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Date November 19, 1981

From Nancy Binkin, M.D., M.P.H., Epidemic Intelligence Service Officer
Family Planning Evaluation Division, CHPE

Subject Foreign Trip Report (AID,RSSA): Mali & Senegal, September 17-October 9, 1981.

To William H. Foege, M.D.
Director, Centers for Disease Control
Through: Horace G. Ogden *HGO*
Director, Center for Health Promotion and Education

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I. SUMMARY

In March 1981, the Centers for Disease Control, the International Fertility Research Program (IFRP), and the Government of Mali initiated a hospital based prospective study of abortion morbidity and mortality in 15 centers throughout the country. We are using a standardized questionnaire developed and field tested by the IFRP and have trained nurse midwives and physicians in each center how to fill out the questionnaires. During my visit I discussed the results of the first six months of data collection with the Malian physicians collaborating with us on the study and helped the fifth year medical student who has been one of the in-country coordinators organize his thesis, which is based on the first six months results. The Malian personnel and I conducted retraining sessions for the nurse midwives and physicians in filling out the questionnaire, developed solutions for problems that have developed during the study, and presented our preliminary results to nursing and medical personnel and to the Ministry of Health officials. A preliminary analysis shows that approximately 16 % of the 288 abortion admissions so far reported were due to illegal abortions. The women obtaining illegal abortions tended to be young, unmarried, high school or college students living in urban areas who wanted several children in the future. About half of these women were septic at the

time of admission and over a third had significant blood loss. The use of the operating room, antibiotics, and oxytocics was considerably greater for the induced abortion group. Women with induced abortions stayed in the hospital an average of 5 days, compared with 3.7 for the spontaneous abortion group and received 9 days of antibiotics, compared with 5.6 for the spontaneous group. Two induced abortion deaths occurred, resulting in an induced abortion death-to-case ratio of 4.4 per hundred.

The physician who is serving as the chief investigator in our abortion study, Dr. M. Lamine Traore, asked about the possibility of continuing the abortion study beyond the designated one year study period. Because funds are not available to continue the study and because the information obtained in an additional several months of data collection would not dramatically alter the study findings, I instead suggested that a simple surveillance system be established. Each hospital and maternity center maintains a registry of all admissions and I suggested data could be collected in the form of a simple line listing including the woman's demographic characteristics and type of abortion according to the WHO criteria (1). Dr. Traore also asked if we could provide technical assistance in developing data collection instruments and in data processing for a study of maternal morbidity and mortality in Mali. He suggested that fifth year medical students could collect data from various regions of the country and these students could then write their theses on the subject. He is drafting a proposal for presentation to the Ministry of Health.

On my previous visit to Mali in February and March of 1981, I was asked by USAID to gather data on the meningococcal meningitis epidemic that had begun in late February, looking specifically at vaccine needs and potential U.S. contribution to the control of the epidemic. Results of my preliminary epidemiologic analysis are given in my trip report dated May 11, 1981. During the present trip I completed data collection for the remainder of the epidemic in Bamako, gathered socioeconomic and meteorologic data for use in further analysis, and collected information on the number of cases and the effects of the vaccine campaign in the rest of the country.

Eight hundred forty-four cases occurred between January 1 and April 31, 1981 with 92 deaths, giving an attack rate of 12.6 per 10,000 and a case fatality rate of 10.9 per 100. Attack rates were highest in the 0-1 age group and the 5-19 age groups. Case fatality rates were highest in the 0-1 and over 35 age groups. Four hundred thousand people were vaccinated in the capital city of Bamako between March 5th and March 26th. The epidemic peaked one week after initiation of the vaccine campaign and subsequently declined. After completion of the vaccination campaign, 210 cases were reported, only 32 of which occurred among the 400,000 vaccinees ($p < .001$). Seventy percent of the vaccinees who developed meningitis had been vaccinated less than 8 days prior to admission. Three thousand three hundred cases occurred in the rest of Mali. Vaccination was not begun outside of Bamako until late March, and from the currently incomplete government records, it appears that many areas of the country remain unvaccinated. We were unable to assess the effects of the vaccine campaign outside the capital.

I discussed with Grandes Endemies officials the need for setting up an effective surveillance system during the upcoming dry season, as meningitis epidemics in the past have usually occurred in two-year cycles. Seven hundred fifty thousand doses of meningococcal vaccine are currently in cold storage in Bamako, and I additionally recommended that at least part of the vaccine be used in areas which were not vaccinated last year, preferably before the dry season starts.

During my stay I was also asked to review the report of an oral rehydration project being supervised by Dr. Peter Kneibel of the USAID Regional Office. We discussed the analysis of demographic and medical characteristics, methods for assessing program effectiveness, and ways of improving followup of patient outcome.

In Senegal I met with Professor Paul Correa, head of the Obstetrics and Gynecology Department at Le Dontec Hospital in Dakar, concerning a proposed study of abortion morbidity and mortality in the Cap-Vert region of Senegal. We discussed the study design, the budget, and his proposal for adding a histologic component to the study. Mr. Jay Friedman and Mrs. Nadine Burton of IFRP will meet with Dr. Correa in late October to discuss further details of the study, which is scheduled to begin January 1, 1982.

II. PLACES, DATES, AND PURPOSE OF TRAVEL

Bamako and Segou, Mali, September 17 to October 5, 1981: to consult with Ministry of Health and School of Medicine personnel regarding prospective hospital-based study of abortion morbidity and mortality currently in progress and to meet with Ministry of Health and Grandes Endemies officials concerning results of vaccination program undertaken in March and April 1981 during the meningococcal meningitis epidemic. While in Mali, I was also asked to review an epidemiologic analysis of an oral rehydration program currently being tried out in Bamako.

Dakar, Senegal, October 5-9, 1981: to consult with Dr. Paul Correa, Chairman of the Obstetrics and Gynecology Department at Le Dontec Hospital in Dakar regarding a proposed study of abortion morbidity and mortality to be conducted in the Cap Vert region of Senegal.

III. PRINCIPAL CONTACTS

A. Mali

1. Abortion Study

USAID

Mr. Tom Park - Health Officer
Mr. Tata Sangare - Assistant Health Officer

Ministere de Planification

Dr. N. Traore - Directeur General de la Planification
Dr. Senousse Konate, Directeur General Ajoint
Mme Sirah Dembele, Bureau de Planification
M. Diakite Moussa, Bureau de Planification

Region de Bamako

Dr. Diabe N'Diaye - Medecin-chef du District de Bamako

Ecole de Medecine and Hopital Pt G

Dr. Sangare - Medecin Chef
 Dr. M. Lamine Traore - Chairman, Department of Surgery
 Mr. Attaher Toure - Medical student
 Mr. Nouhoum Koita - Medical student
 Mme Fatimata Keita, Sage-femme

Hopital de Segou

Dr. Tahirou Bah, Medecin chef

2. Meningitis study

USAID

Mr. Tom Park - Health officer

Ministere de Planification

Dr. N. Traore - Directeur General
 Mr. Salif Koulibaly, statistician

Grands Endemies

Dr. Joseph Coulm, French Technical Advisor

District de Bamako

Dr. Diabe N'Diaye, Medecin-Chef

Hopital Lazaret

Mr. Sanogo Zimogo - Medical Student

Energie du Mali

Mr. Cheikna Coulibaly - Comptroller

Radio Mali

Mr. Abdoulaye Sidibe - Chief of Information Division

Institut Meteorologique

Mr. Nama Keita - Director

3. Oral rehydration study

USAID - Regional Office

Dr. Peter Kneibel

B. Senegal

USAID

Dr. Mike White, Health and Population Officer

Le Dontec Hospital

Dr. Paul Correa

IV. OBSERVATIONS AND RECOMMENDATIONS

A. Hospital based prospective study of morbidity and mortality in Mali

1. Background.

A prospective, hospital based study of abortion morbidity and mortality was started in March 1981 through the joint efforts of the Government of Mali, CDC, and the International Fertility Research Program (IFRP) (See CDC Foreign Trip Report dated May 14, 1981). Fifteen centers were chosen for inclusion in the study, including the two hospitals and four maternity centers in the capital of Bamako and nine hospitals and maternity centers located in cities of greater than 10,000 population scattered through the rest of Mali. We trained several midwives and doctors at each center to fill out a standardized questionnaire on each patient admitted with an abortion complication. The questionnaire includes information on demographic characteristics, medical complications, and details of hospitalization, including duration of hospitalization, number of surgical procedures, and use of medications and transfusions. Each abortion is classified as induced, probably induced, possibly induced, and spontaneous according to criteria outlined by the WHO Task Force on Induced Abortions (1). In addition to the questionnaires, we are compiling information each month on the number of obstetric and gynecologic admissions and on the availability of medications and blood products and are receiving detailed reports of each abortion death.

2. Current status.

At the time of my visit, questionnaires for 288 admissions had been processed at the IFRP headquarters. This represents six months of data collection for Bamako and 1-3 months of data from the rest of the country. Mr. Toure, a fifth-year medical student who is our in-country coordinator, and Dr. Lamine Traore, professor of surgery at the School of Medicine and director of the project, and I discussed in great detail the preliminary data results. We subsequently presented our findings to various Ministry of Health officials, to the directors of the hospitals in Bamako and Segou, and to the nurse-midwives at the six centers in Bamako. Mr. Toure is writing his medical school thesis on the preliminary results of the study, and during my stay I reviewed his first draft.

Mr. Toure and I also held a training session at the Djikoroni Maternity Center in Bamako to instruct additional midwives in how to fill out forms in order to insure full-time coverage of abortion admissions. We also visited the hospital at Segou, the second largest city in Mali. Forms have not been sent from Segou on a regular basis, and we discussed with the two

physicians who handle all abortion admissions the importance of their participation in the study. The chief physician there has been doing his own study on abortion complications over the past year, and we discussed the possibility of sending him the center specific results for Segou for our study.

According to the WHO definitions, forty-six of the abortions in our series of 288 were induced or probably induced, while the remaining 242 fell into the spontaneous or possibly induced category. The picture that has emerged from our study of the illegal abortion patient is that of a young, unmarried, high school or college student living in an urban area who wants several children in the future. About half of these women were septic at the time of admission and over a third had significant blood loss. Over 70% of the women with induced abortions had incomplete abortions compared with 35% of those with spontaneous abortions. The use of the operating room, antibiotics, and oxytocics was considerably greater for the induced abortion group. Women with induced abortions stayed in the hospital an average of 5 days compared with 3.7 for the spontaneous abortion group and received 9 days of antibiotics, compared with 5.6 for the spontaneous group. Two deaths have been reported, both among induced abortion patients, giving a case-fatality ratio of 4.4 per 100.

One of the problems that had arisen in our study concerns the incidence of sepsis. Dr. Traore believes that the incidence is higher than the 50% reported so far among induced abortion patients in the study. In discussing the problem with physicians and nurse midwives in several centers, we determined that temperatures are not routinely taken because most of the hospitals lack thermometers and that the diagnosis of sepsis probably includes only those women with evident peritonitis. We agreed to provide each center with thermometers and Dr. Traore is holding review sessions with the midwives in Bamako regarding diagnosis and treatment of sepsis.

Dr. Traore raised the question of continuing the study for an addition six months now that some of the initial study problems have been resolved. Because additional data is unlikely to dramatically alter the conclusions and because funds for the abortion study had been allocated only for a one year period, I did not feel that continuation was either necessary or possible. However, I discussed establishing a simple abortion surveillance system. Data could be collected by the nurse-midwives in the form of an ongoing line listing of demographic characteristics, type of abortion, and complications as a routine part of the admissions rosters at each of the institutions currently participating in our

study. Periodically the information could be compiled in Bamako by the statistical services division of the Office de Planification, and an annual report could be issued.

B. Possible Maternal Mortality Studies in Mali.

Dr. Traore also expressed a great deal of interest in setting up studies of maternal mortality in various areas of Mali. Data collection on maternal mortality in Mali is acknowledged by the Ministry of Health to be poor. Dr. Traore and I discussed various methods of studying maternal mortality, both hospital and community based. He feels that he can enlist the services of several fifth year medical students who would subsequently be assigned to the various regions for six month periods and who could write their medical school theses on maternal mortality in their designated areas. He asked if we could provide technical assistance in the development of a study and help in data processing, with in country costs met by the School of Medicine and by the Ministry of Health. He will discuss the possibility with the Ministry of Health, who can then contact the U.S.A.I.D. Mission to formally request assistance.

C. Meningococcal Meningitis Epidemic in Mali, January to April 1981.

2. Mali is the westernmost country in the meningitis belt of Africa, a collection of sub-Saharan African nations where meningococcal meningitis is hyperendemic and where large-scale epidemics occur at 10-12 year intervals. The last major epidemic in Mali had occurred in 1969-70, when over 16,000 cases were reported. By late February of this year, it became apparent that another epidemic was occurring centered in the capital of Bamako. I was in Mali working on the abortion study at the time and was asked by AID to gather epidemiologic information on the epidemic and to assess vaccine needs. AID and other international donor agencies rapidly provided vaccine. Four hundred thousand doses of vaccine were given over a three week period in March, with a subsequent leveling of and drop in the number of new cases. A detailed discussion of my preliminary findings and of the vaccination campaign can be found in my trip report dated May 11, 1981.

1. Data Collection

During my present visit to Mali, I completed data collection on cases occurring after my departure from Bamako and on the number of deaths each month for the past two years in Bamako to look for an excess that might represent meningitis cases who died before reaching the hospital. Energie du Mali officials provided me with information on potable water, electrification, and crowding in each of the neighborhoods of Bamako so that a possible link between socioeconomic status and the number of cases from each neighborhood could be examined. I obtained information on the order of vaccination

in neighborhoods from Radio Mali, and gathered meteorologic data for the past 15 years for Bamako, Segou, and Mopti from the Meteorologic Institute. Finally I obtained weekly meningitis statistics for the 46 Cercles of Mali between January and May and collected what little information that was available on vaccination outside of Bamako.

Preliminary analysis of data in Bamako shows that 844 cases occurred between January 1 and April 31, with 92 deaths (Table 1). Death registries for Bamako did not show an increase in deaths in excess of the known meningitis deaths, suggesting that there were probably not many deaths due to meningitis occurring before the victim reached the hospital. Attack rates were highest in the 0-1 and 5-19 year age groups. Case fatality rates were highest in the 0-1 and over 35 groups. Males had both higher attack rates and case fatality rates than females.

The epidemic peaked in mid-March and subsequently declined following the completion of the vaccination campaign (Figure 1). After the campaign, which resulted in vaccination of 400,000 of the 671,000 residents of Bamako, 210 further cases occurred. Thirty-two of the cases were reported among individuals vaccinated more than one week prior to admission, compared with an expected 125 cases among the 400,000 vaccinees if the vaccine had no effect ($\chi^2 = 170$, 1 df, $p < 0.01$). The case fatality ratio was 6.4 per 100 for vaccinated patients, compared with 11.3 per 100 for the unvaccinated group ($p =$ not significant). Seventy percent of the vaccinees had been vaccinated less than 8 days prior to admission, while 20% had been vaccinated more than two weeks before the admission, probably representing vaccine failures.

Three thousand three hundred cases occurred in the other regions of Mali. All regions except Gao and Tombuctu had one or more cercles with over 2 cases/10,000 population per month. Vaccination was not started outside Bamako until late March, and from the governmental records, which are currently incomplete, it appears that a high percentage of the population remains unvaccinated.

3. Recommendations

Presently 500,000 doses of A vaccine and 250,000 of AC vaccine are in cold storage in Bamako. Because epidemics in the past have occurred in two year cycles and a significant portion of the population outside Bamako has not yet been vaccinated, and because long term cold storage in Mali is difficult due to power failures, I discussed with the Grandes Endemies officials the advisability of vaccinating susceptibles outside Bamako before the dry season begins in January.

The active surveillance system established last year during the epidemic is no longer operative, and I also discussed with

Ministry of Health officials (pending CDC approval) the possibility of inviting CDC personnel to assist in setting up an active surveillance system and assisting in epidemic investigation and control should another epidemic occur. We also discussed the possibility of sending a public health advisor with previous West African experience to assist in vaccine campaign logistics. If an epidemiologist is sent to Mali, I additionally suggested that a fifth year medical student and a statistician from the Ministry of Health be assigned to work with the CDC epidemiologist so that they could gain experience in epidemiology and in surveillance. I told Ministry of Health officials that I would notify them if it would be feasible for us to send an epidemiologist, and Dr. Claire Broome, Chief, Special Pathogens Branch, CID, is currently considering the possibility.

D. Oral Rehydration Protocol Review

1. Background

While in Mali, I was asked to review a report of an oral rehydration program recently started at the Gabriel Toure Hospital in Bamako by Dr. Peter Kneibel of the AID Regional Office. Patients with dehydration who are seen in one of the pediatric wards are sent to the oral rehydration center unless they are severely dehydrated. After weighing and a brief physical to assess hydration status, patients are observed for several hours on oral rehydration solution, and if they are no longer vomiting they are sent home with enough solution to last 24 hours and told to return the following day. The patients who return are evaluated according to the subjective criteria of the mother's assessment of the child's state and the nurse's assessment of hydration. Dr. Kneibel is currently trying to assess the demographic and medical characteristics of patients coming to the center as well as the success of the program

2. Recommendations

Dr. Kneibel and I discussed several aspects of the data analysis. In the initial assessment of each child, malnutrition was evaluated according to where the child's weight for age fell in relation to the 50th percentile. A high percentage of children fell into the moderate to severely malnourished categories. Because children with evident dehydration had lost between 7 and 15% of their body weight, we discussed doing either a correction for the degree of dehydration or reweighing the child on a return visit in order to accurately assess the nutritional status of the children in the program.

Follow-up rate on patients is currently 50%. we reanalyzed the data and demonstrated an apparent relationship between distance from the center, with 3 kilometers being an apparent critical distance for return to the center. In order to adequately assess the effects of the program, a much higher follow-up rate is needed. Dr. Kneibel and I discussed the possibility of doing outreach for a brief period to follow up on patients who do not return and check the daily death registries which are maintained by the Service d' Hygiene in

Bamako. We also discussed adding the objective criteria of weight on follow-up visit to the mother and nurse's subject to assessment in order to better assess the programs' effects.

E. Proposed Hospital Based Abortion Study in Senegal

During their July visit to Senegal, Jay Friedman of CDC and Nadine Burton of IFRP discussed the possibility of initiating a study of abortion morbidity and mortality in the Cap Vert region of Senegal with Dr. Paul Correa, Professor of Obstetrics and Gynecology at the Le Dontec Hospital in Dakar (See CDC Foreign Trip Report dated September 23, 1981). He was interested in adding a histopathologic component to the study and was asked to submit an overall budget for the epidemiologic and laboratory aspects of the study.

During my visit, I met twice with Dr. Correa to discuss the budget, the study design, and his proposal for adding a laboratory component to the study. Dr. Correa proposed that an abortion study in the Cap Vert area be done by an intern, who would hopefully be assigned fulltime to the project. The intern would personally visit the hospitals, maternity centers, dispensaries, and clinics each time a woman with an abortion was admitted in order to fill out the questionnaire and to collect pathologic specimens (either the aborted fetus, products of conception digitally or mechanically removed, or uterine scrapings done by the intern with a Novak curette).

Dr. Correa stated that he does not feel epidemiology is an inadequately scientific discipline, and in order to do a scientific study of induced and spontaneous abortion that would be respected by the African medical community, a histologic component would be essential. The purpose of the histologic study is to look for villous and fetal abnormalities (which might be indicative of a spontaneous abortion), to determine whether the woman was pregnant or not, and to look for evidence of hydatidiform moles, which are seen in an estimated one per 200 pregnancies in Senegal. How this information would be integrated into the epidemiologic study was not clear; he suggested that the results would have to be analyzed before a decision could be made as to how to utilize the data.

Dr. Correa feels strongly about the histologic study and he will not consider participation in the epidemiologic study without the histologic component. With the histologic study, however, his proposed budget is \$63,000, \$20,000 to \$30,000 over the limit proposed by IFRP during Mrs. Burton's July visit. Further discussion of the budget and of the histology study will take place later in the month between Dr. Correa and Mrs. Burton and Mr. Friedman.

REFERENCES

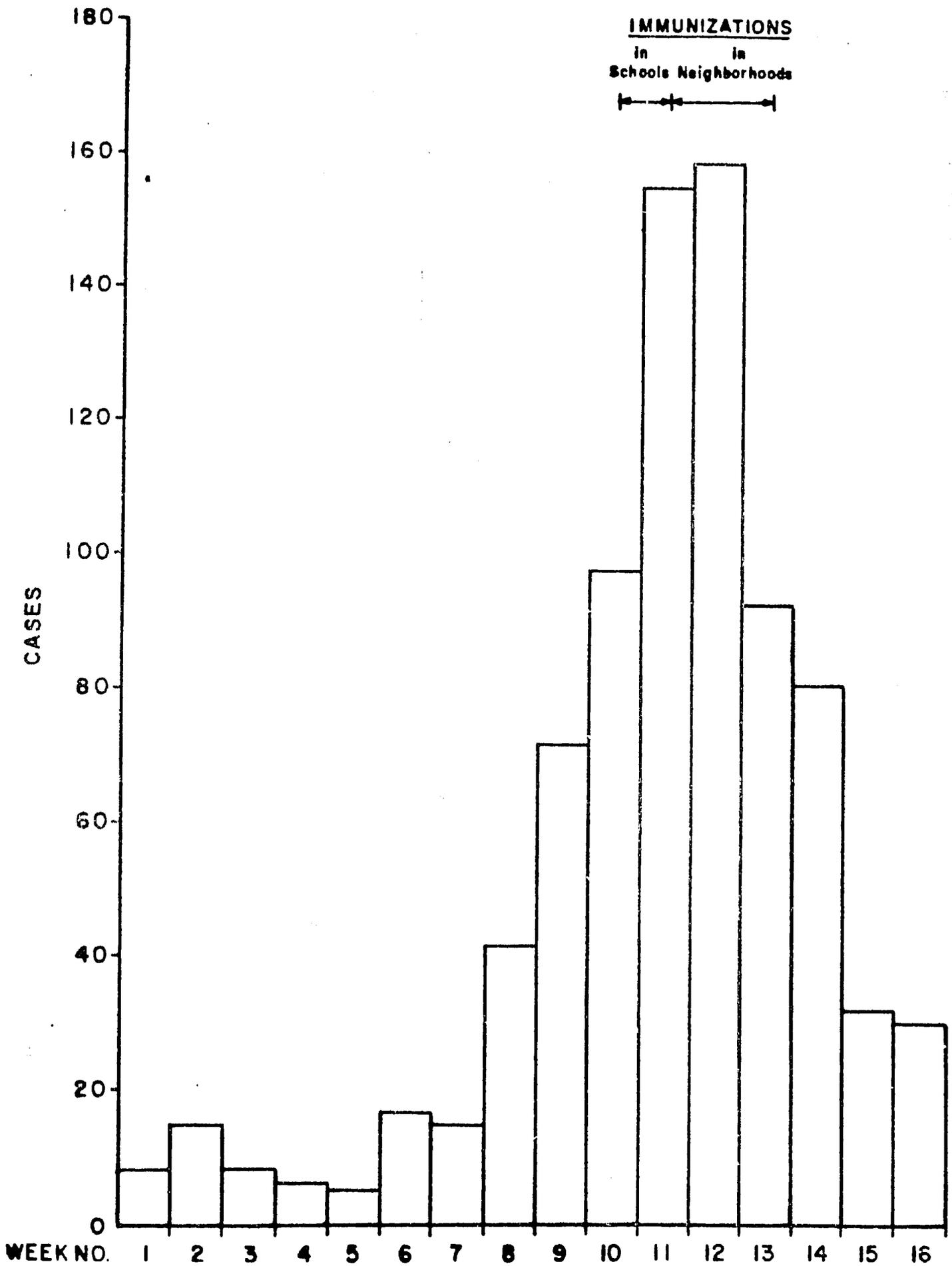
1. WHO Task Force on Sequelae and Complications of Induced Abortion. Meeting of Section of Health and Health Service Implications of Illegal Abortion, Geneva, 27-30 October, 1975. Mimeographed.

Meningitis Cases, Lazaret Hospital
Bamako 1/1/81-5/31/81

Total Cases: 844
Total Deaths: 92
Attack Rate/10,000 = 12.6
Case-Fatality Rate/100 = 10.9
Male:Female ratio = 1.2

<u>Age</u>	<u>Population</u>	<u>Cases</u>	<u>Attack Rate/ 10,000</u>	<u>Case Fatality Rate/100 cases</u>
0-1	44,219	98	19.9	25.5
2-4	76,792	91	11.9	12.1
5-9	100,039	160	16.0	7.5
10-14	76,058	144	18.9	10.4
15-19	78,379	166	21.2	7.2
20-24	69,632	81	11.6	6.2
25-29	54,835	40	7.3	5.0
30-34	43,046	19	4.4	0
>35	123,061	41	3.3	24.4
Unknown	341	4		

TABLE 1 - MENINGITIS CASES, LAZARET HOSPITAL, BAMAKO, JANUARY 1 - APRIL 18, 1981



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