MEMORANDUM

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

Record

DATE May 19, 1977

FROM : Assistant Director
Field Services Division, BE

SUBJECT: Current Status of Epidemic Aid to Haiti

SUMMARY

Three major problem areas are of current interest in Haiti. Only one--the urban electricity shortage in Port-au-Prince--is regarded by the government as an acute problem. Even then, the government seems concerned only with the potential political consequences of upper class and military disaffection, not with the adverse effect upon health that resulted from a secondary severe shortage of potable water. A major opportunity presented by this situation has been recognized and a Haitian-American working group has been formed with the charge to quantify the relationship between water and health. Such data are preliminary to appropriate economic investment in basic sanitation. Incredibly, no such studies have yet been carried out.

My current understanding of the situation in the Republic of Haiti is probably best described in terms of three major problem areas.

Problem One: The rural drought affecting the north, the northwest and the Ile de la Gonaive.

A normally expected winter rainfall for December of 1976 did not materialize in sufficient quantity to provide for agricultural crop production in these areas with the consequence that the corn (maize) crop failed. Corn is the staple of the rural peasant diet. The peasant, therefore, was forced to obtain more expensive grain. However, the peasant in rural Haiti already uses all of his barterable resources for food under normal circumstances. Thus, when he is forced to buy a more expensive grain than corn, he ends up with less food. Kwashiorkor, marasmus, and the resultant high infant and child mortality normally present can be expected to be increased under these circumstances. This year there was competition with successful coffee farmers from the south who, because of a rapid rise in the world market price of coffee, were able to buy much more rice than normal, thereby artificially inflating the internal price of rice in Haiti. All this was at a time when the

corn crop was failing and there were more people competing for the existing rice anyway. The starvation and food shortage apparent in the rural areas is now considerable, but difficult to quantify. According to some relatively impartial observers (missionaries who run clinics) who have been in rural areas long enough to relate secular events to each other, this drought and starvation to date are bad but not as bad as was evident in 1974. However, there has been, as a result of the drought in the north and northwest and Ile de la Gonaive, a net migration into the capital city of Port-au-Prince in search of employment and food. Anecdotally, I am told by several persons that there is some good evidence of hoarding of food grains in warehouses in the capital city and that this large amount of grain will be released slowly to the market when the price of food grains rises high enough to make a good profit.

I think it best to view this first problem as not really a rural drought, but as a population problem because more people in these areas than ever before are now dependent on subsistence agriculture for their survival. The absolute amount of rain each year in each area varies considerably within certain limits; some years are good, some years are bad. The situation now is that so many people are dependent upon the vagaries of this rainfall for growing their food crops that there are more people being affected more frequently when the rainfall drops below average for any period of time.

The Haitian government does not regard this situation as a problem. The rural poor have good years and bad years. This current bad situation "is to be expected, and will be balanced by good times."

Problem Two: The rural drought in the Artibonite Valley.

The Artibonite Valley is Haiti's breadbasket. A dam built about 1950 at Péligre created a lake-reservoir for irrigation water. A 1950 report by an American engineer indicated that secondary to deforestation of the slopes above the dam, heavy silting of the lake was occurring, and that within 30 years the lake would be silted up and virtually useless as a water reservoir. Now, 27 years later, those predictions are becoming true. As a result of that, we are having a decreased water-holding capacity by the dam and there is a decreased amount of irrigation water. As a result of that, the current rice crop in the Artibonite Valley is in danger.

I think this is best viewed as a potential problem, not yet being actively discussed in Port-au-Prince, but one with possibly grave consequences a few months hence.

Problem Three: Urban electricity.

The capital of Port-au-Prince has as its primary source of electricity the hydroelectric generators at Péligre. However, because of the decreased water volume and pressure head in the lake now, the electricity generation output of the dam is significantly reduced. This is a chronic problem that can only be resolved by draining the lake, dredging it, and then reforesting to slow the erosion. Such a course of action is unthinkable now over the short run.

Simultaneously, the supplemental diesel generators which were present in the capital began to exhibit serious signs of impending failure because of non-maintenance, routine preventive maintenance being essentially a concept foreign to Haiti. This is probably contributed to by Haiti having achieved independence too early (1802) and having remained too isolated for the transfer of early machine technology in the last half of the 19th century. The Haitians, being aware that Péligre was having a decreased output and that their supplemental diesel generators were also having a decreased output, did order a very large generating plant from Germany, which, unfortunately, while being unloaded at the dock, was destroyed.* In any event, the absolute amount of electricity in the capital became critically low in early February 1977.

3A. The government view of the urban electricity problem is directed toward the potential political consequences of the shortage. The power base for the President for Life of the Republic (25-year-old Jean Claude Duvalier) is adversely affected in two important areas by the electricity shortage. First, the military (a major force in the country) is in a peace time posture; the prospect of having them sitting around their darkened barracks at night without television or music to occupy them, and to have them grumbling about the inefficiency of the current government is not particularly pleasing to that government.

Second, a rather large group of hangers-on in the old days of Papa Doc have now become a nouveau riche but very important class in economic development. They are being severely tested in terms of their loyalty to the current regime when the electricity shortage forces the closure of their factories, thereby shutting off their source of income.

* It is not clear whether this problem was merely an accident or secondary to some mechanical failure which may have been at least partially caused by non-maintenance of a crane or some other piece of equipment.

3B. My View

All of the foregoing represents background for the major problem immediately visible to me upon arrival in Port-au-Prince. The power shortage had a severe and widespread effect on water availability in large sections (but not all sections) of the city of Port-au-Prince during the approximately ten weeks of its duration. This is now discussed in detail.

CAMEP is the acronym for the city water authority (Central Autonome Metropolitaine de l'Eau Potable) that supplies water for approximately one million Haitians in and around Port-au-Prince. CAMEP has 20,000 legal connections and an estimated 10,000 illegal connections into its water supply, for a ratio, at best, of one water connection for every 33 residents. This compares to the city of Atlanta, Georgia, where one connection serves about 5.5 persons (675,000 people versus 122,000 active meters).

The water distribution is not uniform socioeconomically or geographically and there are, in fact, three classes of water supply in Port-au-Prince. One class is the multiple tap, which is what the typical American has in his home, multiple hot and cold water taps throughout the house. This encompasses a very small percentage of the population but a large number of the existing connections. The next class of supply is the single tap, which means one pipe connection in the house. These two classes take the majority of the connections. The majority of the population is served by the municipal standpipe. I will be able to quantify these later, but I am told that one standpipe serves several thousand poor people. Thus, under normal circumstances for the majority of the population of Port-au-Prince, all water for domestic use (drinking, cooking, personal hygiene, clothes washing, for cleaning utensils and the household environment) must be carried from a public fountain in the street to the home, whatever distance that may be. Consequently, a whole class of young girls, between the ages of 8 (sometimes 7 or 6) up to 14 (sometimes 15 or 16) normally spend all of their productive hours each day carrying water from the public fountain to the home. Under these circumstances, water use is marginal and certainly is never luxurious, since the carrying of water is a repetitive and heavy burden.

Port-au-Prince began its existence as a city on the southern coastal end of the cul-de-sac plain nestled firmly against the Kenscoff massif. Initially, then, the city received its water supply from springs, gravity fed, which flowed down the mountain and into the plain. As the city grew northward away from the mountains, it outstripped the existing water supply and several deep wells have been drilled at the north end of the current city limits which supply more than half of the city's water. Pumping water out of the ground requires energy and the energy supply for these pumps is electricity. Water from both sources is then filtered, chlorinated and conducted into the city water mains under normal circumstances.

When the full force of the electricity shortage occurred in early February 1977, the city was acutely deprived of more than half of its water supply. Although CAMEP made a very good attempt to distribute what water existed in the system to all parts of the city equally, it was not able to do so for many reasons, which need not be detailed here. Suffice it to say that some areas of the city were completely spared, some areas suffered tremendously and had virtually no water for many weeks, and other areas fell in between these two extremes.

My reaction to this situation was to recognize an opportunity which is best summarized in the following quotation from White, Bradley and White "Drawers of Water - Domestic Water Use in East Africa":

> "If the pollution of a source is halved, or the quantity of water per person is doubled, what improvement of health will result? We can be confident that increasing supply by half a liter for those consuming three liters a day will have some effect, and we can also be sure that allowing another hundred liters of bath water for the rich man who already wallows in a hundred liters will change health but little. There is a sector--we would guess somewhere in the 20 to 80 liters per person range--where health benefits of increasing water begin to level out. It is essential to find more precisely where this point lies, since it greatly affects social costing of water, and this can best be determined by field studies of the effects of varying levels of water improvement. It is remarkable that such studies have not yet been carried out."

It became clear to me that it was possible to find (i.e., there already existed), in Port-au-Prince, two comparable poor populations who are normally drawers of water, who differed significantly in the amount of water that was actually available to them. There must have been a major health impact in the population that was deprived since, in order to avoid dying of thirst, they were forced to alternate sources of water--

even drinking water from gutters in the street--to provide for their basic physiologic needs. The water-deprived population must have suffered an extra burden of morbidity and mortality during the water shortage. The two populations could be defined geographically because of the way the water system is constructed and supplied.

With the able assistance of Dr. Charles Weldon and Mr. Win McKeithen of the U.S. AID Health Office in Port-au-Prince, I was able to arrange for a counterpart in the Ministry of Public Health and Population, the Assistant chief of the Epidemiology Service in the Division of Public Hygiene, Dr. Molière Pamphile. He and his Chief, Dr. Maurice Brutus, agreed that the situation in Haiti represented an extraordinary opportunity to quantify the relationship between water and health--a point of considerable practical interest in the water investment and economic opportunity sector. However, we met a stone wall when we attempted to conduct a survey of water-use patterns in Port-au-Prince in order to identify our two populations. The Secretary of State for Public Health and Population, Dr. Willy Verrier, informed me that he "did not have the authority to grant anyone permission to ask questions about water use." He said that if we wanted to know about water use, we would have to go to CAMEP. I went to CAMEP and there met one of their operational engineers, Henry Dominique, who was very threatened by my proposal because he saw in it the seeds of many future troubles for him and for CAMEP. He did not want me trying to estimate how many people had died or how many people had been sick because of water distribution problems that CAMEP had experienced. I was unable to convince him otherwise.

After exploring many other alternatives, I had a frank exchange with an ex-Minister of Health, Dr. Carlo Boulos. Dr. Boulos is somewhat of an elder statesman, removed from the political fray, very highly respected, who speaks frequently with the President and serves as an advisor to him. Dr. Boulos was the initiator of the malaria program in Haiti under Papa Doc and, most importantly, was the founder and first president of CAMEP. I told Dr. Boulos my problem and explained very carefully to him what I wanted to do, why I wanted to do it, and what the consequences for Haiti might be. I told him that I was not at all sure of the success of this study, but that it needed to be attempted. No one had ever been able to quantify the relationship between water and health, and to let this opportunity go by would be highly undesirable. Dr. Boulos listened, spoke very philosophically and told me that I should be allowed to do this, that this was good for the country. He said that Mr. Dominique did not have sufficient vision to understand that I was not trying to point a finger of guilt, but rather to provide an information base upon which to make more appropriate plans and requests for future city water supplies. Dr. Boulos told me he would take care of this. In fact, the next

day he called me and told me that I should proceed; he had opened all the doors and chastised those who had blocked my way. I then met the Engineer-in-Chief of CAMEP, Mr. Roger Ollivier, a senior official of tremendous vision and foresight who trained in the United States as a sanitary engineer. We had a very frank discussion, and subsequently agreed to form a working group from four participating agencies: 1) CAMEP, 2) the Haitian Ministry of Public Health and Population, 3) the U.S. AID to Haiti Mission (Disaster Relief Officer), and 4) the Center for Disease Control. This is the basis for the enclosed protocol (Appendix). I left Port-au-Prince on April 23, 1977 with the understanding that the working group would continue in my absence to examine the water supply system of CAMEP as discussed in the first stage of the protocol and that I would return to Port-au-Prince with a U.S. epidemiologist from CDC who would participate full-time in the second and third stages. Accordingly, on May 10, 1977, Dr. Stephen Thacker, Epidemic Intelligence Service Officer located at the District of Columbia Department for Human Resources and myself arrived in Port-au-Prince and reviewed the selection of the two populations. One area--the deprived area--was found to be quite satisfactory. This is an area called Belair, near the Fort National. The other area which they had selected--Bolosse--was not anywhere near as satisfactory because the population was not uniformly poor and indeed a large American church mission had made obvious socioeconomic impact on that community. After several days of searching and further meetings, we did locate an appropriate control area, an area at the south end of town, equally as poor as Belair, but which was not at all deprived during the water shortage.

The conceptual model shown in Figure 1 is adapted from White, Bradley and White and at once shows up the deficiencies in the data available. Approximately two and one half liters per person per day are required for basic physiologic maintenance and are essential to life. This is represented by Point A in Figure 1 which thereby indicates that volume of water use below which no normally adapted adult human can exist. As the amount of available water increases, thus allowing for cooking, cleaning of body, cleaning of clothing, and cleaning of the environment, so the level of health increases, but the slope of the curve is not known. We must assume, however, that at some point necessity gives way to luxury and we begin to have sufficient water for watering the lawn, for filling the swimming pool, for washing the car, etc. Point B represents that volume of water use where the benefit to health begins to level out. The study design is intended to identify points on both the X and Y axes for both populations. We should have accurate measures within relatively narrow confidence limits of the per capita water volume daily use for both populations. The confounding variable of polluted source for the deprived population will be a little difficult to include in these calculations, but we hopefully will have some estimate of this. As far as the Y axis is concerned, we will have several measures of health, both absolute and relative, for both populations. As of this moment, Dr. Thacker and the other members of the group are designing

and conducting a systematic survey of both geographical areas. The survey is being designed with the welcome assistance of Dr. Gretchen Bergren, a Harvard School of Public Health faculty member who has worked in rural Haiti for ten years and whose knowledge of the Creole language and its application to survey methodology in Haiti will be invaluable in this study. The actual survey will be conducted by visiting public health nurses from the Haitian Division of Public Hygiene. Some small amount of funds may be required for this purpose, but I have been given to believe that such funds may be locally available, either from the U.S. AID Mission or from the Ambassador's Disaster Fund ($25,000), not all of which has yet been spent. I have arranged with those now working in Haiti to return to Port-au-Prince when the study reaches the data analysis stage. I will be providing ongoing consultation by telephone from CDC, especially in the area of statistical consultation with our statisticians here. I will participate actively in the analysis and in the write-up of the study. I expect to return to Haiti sometime during the first or second week of June (whenever they are ready) in order to complete this project.

Stanley I. Music, M.D.

Enclosure

cc:
Dr. Foege
Dr. Brachman
Dr. Gregg
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Dr. Conrad
Mr. Harris
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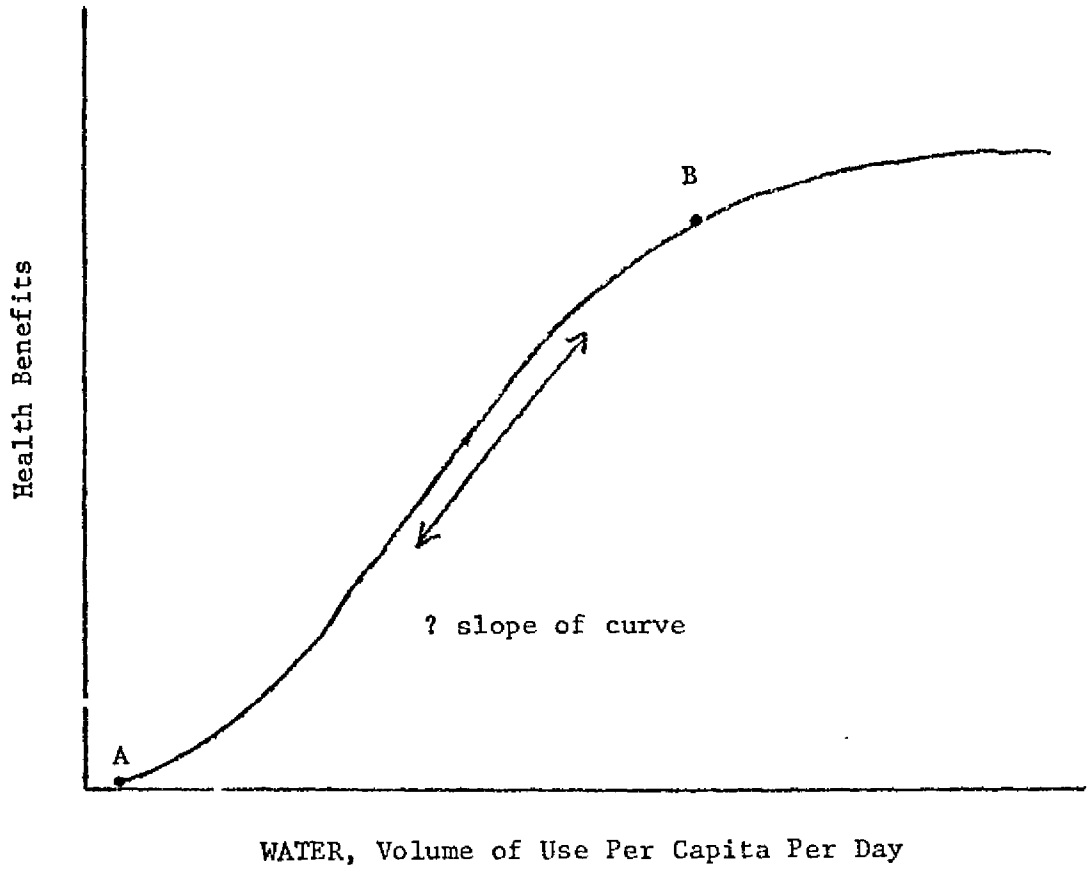

FIGURE 1 (Adapted from White, Bradley, White)

DRAFT

Protocol for the Assessment of Health Impact of a Temporary decrease in Available Potable Water.

INTRODUCTION

A series of circumstances, much aggravated by a severe and unpredictable decrease in rainfall, has resulted in a temporary decrease in available potable water in parts of the city of Port-au-Prince, Republic of Haiti. The water shortage became acute in February, 1977 and was virtually relieved for most areas by mid April, 1977. The complex factors contributing to the water shortage so influenced the existing municipal water supply system, that some areas of the city were completely spared while others had shortage of varying degree until relief could be effected.

WATER AND HEALTH, AN OPPORTUNITY

Recognizing the great deficiencies in the world in knowledge for quantifying the health benefits of increasing the availability of water,

Recognizing the benefits to be derived from quantifying the social costing of water and that this can best be determined by field studies of the effects of varying levels of water availability and usage,

Recognizing a lack of much useful and important knowledge about infections and water-related disease that is so essential for meaningful comprehensive health planning and the allocation of future health sector investments in developing countries

Recognizing the singular scientific opportunity presented for increasing knowledge and understanding for health planning in Haiti

Representatives from

(1) The Ministry of Public Health and Population, Republic of Haiti, MOPH/P

(2) The Central Autonomous Body for Metropolitan Potable Water of Port-au-Prince, CAMEP

(3) The U.S.Agency for International Development, USAID

(4) The U.S. Public Health Service Center for Disease Control,CDC

Agree to the desirability of combining efforts and working together for the purpose of assessing an impact on health of the described temporary decrease in available potable water.

SCOPE OF WORK

The First Stage:

Objective: the selection of at least 2 appropriate geographic areas of Port-au-Prince, of comparable population structure in those variables affecting water use, that have actually differed significantly in their available water supply.

Methods:

the participants will become thoroughly acquainted with the full working of CAMEP, its system for distributing water and the available records of water distribution, and will supplement those records with fields observations, if necessary, to meet the objective.

The Second Stage

Objective: the collection of all available records of mortality and possible water-related morbidity, from all existing sources,

for study areas specified in the First Stage.

Methods:

cemetary records, hospital, health center, outpatient, and private physician records, existing nutritional survey data will be actively collected in as thorough a manner as possible to meet the objective.

The Third Stage

Objective: the analysis and interpretation of the data to measure the health impact.

Methods: appropriate epidemiological and statistical techniques will be utilized to quantify as much as possible the health effects and to meet the objective.

The Fourth Stage

Objectives: the production of a written report of the findings and possible recommendation of the participants.

Methods: Convening as a scientific technical body of diverse disciplines the participants will write a formal report of their collaborative efforts and will make this available to their respective agencies to meet the objective.

PARTICIPANTS

(1) MOPH/P

Dr Maurice Brutus, Chéf du Service d'Epidemiologie

Dr Molière Pamphile, Assistant-Chef du Service d'Epidemiologie

Ing Struller M. Guillet, Chef de Section Central de Statistique

(2) CAMEP

Ing Roger Ollivier Ferdinand, Ingénieur en Chef, CAMEP

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Ing Tibor Nagy, Disaster Relief Officer

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(4) CDC

Dr Stanley Music, Assistant-Director, Field Services Division