Photo credit: Poppy Berdoy-Webster

Action Against Stunting Hub: Malnutrition and Stunting in Senegal Current situation

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Introduction

- In Senegal, as in other developing countries, malnutrition is a major public health problem, especially in suburbs and poor rural areas.

- The prevalence of stunting, malnutrition and specific deficiencies including iron, vitamin A and iodine deficiency remain high.

- According to the Continue Demography Health Surveillance (C DHS) in 2016, 17% of children under five suffer from stunting, including 4% severe stunting, which show a precarious nutritional situation.

Stunting and Malnutrition in Senegal

The proportion of children stunted is about twice as high in **rural areas** (20%) as in **urban areas** (12%).

Prevalence stunting in North and Central Senegal: 18%

Prevalence stunting in Western Senegal: 11%

Prevalence stunting in Southern Senegal : 25%

Stunting and Malnutrition in Senegal

The proportion of children stunted increases with age:

- 10% to less than 6 months,
- 23% at 24-35 months,
- 18% between 36-47 months
- 13% between 48-59 months.

- ‘Leanness’ is found in 8% of children (9% in rural areas and 7% in urban areas);

- Global Acute Malnutrition (GAM) varies little with sex
  - 6% among girls against vs 8% for boys

- Overall risk of stunting was 24.5% and 19.4% for boys and girls, respectively, during infancy ($P < 0.001$) compared with 59.2% and 47.9%, respectively, at 12-39 months ($P = 0.010$)
- Children whose mother has **no education** (**20%**) are more affected by stunting than those whose mother has **primary education** (**13%**) and slightly more than twice the mother has a **medium / high school education or higher** (**8%**).

- For mothers of children with **severe stunting**,
  - 5% have no education, compared with
  - 3% have primary education and
  - 2% have at least intermediate or secondary education

Anemia in children

- Anemia is often linked to iron deficiency.
- This iron deficiency is often associated with geophagy and / or infections.
- A Dakar suburban survey of **apparently healthy** children aged **9 to 15 months** who were immunized revealed that **86%** of them were anemic

Vitamin Deficiencies

- For vitamin A deficiency, it is recognized that deficiency is a major public health problem in our countries, both in terms of ocular lesions and blindness, and by their influence on the morbidity and mortality of children under 6 years of age.

  According to a national survey, prevalence among children aged 2 to 5 is estimated at 14.1% of Xerophthalmia

- Thus, the current context of the strong pressure of poverty shows that malnutrition continues to affect large segments of the population;

- This is why, despite the progress made the interventions of the Ministry of Health have not yet been able to overcome malnutrition in the country;

- A mapping of malnutrition in our country therefore requires a study involving the largest number of geographical areas

Parasitology in Senegal

Schistosomiasis

Of the 72 districts mapped: 58 are endemic despite MDA

- 12 low prevalence : 1-9%
- 29 moderate prevalence: 10-49%
- 16 high prevalence : ≥ 50%
- Very high proportion of novel zoonotic hybrid schistosomiasis infections

Soil-transmitted helminthiasis

All districts of the country are meso-endemic

- The overall prevalence rate of intestinal parasitic infections is **21.9%**.
- *Ascaris lumbricoides* is the leading cause of parasite infection with **46.7%** of cases observed

Questions remaining

- Typology of stunting
- Genetic, Epigenetic and Microbiological Etiology ? Roles of:
  - Infection (STH, Schistosomiasis ….)
  - Microbiome
- Impact in cognition
- Socio anthropological knowledges

Questions remaining: E.g. current research (CBF PhD)

In this spirit, it seems to me that studies to improve the health of mothers and children are essential to achieving MDGs 4 and 5 and the SDGs.

Evaluate the impact of schistosomiasis *spp* and soil-transmitted helminthiasis on pregnancy and growth of the child in intra and extra uterine.

Context

It is estimated that about 40 million women of childbearing age currently suffer from schistosomiasis, but little is known about the specific morbidities inflicted on pregnant women and their descendants.

10 million women in Africa a year have schistosomiasis during pregnancy

To date, there are no epidemiological surveys evaluating the impact of schistosomiasis on pregnancy women and on the growth of the product of conception in Senegal and in the world.

Context

- Women who are underweight and those with anemia or infections are at increased risk of anemia, premature delivery, and low birth weight infants (<2500 g)

- Maternal infection and anemia contribute to child malnutrition by affecting the quality and quantity of milk as well as the duration of exclusive breastfeeding

Context

- This is important as women aged 18 to 25 living in endemic areas of schistosomiasis can spend nearly 25% of their reproductive life pregnant and 60% of their reproductive life in lactation.

- The delay in treatment of more than one year **causes significant morbidity** in **non-pregnant women** and such **morbidity** could be further **exacerbated** in **pregnant women**, who have increased the need for micro and macro-nutrients

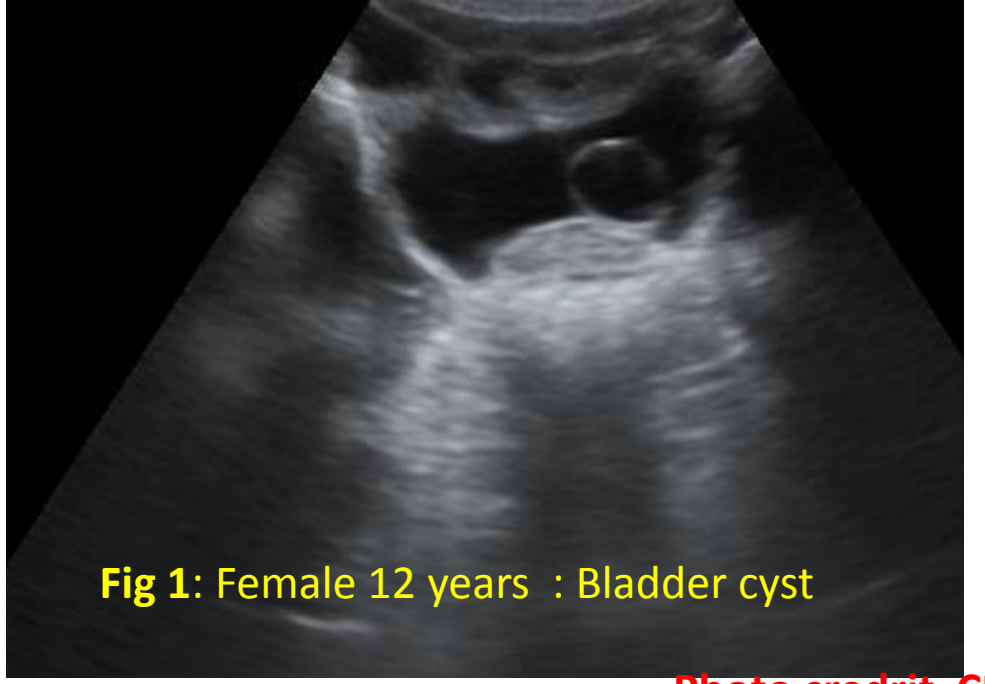

Fig 1: Female 12 years : Bladder cyst

Fig 3: Male 10 years : Bladder mass

Photo credrit CBF (Zels project 2018)

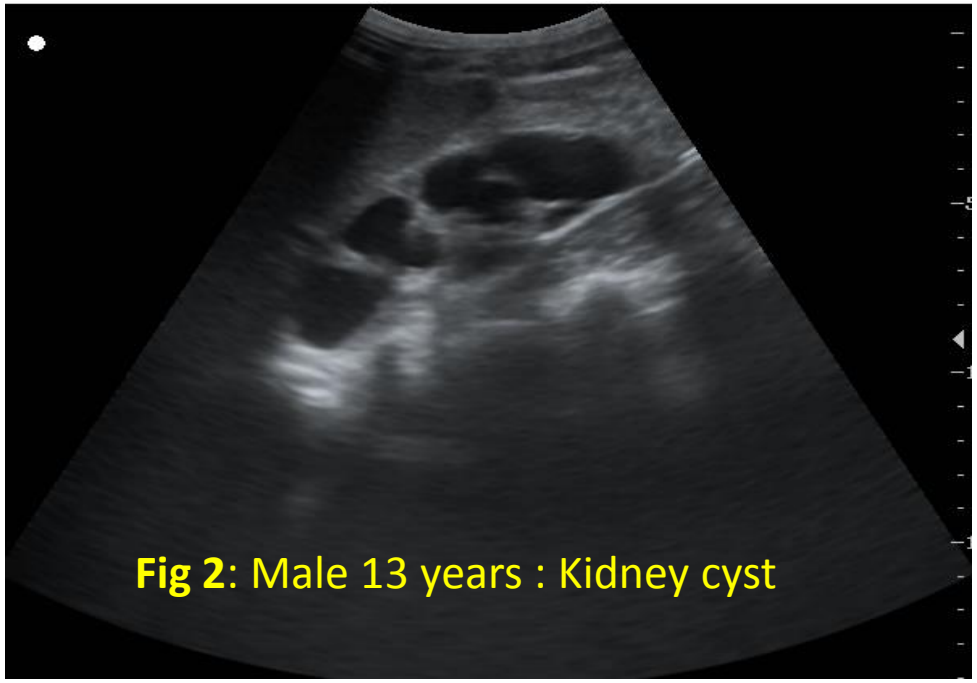

Fig 2: Male 13 years : Kidney cyst

Fig 4: Pregnant women 20 years
: shistosomiasis

Aims

- To evaluate the impact of schistosomiasis *spp* and geohelminthiases on pregnancy and growth of the child intra and extra uterine.

- Characterize the intestinal microbiome of children and their mothers exposed to Schistosoma spp and soil-transmitted helminthiasis in order to compare the structure of the gut microbiome (abundance and diversity) in children of mothers infected with schistosomes spp compared to children of uninfected mothers .

Observational & anti-parasite Intervention cohorts; pregnant mothers (SSA countries*)

	Trimester 2			Trimester 3			
Intervention Groups	4	5	6	7	8	9	BIRTH
• SCH uninfected • (n=200)							
• SCH infected and accepted PZQ (n=200)							
• SCH infected and refused PZQ (n=200)							
Measurements							
Infant size, age, development (ultrasonography)	↑	↑	↑	↑	↑	↑	↑
Maternal Epigenetics	↑						
Maternal Stool (and urine) – microbiome, integrity, inflammation, parasitology (including FGS questionnaire/scoping)	↑	↑	↑	↑	↑	↑	↑
Maternal Blood – gut integrity, growth factors, anemia, inflammation,		↑		↑		↑	

	Age weeks	Age months							
Measurements	0	1	2	1	2	3	6	12	18	24
• Weight, length, HC, MUAC	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
• Epigenetics	↑									
• Stool – microbiome, integrity, inflammation	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
• Stool (and urine) - parasitology					↑		↑	↑	↑	↑
• Blood – gut integrity, growth factors, inflammation*, anaemia		↑		↑		↑	↑	↑	↑	↑
			↑		↑		↑	↑	↑	↑
					↑		↑	↑	↑	↑

*SSA only as SCH – PZQ now recommended in pregnancy

Infants then followed up into main cohorts or additional group TBC

UCAD department of Parasitology (DP)

- The laboratory facilities available within the department of Parasitology include among other facilities, a molecular biology laboratory as well as an immunology laboratory.
- As a line extension of the department of Parasitology, several sentinel sites have been created and under the supervision of the head of department, with the objective of maintaining a continuous surveillance of parasitic diseases epidemiology.
- Among these sentinel sites the *Keur Socé* health research center witch is based in the central part of the country where a demographic surveillance system has been set in place since 2009 with regular updates (every 6 months).
- Laboratories in several hospitals
  - Albert Royer Children Hospital (collaboration with pediatricians)
  - Research programs are conducted
    - in the 3 hospital sites in Dakar
    - on 7 peripheral sentinel sites

DP Field Sites description

- Rural community of Keur Soce
  - DP has been offered a plot of land by the community
  - Setting up of the Keur Soce research center
  - workspace for laboratory and clinical research activities as well as accommodation for field staff
  - biochemistry analyzer, a Heamatology analyser
  - Microscopes; audiogram and ECG machines…

Thank you