Rev. Inst. Med. trop. São Paulo
38 (4): 247-248, julho/agosto, 1996

EDITORIAL

MERCURY CONTAMINATION AND HEALTH RISK IN THE BRAZILIAN AMAZON. AN ETHICAL DILEMMA

For several years the uncontrolled use of mercury in informal sector gold mining camps in the Brazilian Amazon, known as *garimpos*, has been regarded as a potentially serious public health issue. There are two contamination pathways. The first is an occupational one: miners and traders may inhale burning mercury/gold amalgam, an operation which is routinely carried out without even the most rudimentary precautions. The vapour may also pose a problem for those living in or near burning sites, and to the ecosystem in general, since the vapour becomes a source of atmospheric pollution, often at some distance from the original burning site. However, most attention has been paid to the second contamination route, organic mercury contamination through fish, since it involves both a larger exposed population – fisheaters – and a much more toxic form of mercury. All the debates regarding mercury contamination linked to Amazonian mining are haunted by the tragic precedent of Minamata in Japan, where large-scale contamination by organic mercury had traumatic consequences for a number of fisheating – more specifically shellfish eating – communities. Given the fact that fish is the basis of the Amazonian diet, and the per capita daily fish consumption of the *caboclo* riverine peasant population is probably among the highest in the world, the ingredients of a large-scale human and environmental disaster appear to be present in the Brazilian Amazon.

But things are not so simple. Worry about the consequences of mercury contamination has driven a considerable amount of field research in the Brazilian Amazon since the late 1980s, and both Brazilian and international scientists have generated a large body of information about mercury levels in the Amazonian environment, and in individual Amazonians. While much remains to be done, recent accomplishments are also impressive: there is now good-quality comparative data on environment mercury levels from a number of different Amazonian river systems. A particulary encouraging change over the last few years has been the establishment of good quality mercury analysis laboratories within the Amazon region itself, in Belém, Manaus, Porto Velho and Santarém. This promises to make future fieldwork easier, and regular monitoring of mercury levels within the Amazon is now being carried out.

However, despite all the activity and the improvements in knowledge, we still remain almost as much in the dark as ever regarding the central issue of mercury contamination in the Amazon – to what extent does it constitute a public health risk? This may seem surprising, given the number of studies which have taken the standard bioindicators – mercury levels in hair and/or blood for organic mercury, mercury levels in urine for inorganic mercury – and analysed individuals in the Amazon defined as at risk. Yet in a sense, this is exactly the problem: those to whom researchers have paid attention have been individuals, yet mercury as a public health issue exists at the level of the community and the region, rather than the individual alone. While the study of mercury contamination in the environment has been advancing, the epidemiology of mercury contamination in the Amazon is still in its infancy. And the result, looking at the literature, is that we simply cannot say whether mercury contamination constitutes a public health risk in the Brazilian Amazon. Without the epidemiology, it is impossible to say.

Let me illustrate this point with an example: the threshold levels of mercury contamination defined by international agencies. With only a couple of exceptions, the work on mercury contamination among human populations in the Brazilian Amazon has taken samples from a group of individuals, taken from a wider population about whom very often no hard information is supplied, and those samples are then compared to threshold levels used by international institutions, such as the World Health Organization, the U.S. Government, the European Union, etc. If a reasonably large percentage of samples exceeds these limits, as they usually do, this is taken as evidence of a contamination problem. Recommendations are then made about the need for *caboclos* to modify their fisheating habits. But a hair sample result on its own means little; it cannot be taken as a substitute for clinical information. Even interpreting the hair sample result is problematic. A threshold level is one at which removal from exposure is recommended, not the level at which clinical symptoms can be expected to occur. All the clinical data about the occurrence of symptoms of mercury contamination suggests there is considerable variability in susceptibility between individuals, for reasons as yet largely unknown, which makes interpretation of sample analysis still more difficult. This is all the more so when, as is usually the case, the sample results are presented in isolation from clinical data, and without baseline epidemiological information.

The truth is that epidemiology is difficult to do in the Amazon basin. Outside the few urban centres, birth and

death certification is patchy. Many communities have no health infrastructure at all. The most one is likely to encounter is a rudimentary health post staffed by a nurse or nurse auxiliary, with little or no written records. Spontaneous abortion, a critical early indicator if mercury contamination does pose a serious public health risk, is hedged about with cultural sensitivities which make it impossible to gather reliable information without extended fieldwork. So health researchers in the field in the Amazon routinely need to generate their own baseline epidemiological data, which implies more time doing censuses, household surveys, designing clinical questionnaires and gathering medical histories, with all that implies about extra field personnel, more time in the field, additional data processing and greater spending. The reasons why the basic epidemiological studies we need have not been done are straightforward: in the Amazon, they are logistically very difficult to do, and are very expensive.

And there is a further complication. We know that there are very marked differences in mercury levels in hair both within and between sub-regions of Amazonia. High mercury levels in hair have been found in areas where no gold mining has taken place, and other populations living in areas with long histories of gold mining do not have the high mercury levels we would expect. We also know that organic mercury concentrations in fish vary significantly depending on diet: fruit-eating fish tend to have the lowest levels, carnivorous the highest, and detritus-feeders and omnivores come somewhere in between. Thus, in theory, it is entirely possible to have two fisheating villages a few kilometers apart on the same river, identical in every respect except that one village eats much more carnivorous fish than the other. Even if we had all the epidemiological information, which would be standard in São Paulo or Porto Alegre, this would still be a very difficult problem.

So we have a dilemma. On the one hand, a body of research and policy recommendations that it is necessary to carry out campaigns among the *caboclo* population to reduce their fish consumption, or change the species composition of their fish diet. On the other hand, there is an absence of hard clinical and epidemiological information which could quantify the threat. Many argue that, even in the absence of this data, common sense dictates that it would be prudent to take these measures now, in the face of a known potential risk, in the expectation that future work will quantify the threat. But I do not agree with this argument.

For the last three years I have directed a large project, financed by the European Commission but executed by Brazilian institutions, which has sought to provide precisely the kind of the epidemiological and clinical information which might quantify the public health risk mercury contamination poses. In the course of the fieldwork this has involved, I have become convinced that the best course of action in the riverine *caboclo* communities is to do nothing. This may seem surprising, even shocking, but it has a certain logic. We have concentrated in our work on children aged between 7 and 12 in the valley of the river Tapajós, the heartland of Amazonian *garimpagem*, of whom we have now examined several hundred. I have been impressed in this work by the good nutritional status of the children, in contrast with the nutritional standards one might expect to find in other parts of the world like West Africa, which have health indicators similar to those found in rural Amazonia. If children survive infancy, their life chances are reasonable, and the main reason for this is the fact that most children eat fish at least once a day and have a high-protein diet as a result.

In this context, from the public health point of view any external intervention seeking to modify patterns of fish consumption will do more harm than good. In the first place, the type of information which it would be necessary to pass on to communities in complex. Not all fish species have high mercury levels, even in contamined areas. And not all sub-groups within the population are at risk. Mercury levels in Amazonian fish make it quite clear that adults are not at risk: even if they ate fish every day for the rest of their lives, they would not accumulate sufficient mercury to show clinical symptoms. The true at-risk population is young: fetuses from the late 1970s onwards, when large-scale mercury use began, whose mothers were eating contaminated fish during pregnancy. Thus any educational work would have to be aimed at pregnant mothers, without alarming the rest of the community, and even then would need to stress that only carnivorous fish species should be avoided.

In reality, the negative side-effects of any such campaign would more than outweigh the benefits. While intensive work in a few communities might be able to reach the targetted women and pass on the correct information, even within those communities it would be difficult to avoid the impression that something serious was wrong with eating fish. And in the vast majority of communities where educational work does not take place the inevitable result would be the passing on of distorted, incorrect information which would make all individuals worry about eating all fish species. There is no alternative to eating fish, for the vast majority of Amazonian *caboclos*. In the overall context of *caboclo* life, the negative health consequences of reducing fish intake would be far more important than the possible benefits in reducing exposure to mercury, especially for children. In this setting, paradoxical though it may seem, the at-risk population is most benefitted by being left alone.

Dr. David Cleary
Diretor do Projeto Mercúrio. Fundação Esperança.
Rua Dep. Coaracy Nunes, 3344 – Caixa Postal 222
68040-100 Santarém - Pará - Brasil.
Fones: (091) 522-2726 / 522-1079 - Fax: (091) 522-7878