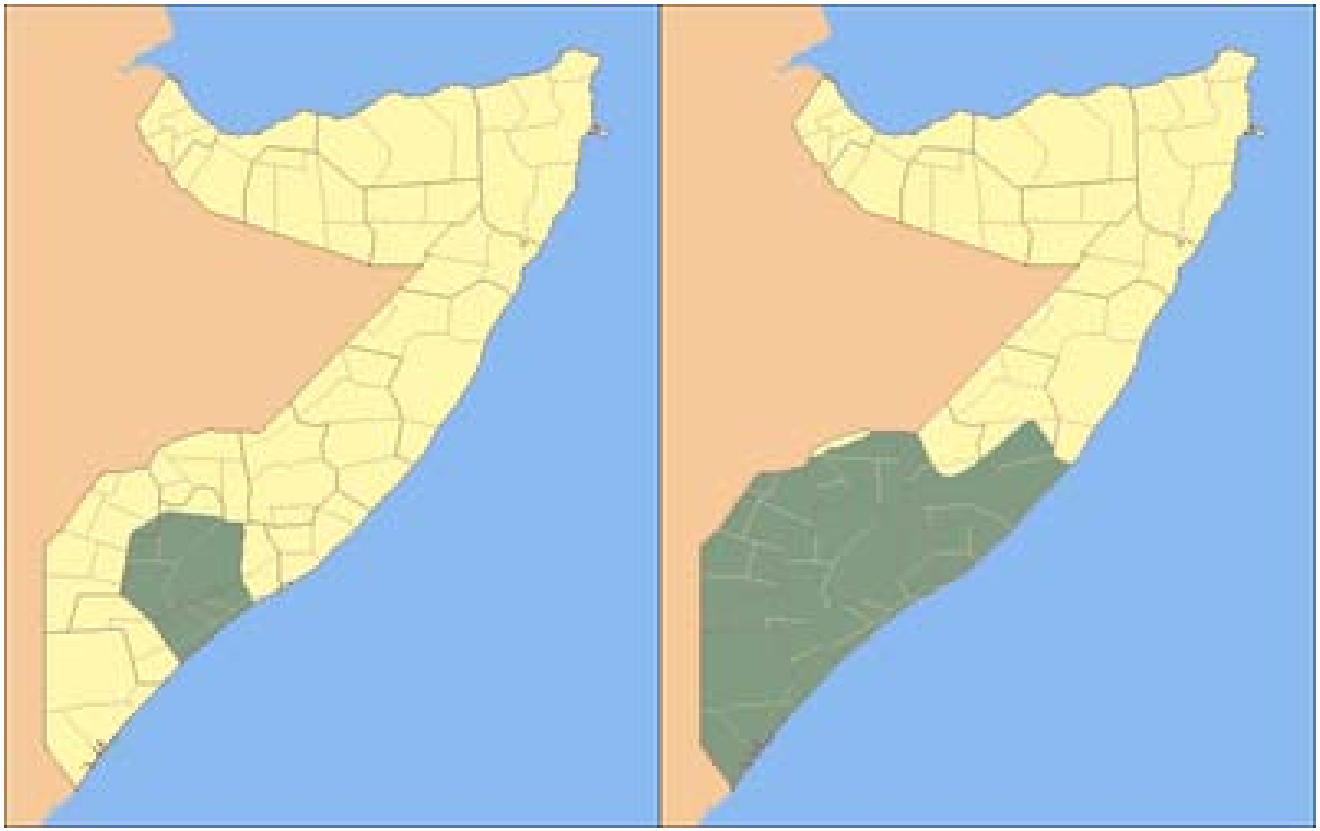
Dadaab

- Built in 1993 after Battle of Mogadishu in Somalia, original capacity: 90,000
- Now contains 300-350,000 refugees
- 3-4,000/month across Somali border
- Now considered the largest refugee camp on the planet

Al-Shabaab

al-Shabaab: (Arabic: الشباب, *"The Youth"*)

Al-Shabaab



Map showing territorial gains made by al-Shabaab since January 31, 2009, when the civil war with Sharif Ahmed started.

The Camp

The Camp

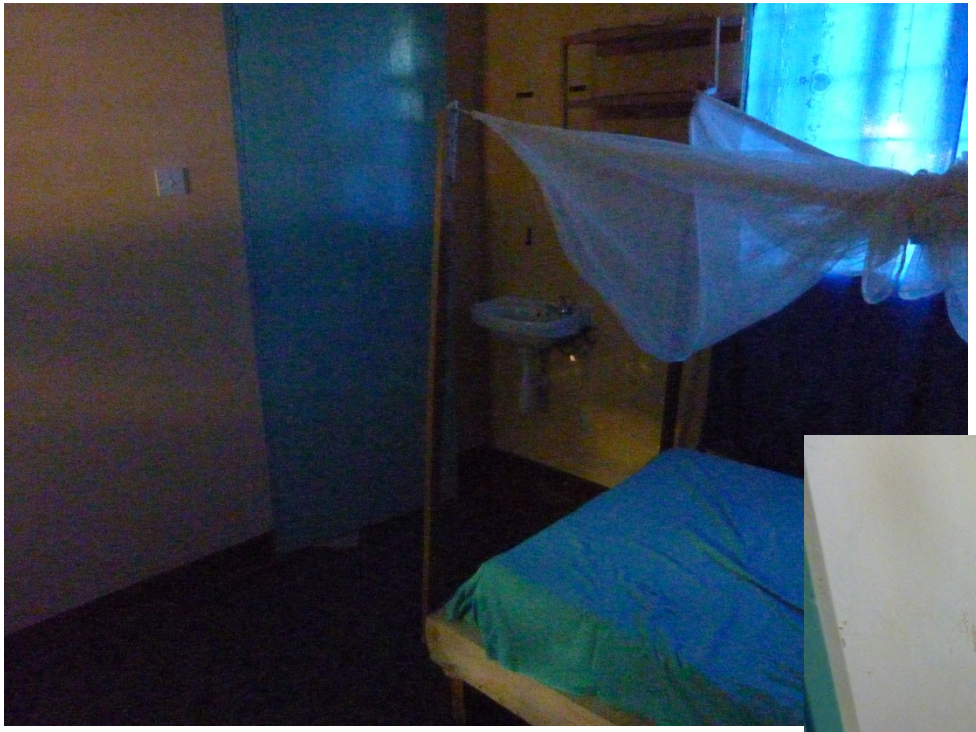
Wound contracture after Snakebite

Burn Contracture

GSWs with EC fistulae

The Camp

The Camp



The Camp

The Camp

Take home message

Be thankful for what you have; you'll end up having more. If you concentrate on what you don't have, you will never, ever have enough.

Oprah Winfrey