

## **Statement from BU Team – May 6, 2014**

Our team at the Boston University School of Public Health (BUSPH) has spent the past five years investigating the epidemic of chronic kidney disease in Nicaragua (also known as the Mesoamerican Nephropathy or MeN). Our initial involvement was part of a dialogue process coordinated by the Office of the Compliance Advisor/Ombudsman of the International Finance Corporation (IFC) in relation to Project #25331 (Nicaragua Sugar Estates Limited S.A.) in response to a complaint filed by the Center for International Environmental Law (CIEL) on behalf of former NSEL employees and residents in the affected community.

Our research was indirectly referenced in the documentation supporting a new loan (Project #32253) to another sugarcane company in the same region. Given the direct relevance of our research, we were concerned (and remain concerned) that the process of conducting the “Environmental and Social Review” for this new loan did not include a more thorough consideration of our work. In particular, it is surprising that after five years of working on this project, including three years under the auspices of the IFC, we were not contacted by the IFC to discuss this very complicated situation.

The IFC’s supporting documentation for the new loan states: “No direct relationship between the sugar sector and the disease has been established.” This is the IFC’s summary of our and other’s work but it is a serious oversimplification of the research to date. We are not familiar with the work practices at the facility operated by Consorcio Naviero Nicaraguense SA (i.e. Project #32253) and we are not making a judgment about whether the new loan should be made. However, given that our team has worked on this research in coordination with CAO for the past five years, we are concerned about the IFC review process and the serious oversimplification of the available research. Accordingly, we would like to summarize our activities and clarify our conclusions to date.

### **Summary of Activities**

The BUSPH team first conducted a Scoping Study from June to December 2009, which summarized the available information on MeN, identified data gaps, and recommended research activities to address those gaps. We then conducted the following six research activities (in order of the date when reports were made public):

- An **Industrial Hygiene/Occupational Health Assessment** (August 2010), evaluating the potential hazards associated with chemicals and work practices at the Ingenio San Antonio (ISA), including recommendations for improving work practices;
- An **Investigation of Water Quality** (August 2010), including the analysis of a large number of contaminants in water samples collected from locations selected by ASOCHIVIDA;
- **Interviews with Physicians and Pharmacists in the Region** (February 2012), examining perceptions of health professionals in Nicaragua regarding CKD diagnosis, etiology and treatment;
- A **Pilot Cohort Study** (February 2012), assessing the feasibility of conducting a complete retrospective cohort study to evaluate the relationship between work practices at ISA and CKD;
- An **Investigation of Biomarkers in Workers** (April 2012), evaluating biological markers of kidney injury and CKD in ISA workers, miners, construction workers, and port workers; and

- **An Investigation of Urinary Biomarkers in Adolescents** (June 2012), evaluating evidence of subclinical kidney damage among adolescents in different areas of Nicaragua.

We produced a series of detailed reports<sup>1</sup> that describe the methods, results, and conclusions for the Scoping Study as well as for each of the six research activities. We also produced a report that summarizes the overall effort and describes the highest priority areas for future research.

### **Summary of Conclusions**

The *Investigation of Biomarkers in Workers* (McClellan, et al, 2012) is the research activity that most directly addressed the issue of kidney damage among Nicaraguan sugarcane workers. We measured biological markers of kidney injury and CKD in 284 sugarcane workers (also referenced in the report as ISA workers) at the beginning and end of the 6-month harvest. We also measured the same biomarkers in 51 miners, 60 construction workers, and 53 port workers. In the conclusions section of that 52-page report, we state:

*“Overall, our results show evidence of tubulointerstitial kidney injury among workers at ISA and in other industries, which also appears to be associated with decreased eGFR. These findings suggest that there is an occupational component to the CKD epidemic, but that the epidemic is not limited to sugarcane workers. Given the nature of the work performed by workers with the highest risk, volume depletion and muscle damage are important hypotheses that require further attention. This does not rule out the possibility that there could also be an important non-occupational component, which could include environmental exposures, personal behaviors, and/or other factors.”*

Our findings of increased kidney injury and decreased kidney function among sugarcane workers in this study, combined with additional evidence from our and other researchers’ work, suggest that there is an occupational component to the CKD epidemic. In the Summary Report and in peer-reviewed publications we describe our leading hypothesis, which is shared by many other researchers:

*“Agricultural workers in tropical developing countries work in conditions that predispose them to a combination of chronic volume depletion, muscle damage, and exposure to agrichemicals. While chronic volume depletion and muscle damage alone are unlikely explanations for the CKD epidemic, such factors may magnify the effect of low-level exposure to nephrotoxic agents that alone would not result in CKD. Such low-level exposures might occur at work but could also be due to non-occupational factors that are ubiquitous in a region and cause repeated subclinical acute kidney injury that only progresses to CKD in subpopulations that also experience chronic volume depletion and/or muscle damage.”*

Based on our research, as well as research conducted by others in the region, we believe that the CKD epidemic is caused by a combination of multiple factors. Results to date suggest that one or more of these risk factors are occupational, and more research is needed to identify the specific factors. We have identified heat stress related to strenuous work in conditions of high temperature as one such factor that is likely to play a role in the excess of CKD. This was also the consensus of experts who participated in the First International Workshop on Mesoamerican Nephropathy in Costa Rica (November 2012), which included members of our team.

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<sup>1</sup> These reports can be found at: <http://www.cao-ombudsman.org/cases/document-links/links-82.aspx>

Importantly, this summary does not include new conclusions or represent a change to our prior conclusions, but rather summarizes the conclusions that we have described in previous reports, peer-reviewed journal articles, and the Technical Report of the MeN Conference (Wesseling et al).

### **Moving Forward**

Our research team is proceeding with new research projects to address both occupational and non-occupational risk factors for MeN. Because additional research will take time, it is important to take action to address the epidemic—and to evaluate the effectiveness of any such actions—even while the underlying cause(s) remain uncertain. These actions should include: (a) evaluations and improvements of work practices in the sugarcane industry, as well as in other industries affected by the epidemic, (b) evaluations and improvements to CKD surveillance in Nicaragua and other Central American countries, and (c) improvements to care for members of the community with CKD.

### **REFERENCES**

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