

First assessment of the impacts of Saharan dust events on respiratory health in West Africa: A case study in the Northern Benin

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Introduction

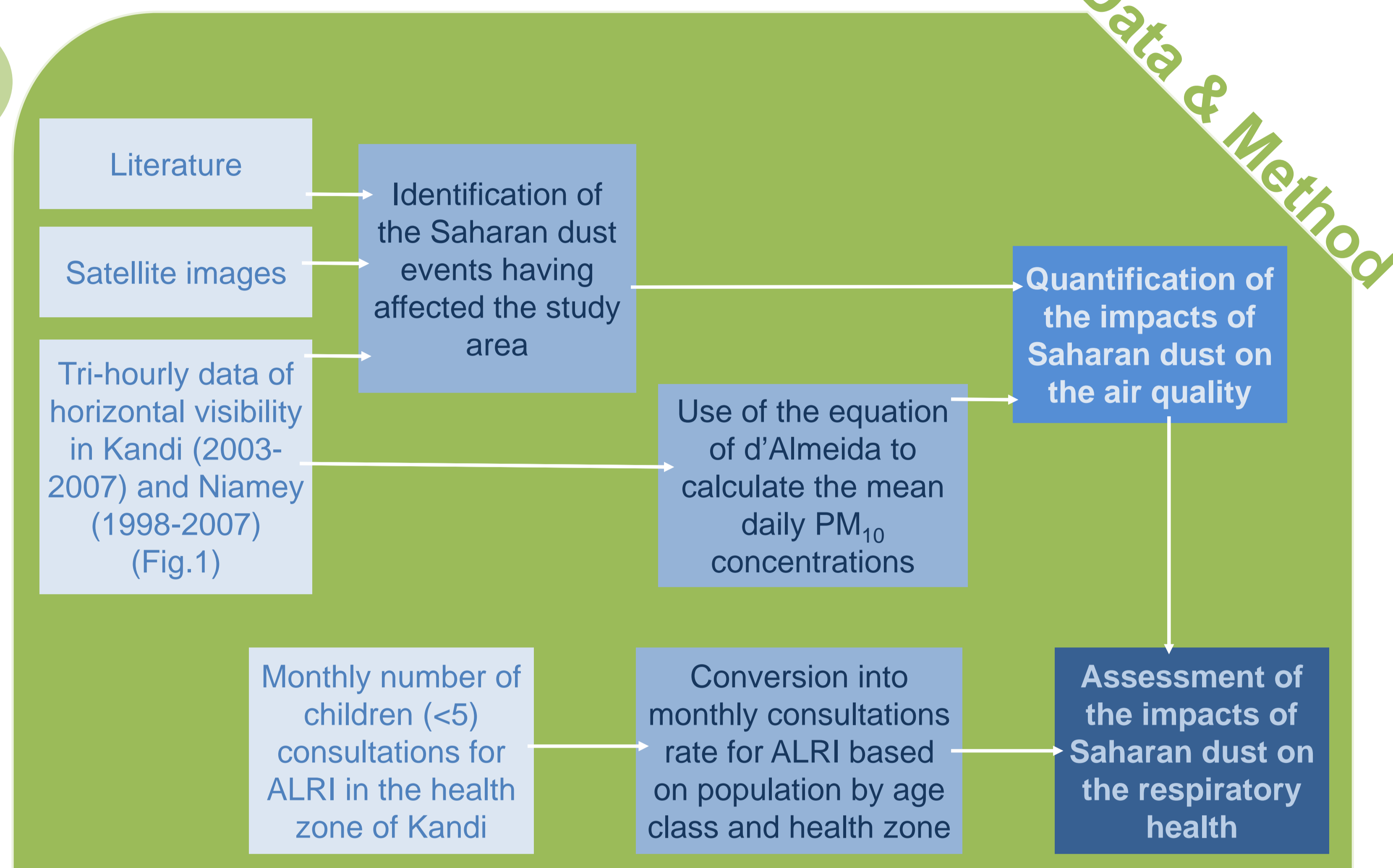
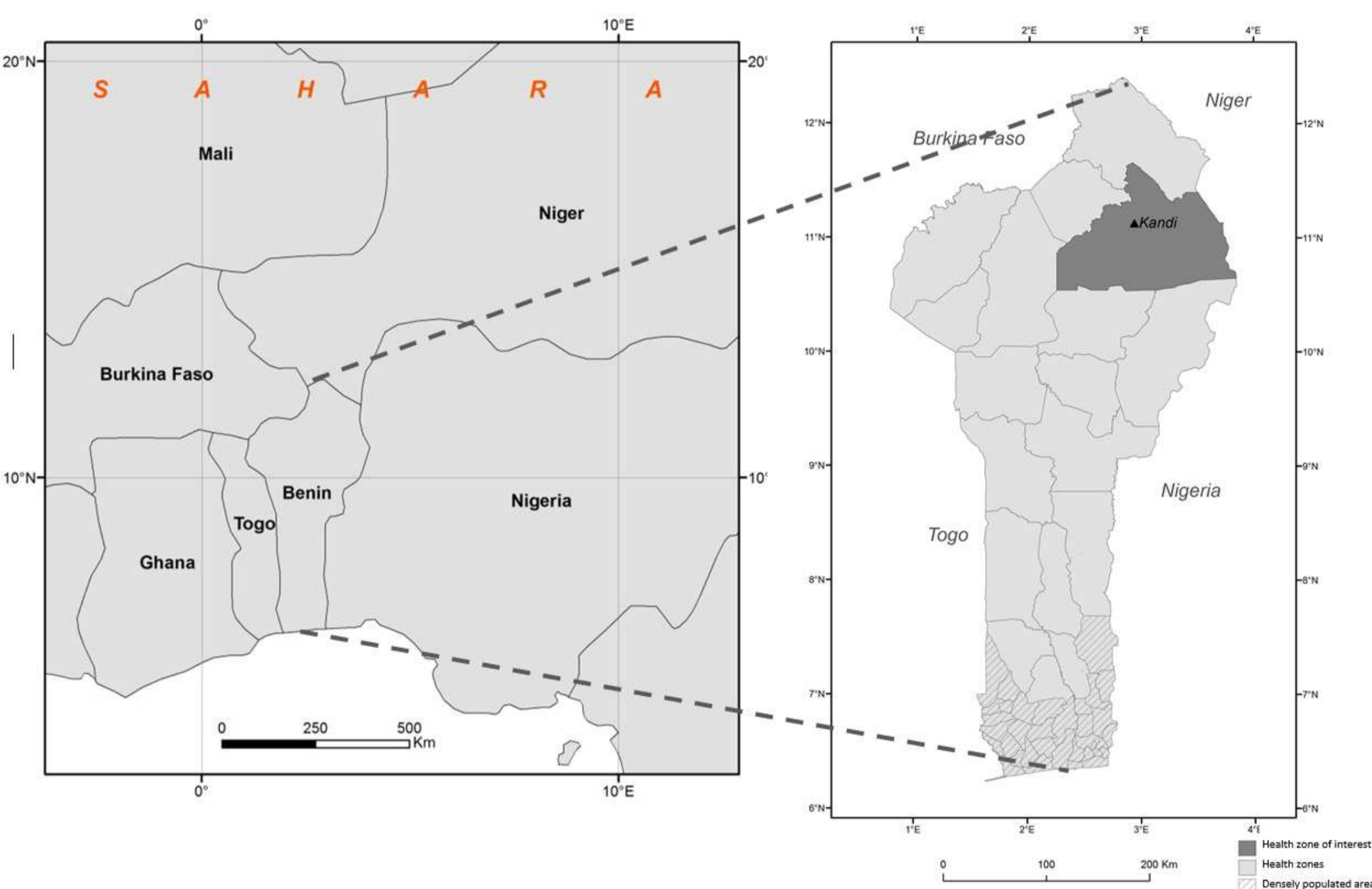
More than 50 % of the total desert dust emitted into the atmosphere comes from the Sahara. Dust storms lead to particulate levels that exceed internationally recommended levels especially near the Sahara. However, this source of air pollution appears to be under-studied, particularly in the literature devoted to human health impacts in West Africa [1].



Objective

Quantify the impacts of Saharan dust events on air quality and on acute lower respiratory infections (ALRI) affecting children under 5 years old in the Northern Benin

Study area



Results

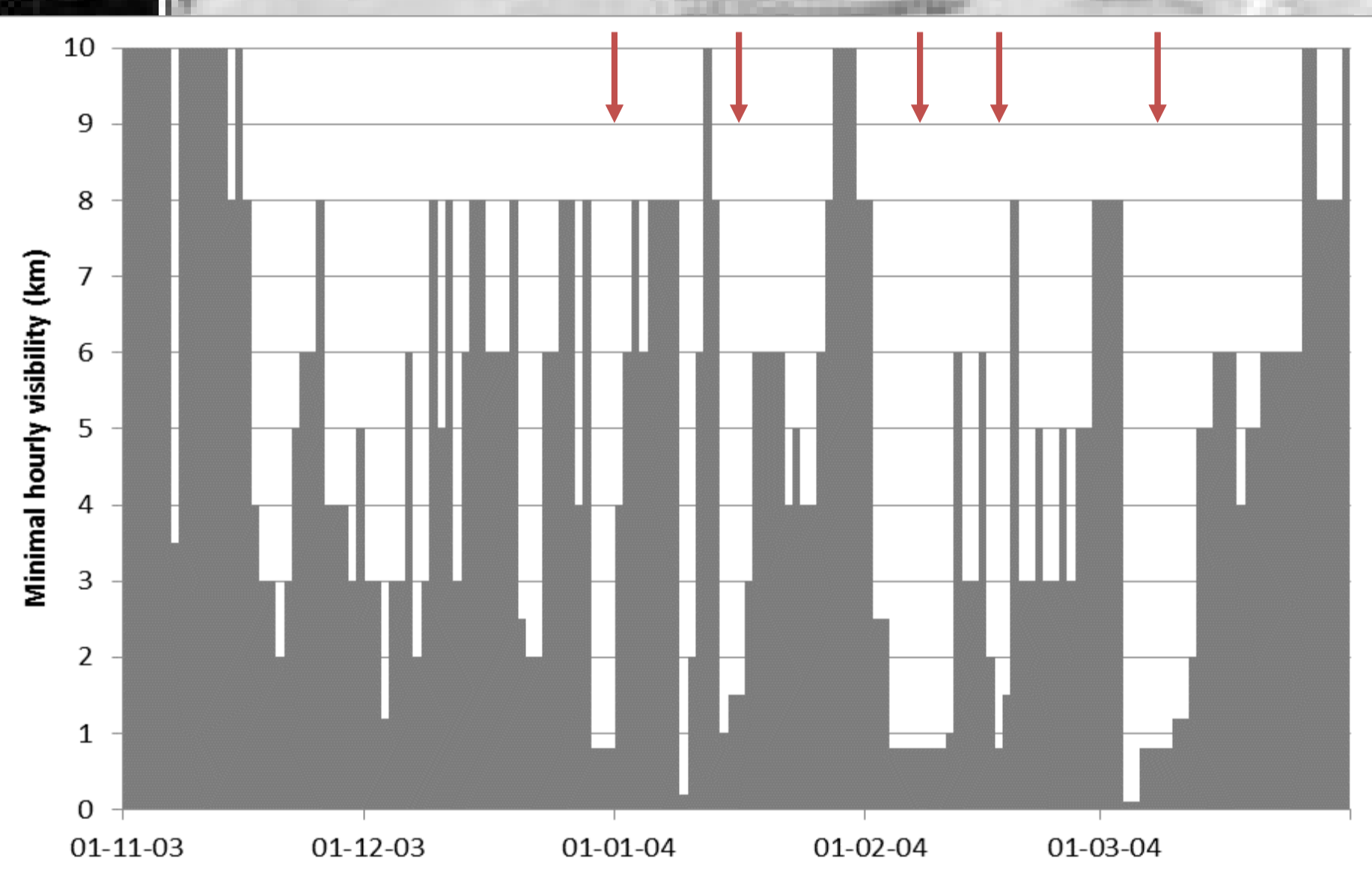


Fig.1: Detection of the potential dust events (arrows) in the daily visibility data in Kandi during the dry season 2003-2004

ID	Onset of the event	Offset of the event	Mean daily PM ₁₀ concentrations over the event (µg.m ⁻³)
1	29/12/2003	31/12/2003	766
2	2/02/2004	10/02/2004	868
3	16/02/2004	18/02/2004	611
4	4/03/2004	12/03/2004	1197
5	06/01/2005	14/01/2005	1387
6	12/02/2005	15/02/2005	434
7	25/02/2005	27/02/2005	1783
8	8/03/2006	12/03/2006	1066
9	12/12/2006	14/12/2006	941
10	29/12/2006	9/01/2007	1101

Tab.1: Dust events identified on the basis of the visibility data in the station of Kandi and the literature during the dry seasons from 2003 to 2007

Impacts on respiratory health

- There are peaks of ALRI rates in March, at the end of the dry season (Fig.2)
- More than 13% of the children under 5 were affected during a dry season
- ALRI rates increased on average of 12.5% during the months having been affected by the 10 dust events
- **Need of daily or decadal health data to improve the precision of these results**
- **Need of replication this kind of study in other parts of West Africa (i.e. Sahelian region)**

Impacts on air quality

- Identification of 10 dust events (Tab.1) with a total of 61 days
- Maximum PM₁₀ concentration for the period of a dust event : 1783 µg.m⁻³
- Maximum daily PM₁₀ concentration during a dust event : 3127 µg.m⁻³
- Mean daily PM₁₀ concentration for days with dust event: 1017 µg.m⁻³
- Mean daily PM₁₀ concentration for days without dust event : 55 µg.m⁻³

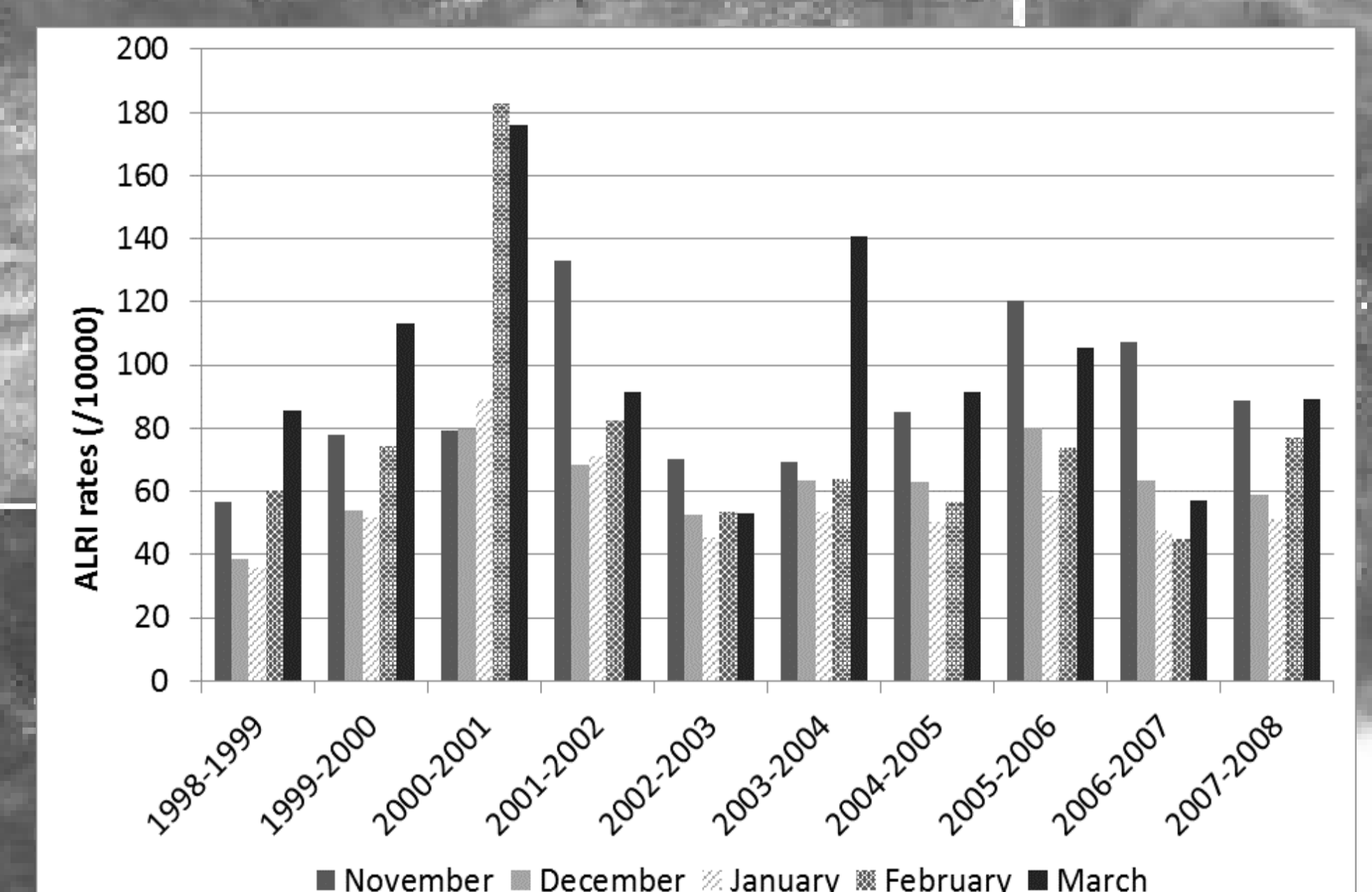


Fig.2: ALRI rates in children (<5 years old) over the dry seasons (five months) between November 1998 and March 2008 in the health zone of Kandi

Conclusions

The daily PM₁₀ concentrations were multiplied by 18.5 during dust events, what contributes to strongly exceed the WHO standards. From health data, we calculated a 12.5% increase of the monthly ALRI rates during months having recorded dust event on the same period. Even if this increase is significant, it seems relatively low compared with the impacts which we could expect considering reached PM₁₀ concentrations [2]. So, it is necessary to multiply such research in West Africa to better quantify the impacts of Saharan dust on human health.

References
[1] de Longueville F, Ozer P, Doumbia S, Henry S (2013c) Desert dust impacts on human health: an alarming worldwide reality and a need for studies in West Africa. Int J Biometeorol 57(1): 1-19

[2] de Longueville F, Hountondji YC, Ozer P, Marticorena B, Chatenet B, Henry S. 2013b. Saharan dust impacts on air quality: what are the potential health risks in West Africa? Hum Ecol Risk Assess 19(6): 1595-1617