MENINGOCOCCAL MENINGITIS IN ETHIOPIA 1974.1983 AND STRATEGIES OF CONTROL.

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ABSTRACT

Ethiopia lies in the eastern part of the African cerebrospinal meningitis belt, but the existence of seasonal epidemic of this dangerous diseases has only been recognized since 1974. In the last decade, epidemic" have occurred every year in at least two region.! in northwestern Ethiopia. This study review" the experience" of three period. During 1974-1976, the region affected were identified and health workers began to appreciate the seriousness of meningitis. There were major epidemic" in 1977 and 1981. More epidemiological studies were done, active and passive "surveillance begun, polyvalent vaccine (A+C) introduced and field treatment of patients proved effective. Much lower case fatality rate" in the 1982 and 1983 outbreak showed the value of these measure. Equally important has been the active participation at all level of government and non government agencies and the communities themselves. Each region is now self sufficient in early detection and management of epidemic". Meningitis control in Ethiopia is a successful example of the primary health care approach.

INTRODUCTION

Meningococcal meningitis caused by Neisseria meningitidis is a serious public health problem in many countries, usually appearing as an outbreak during the cold, dry late winter and spring months. In Africa,Lapeyssonnie (1) has described it as occurring in the band of countries located south of the Sahara and north of the equator, stretching from Upper Volta in the west to Ethiopia in the east, and known as the cerebrospinal meningitis belt or CSM belt (Figure 1). The countries situated in this semi-arid Sahelian zone have similar climatic characteristics from January to June, in particular a dry spring season peaking in March-April-May by serogroup A *Nesseria meningitidis*. The existence of these seasonal meningitis epidemics in Ethiopia has really only been recognized since 1974. However, there had been reports in the Ministry of Health of outbreaks (incompletely described) in Gondar, Tigrai, and the southern part of Eritrea since the 1940s, and the western regional bordering Sudan were included as part of the CSM belt (2). There were also a few laboratory studies indicating sulphonamide resistance by strains of serogroup A meningococcus (3,4). The first comprehensive retrospective study was the review of the 1974-76 outbreaks (5) which affected six regions in the north and west of Ethiopia A 1977 outbreak of meningitis among militia in a military training centre near the capital, Addis Ababa, also permitted greater awareness and better understanding of the disease by health workers (6). Since 1977, progress in the management of meningitis has been swift, including progressive followup studies, use of guidelines in surveillance, introduction of reporting, and modification of prevention, treatment and control This study made it possible to identify the

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[1] Ethiopia is divided into fourteen Administrative Regions. These, in turn, are subdivided into awrajas and the awrajas into woredas. Any reference to "region" means one of these Administrative Regions.

regions affected by meningitis, as well as the eastern end of the African CSM belt methods (7). The worst epidemic, affecting over 38,000 cases, was in 1981 (8). This dramatic experience led to reconsideration of the control strategies then in use, and to major changes in these strategies being made at a symposium and workshop held in November, 1981 (9).

This paper has two major parts:
a) a description of the meningitis situation in Ethiopia from 1974 to 1983 and.
b) a report on progress in the strategies applied to the management of meningitis (treatment, control and prevention) during three periods, 1974-1976, 1977-1981 and 1982-1983.

The objectives are to provide up-to-date information on the knowledge gained during these years, and to highlight developments in the use of various strategies, including the Primary Health Care approach, in conquering this acute, seasonal, highly prevalent and often fatal communicable disease.

METHODS AND MATERIALS

Information on the status of meningo coccal meningitis in Ethiopia was collected from the annual reports submitted on special forms from the 14 regions to the Ministry of Health's Communicable Diseases Control Division (CDC). The reports include the number of affected cases by age, sex, season and year, as well as the number of case fatalities. It has been possible to detennine the epidemiology both retrospectively from the 1974-76 studies (5) and, since 1977, prospectively by using an active and passive surveillance system during both endemic and epidemic seasons. Regular and continuous contact is maintained with the awraja and regional medical officers, during epidemics) there is immediate dissemination of information via radio, telex and telephone. Laboratory studies, mainly from a few regions, have been performed by a team fromthe Central Laboratory and Research Institute.

The analysis of this infonnation on the distribution of disease is in three categories: for distribution by region and season, we have analyzed the 10 year period, but for analysis by sex, the fairly complete data of 1981, and 1983 and for age, that of 1982 and 1983 were used. In particular, the paper looks at the control measures used since 1981; that is, following the major revision of strategy that came out of the 1981 workshop. Information from the region most affected in each outbreak (Wollo in 1982 and Wollega in 1983) is considered to assess how well the workshop recommendations were followed. The analysis emphasizes the most important strategies used in controlling meningitis:

a) case detection through active and passive surveillance: b) case reporting; c) case treatment - Use of drugs and field sites for treat-ment; d) chemoprophylaxis and immunoprophylaxis. e) multi-sectoral institutional

involvement 1) utilization of health workers and g) community participation.

BACKGROUND: MENINGOCCOCAL MENINGITIS 1974-1983

Meningitis Areas
The areas affected by meningitis lie within the CSM belt of Africa (Figure 1), and contain about 18 million people, that is, over half the population of Ethiopia. Seven administrative regions - Eritrea, Tigrai, Gondar, Gojam, Wollega, Wollo and Shoa are affected to varying degrees (Table 1). Seasonal epidemics have occured yearly in at least two, and commonly in four or five, regions during the 10 year period, particularly in Gondar, Gojam, Wollo and Wollega.

Sex and Age
Table 2 shows sex distribution in the 1981 epidemic, in regions from which complete data have been available. The disease was more common in males than in females, 54.4% vs. 45.6%. Meningococcal meningitis affects predominantly the younger age groups. The data from the 1983 outbreak in Wollo and Wollega (Table 3) show that 37.7% of those affected were in the age group 5-14 years, while 28.6% were between I and 4 years and only 6.90;0 were between birth and 1 year old. Only 26.8% of those who contracted the disease were over 15 years old. Seasonal incidence Outbreaks of meningitis typically occur every year in the spring, beginning in January , peaking in February -April, and declining in May and June with the coming of the rainy season. The association of changes in climate with the course of an epidemic was studied in 1977 during the out break of meningitis among military recruits near Addis Ababa (Figure 2). Many cases were seen during the months when temperatures were high and rainfall low, whereas the start of the rains and the decrease in temperature in May-July terminated the outbreak.

The Cause of Meningitis
Laboratory investigations on the epidemics have been limited. Bacteriological studies using culture methods on the cerebrospinal fluids of meningitis cases in 1977 to 1981 (9) have revealed that the cause of the outbreak is predominantly serogroup A N. meningitidis. All the microorganisms have been found to be resistant to sulphadiazine with minimum inhibitory concentration (MIC) of 5 mg. to 10 mg. of the drug.

DEVELOPMENT OF STRATEGIES IN THE CONTROL OF MENINGITIS OURBREAKS

1974-1976
During this period, there was no organized system for controlling meningococcal meningitis in Ethiopia. Knowledge of, and skill at, handling epidemics was quite limited, while methods 0£ reporting and surveillance hardly existed. Sulphonamides had been used extensively both £or treatment and prophylaxis. Vaccination was not used as a preventive measure. However, more knowledge was gained on the distribution of the disease, its seasonal incidence and the numbers of case fatalities and retrospective studies of this situation (5) have helped in introducing methods of control and in fostering a proper appreciation of this major problem at regional health departments and the Ministry of Health.

1977-1981

The epidemic of 1977 that occured among militia in Tatek Military Training Centre, 35 kilometres west of Addis Ababa, proved significant in improving control of meningitis outbreaks because it provided a unique opportunity to study the characteristics of an epidemic. Collaborative efforts by the Ministry of Health and the military.

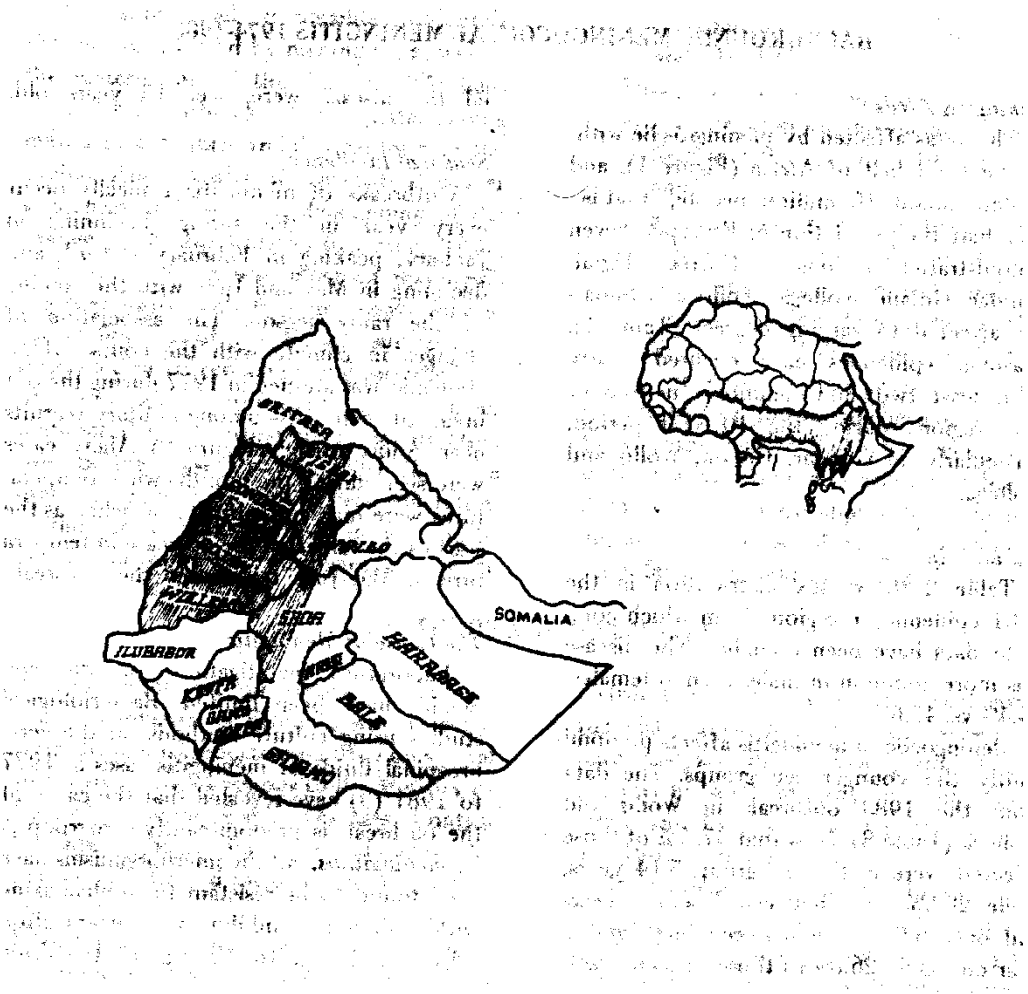


FIGURE 1. Meningococcal meningitis endemic areas in Ethiopia. The smaller picture shows the cerebrospinal meningitis belt of Africa.

TABLE 1: Distribution of Meningococcal Meningitis, 1974-1983 (reported cases by region)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Gondar	56	77	60	-	220	190	1226	27,798	825	-
Gojam	25	15	14	629	50	100	15	3,400	-	-
Wollo	137	61	781	-	60	50	-	6,980	1135	989
Wollega	100	115	159	202	43	17	-	483	1143	2712
Shoa	33	267	61	465	57	-	-	-	-	-
Tigrai	47	68	113	-	-	-	-	19	2742	-
Eritrea	-	-	-	-	-	-	-	20	366	-
TOTAL	398	603	1188	1296	430	357	1241	700	6211	3701

Note: Blank spaces indicate that no cases were reported to the Ministry of Health.

TABLE 2: meningitis Cases by Sex and Region, 1981 Male Female Total

	Region[1]				
	Number	Percent	Number	Percent	Number
Gondar	15,105	54.3	12,693	45.7	27,7982
Wollo	664	57.5	491	42.5	1,155
Wollega	247	51.1	236	48.9	483
Eritrea & Tigrai	24	61.5	15	38.5	39
TOTAL	16,040	54.4	13,435	45.6	29,475

Note 1: Gojam and Shoa are not included because information on cases by sex was not available.

Note 2: There were 69BO cases in Wollo in 1981, but data on sex were available for only 1155 cases.

TABLE 3: Meningitis Cases by Age and Region, 1983

	Wollo (N=989)		Wollega (N=2712)		Total	
Age	Number	Percent	Number	Percent	Number	Percent
0-1	65	6.6	190	7.0	255	6.9
1-4	379	38.3	678	25.0	1057	28.6
5-14	317	32.1	1079	39.8	1396	37.7
15-44	209	21.1	683	25.2	892	24.1
45 +	19	1.9	82	3.0	101	2.7
TOTAL	989	100.0	2712	100.0	3701	100.0

administration made it possible to control the epidemic which affected hundreds of men. Systematic methods of management could be used, such as treatment of cases under guidelines and supervision in the field hospital, Saint Paul's Hospital and other hospitals in Addis Ababa, and

preventive vaccination of 92,000 militia using polyvalentA+C vaccine. The experience gained from this epidemic led to further studies with the aim of providing more information on the management of epidemics, obtaining reliable reports from the regions and instituting continuous surveillance during both endemic and epidemic seasons in Ethiopia.

Between 1977 and 1981 there were various improvements, particularly the increased awareness among health workers of meningitis as a serious problem, although this was more evident in regional health departments and the Ministry's Communicable Diseases Control Division than in health centres and health stations. National surveillance was introduced, guidelines on the management of outbreaks were increasingly
used by health workers, reporting improved tremendously and repeated visits by specialists and Ministry of Health officials were made to affected areas. However, the use of sulphonamide continued in many health centres and health stations despite the resistance of the causative microorganism that was demonstrated in the Tatek epidemic.

The great outbreak of 1981, affecting over 38,000 people mainly in Gondar, WolIo, Gojam and Wollega Administrative Regions, was extremely significant in the development of additional control and prevention strategies. An ad-hoc committee was established to organize the control of epidemics, and a greater appreciation of meningitis as a serious recurrent disease was created within the awraja, regional and national administrations. Adequate financial help was provided, and regions given the authority to use various control methods (with close support and supervision by the Ministry of Health) especially in improving active surveillance and establishing commitees which included government and community organizations. For the first time field treatment of patients in shelters and tents was introduced (Figures 3 and 4). It was possible to send experts and officials from the Medical Faculty and the Ministry of Health who coliJd give on-the-spot instruction in the management of acute cases, explain guidelines for chemo- and immuno prophylaxis and organize committees at regional level. Polyvalent antimeningococcal vaccine A+C was used extensively with both military recruit and civilian populations. In all the affected regions combined, 160, 492 people werevaccinated, 77,550 of them in Gondar, the most severely affected region. All levels of health workers, including student nurses and sanitarians, participated in the control measures. The majority of the workers, however, were health assistants, e.g. 63 out of 83 in Wollo (Table 4), and in some regions only one physician was available Fifteen special surveillance workers trained by medical personnel participated in Gondar.

Most of the cases were treated in 102 shelters with either penicillin G. or chloramphenicol. Chemoprophylaxis using sulphonamide was practised in one awraja in Gondar, and rifampicin given to some
people in various areas of Gondar.

Overall, the system developed during the 1981 epidemic brought about a significant
improvement in early case detection and resulted in the very low case fatality rate of less than 3% in Gondar region (which had
the majority of eases, 27,000 out of a total 38,000). In iVollo 45 out of 1155 died (fatality rate of 3.9% and in Wollega, 40 out of 483 (8.3%). The experience gained in this epidemic was thoroughly analyzed at the November, 1981, workshop.

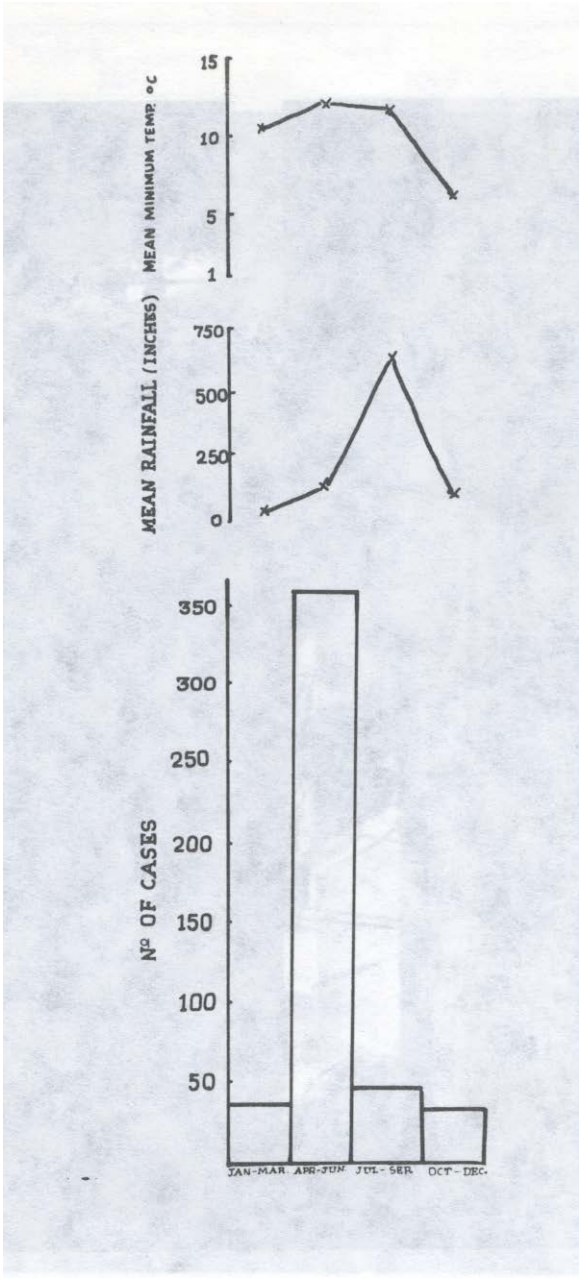


Figure 2 Climate and meningoccocal meningitis in Addis Ababa

FIGURE 3. Field treatment site during meningitis epidemic in Gondar Region (1981)

Figure 4: A meningitis patient in a treatment shelter during the epidemic in Gondar Region (1981)

Table 4: Manpower Deployment in the Control of Outbreaks

	Wollo[1]		Wollega[2]	
	1981	1982	1981	1983
Physicians	1	1	0	1
Health Officers	4	1	2	14
Nurses	7	0	4	0
Sanitarians	3	1	2	0
Health Assistants	63	12	12	38
Other Health Workers	5	3	19	10
Community Health agents	0	0	16	57
Total	83	18	55	120

Note 1: "Other health workers " includes employees of the regional and awraja government agencies, the surveillance units of the regional health departments and the Malaria Control Programme, CDC coordinators, student nurses, student sanitarians and laboratory technicians.

Note 2: Number of patients were as follows: Wollo -6980 (1981) and 1135 (1982). Wollega -483 (1981) and 2712 (1983).

Symposium and Workshop on the Control of Meningitis, Nov. 1981

The ad-hoc committee which was established in early 1981 in the Ministry of Health to organize epidemic control also planned this symposium/workshop. Participants in the meeting came from all areas of the country. Basic information about meningococcal meningitis, particularly on its epidemiology, clinical aspects)diagnosis, control and prevention, was provided, and reports from each region were presented by
the respective Regional Health Officers. The methods used in each region were extensively discussed at the workshop, and the following recommendations were produced.

1. An efficient surveillance system not only during epidemics but also during non-epidemic periods, is of paramount importance in detecting outbreaks of meningococcal meningitis at an early stage.
2. Field management of meningococcal meningitis cases has been found to be useful in preventing deaths, as well as practical from the point of view of logistics, transport and preventing the spread of the disease, and should be applied in every region.
3. A well-informed and properly motivated public has a significant role to play in the control of meningococcal meningitis, e.g. in surveillance, provision and arrangement of shelters, transportation of patients and provision of food and water to patients, as was demonstrated during the 1981 epidemic. The community's role should be strengthened by organizing committees at various levels.

4. Antimicrobial susceptibility studies have repeatedly revealed that the causative agent is resistant to sulphonamides thus, this group of drugs should not be used. Chemoprophylaxis should be given to
selected sectors of the population using polyvalent anti-meningococcal vaccine A +C
5. The effectiveness of polyvalent < A +C) anti-meningococcal vaccine has been well documented in controlled studies (10, II) and has been used in Ethiopia since 1977 (5). Selective vaccination of high-risk population groups (by age and micro-climatic factors) should be adhered to. These are: (a) people in close contact with index cases; (b) restricted populations, e.g. in military barracks and prisons; and (c) special groups such as visitors and those involved in epidemic control and patient care. Vaccinations should be given early in the epidemic period, not during the endemic period.
6. Administration should be handled at regional level with regard to the procurement, storage and distribution of supplies (drugs for treatment vaccines, field equipment, health education material etc.) and
transport facilities.
7. Rapid diagnostic methods for field use should be introduced and research on the application (serological tests on cerobrospinal fluid as compared to conventional methods (culture) should be conducted.
8. Research is needed on patterns of seasonal outbreak, level of endemicity, periodicity of epidemics and
carrier status.

1982-1983
The regions of Wollo and Wollega were affected during the 1982 and 1983 epidemic seasons, and management of the outbreaks was based on the workshop recommendations.

Surveillance and Reporting:
Active surveillance during the epidemic seasons covered all age groUpS (Table 3), which was an improvement over the past practice of concentrating surveillance on the adult (particularly military) population only. Similarly, more complete in£ormation was collected on the distribution of the disease by sex, including case fatality rates by both age and sex (Tables 5 and 6). Total case fatality ratios were 4.76% in W ollo in 1982 and 4.46% in Wollega in 1983.

Table 5: Meningitis Cases in Wollo 1982
A. Age and Sex

	Male (58%)		Female (42%)		TOTAL	
	Number	Percent	Number	Percent	Number	Percent
0-1	24	3.7	18	3.8	42	3.7
1-4	183	27.8	135	28.3	318	28.0
5-14	239	36.3	167	35.0	406	35.8
15-44	191	29.0	235	28.3	326	28.7
45+	21	3.2	22	4.6	43	3.8
TOTAL	658	100.0	477	100.0	1135	100.0

B. Case Fatality Rate (Total=54 of 1135 or 4.76%)

	Male (58%)		Female (42%)		TOTAL	
	No.	% of Male Deaths	No.	% of female Deaths	No	% of Total deaths
0-1	2	6.1	1	4.8	3	5.6
1-4	16	48.5	12	57.1	28	51.9
5-14	11	33.3	5	23.8	16	29.6
15-44	3	9.1	3	14.3	6	11.1
45+	1	3.0	-	-	1	1.9
TOTAL	33	100	21	100	54	100

Table 6: Meningitis Cases in Wollega. 1983

A. Age and Sex

	Male (58%)		Female (42%)		TOTAL	
	Number	Percent	Number	Percent	Number	Percent
0-1	85	6.1	105	7.9	190	7.0
1-4	327	23.6	351	26.5	678	25.0
5-14	547	39.5	532	40.1	1079	39.8
15-44	394	28.4	289	21.8	683	25.2
45+	33	2.4	49	3.7	82	3.0
TOTAL	1386	100	1326	100	2712	100

B. Case Fatality Rate (Total = 121 of 2712 or 4.46%)

	No.	% of Male Deaths	No.	% of female Deaths	No	% of Total deaths
0-1	5	7.5	-	-	5	4.1
1-4	20	29.9	21	38.9	41	33.9
5-14	26	38.8	21	38.9	47	38.8
15-44	14	20.9	-	16.7	23	19.0
45+	2	3.0	3	5.5	5	4.1
TOTAL	67	100	54	100	121	99.9

Field Management of Cases:

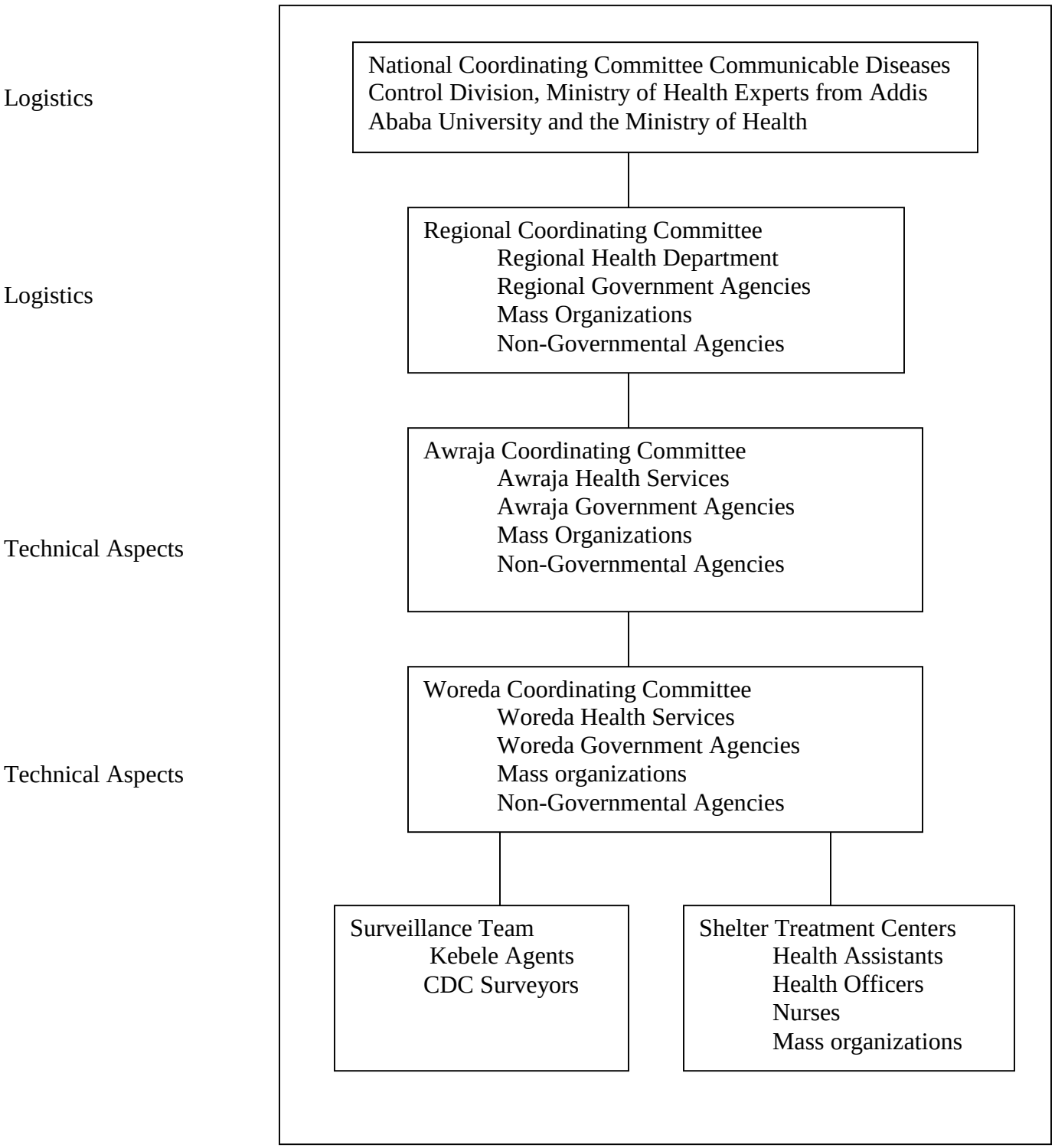
As this had been proven useful and practical it was extensively employed in both Wollo and Wollega, predominantly at health stations and temporary treatment shelters. Hospitals and health centres were
seldom used. In 1982, all 1135 cases of meningitis were handled in nine health stations in WolIo. In 1983, 10 health stations and nine temporary shelters managed most of the 2712 cases seen in Wollega; only

four health centres and one hospital were used.

Manpower Deployment and Community participation

It was possible to control the out breaks of meningitis in 1982 and 1983.

FIGURE 5 Organizational Structure for Meningitis Management



Note: Mass Organizations = Peasants' Associations, Revolutionary Ethiopian Women's Association etc.; Non-Governmental agencies = Ethiopian Red Cross, OXFAM etc

because of better planning and decision making resulting from committees being organized at different levels (Figure 5). Health workers and community members were assigned to participate in all aspects of treatment, control and prevention. Table 4 shows the manpower involved. It is clear that health assistants and surveillance workers played a more active role than in the past, while in Wollega 57 Community Health Agents participated. As contrasted with the strategy used in 1981, In 1982 and 1983 the community was continuously involved, particularly in Wollo.

Use of Antimicrobial Drugs:
Sulphonamides had been extensively used in the past. In 1982-1983, the major drugs used in treatment were penicillin and chloramphenicol. In selected cases rifampicin was used in chemoprophylaxis. Vaccination: Since 1977 polyvalent antimeningococcal A +C vaccine has been used every year as a preventive measure. The number of people vaccinated each year has varied, e.g. in 1977 approximately 92,000 militia were vaccinated, in 1978, 72,000, and in 1982, 209,200, in the seven administrative regions affected by meningitis. The major change in vaccination policy was the inclusion of carefully selected segments of the population, taking into consideration age, crowding and other relevant factors, with the aim of concentrating preventive measures on the most vulnerable portions of the population. In 1982 (Wollo) 48.2% of those vaccinated, and in 1983 (Wollega) 53.6% were in the young age groups, those most likely to contract meningitis.

The Administrative Aspect in Meningitis Management:

A variety of methods has been used to accomplish regional self-sufficiency, but the basic organizational structure is that illustrated in Figure 5. It should be noted that in 1982 and 1983 surveillance was practised
during both the endemic and epidemic seasons and all regional health departments were fairly well organized in procuring supplies, employing manpower in early detection and managing outbreaks.

Problems have been encountered mainly with regard to local cultural practices, such as patients being taken to "holy water" sites or relatives crowding into shelter treatment sites (thus making isolation difficult). However, attempts have been made to utilize shelter treatment sites properly and to change people's attitudes through health education. The mass organizations and various government and non-government agencies played a major role in this. Supply problems have mainly concerned transport facilities and equipment, e.g. for camping, at regional health departments and health centres.

Regular contact with the surveillance unit of the ~1inistry of Health's Communicable Diseases Control Division and the Ad-Hoc Committee for the Control of Meningitis (established 1981 and composed of staff from the Ministry of Health and Addis Ababa University) has continued. There

is monthly case reporting at both regional and Ministry of Health level, and the national level committee is regularly informed about
the meningitis situation in all regions of Ethiopia, enabling it to give advice when needed.

DISCUSSION

This 10 year review of meningococcal meningitis in Ethiopia testifies to the progressive improvement in general management case reporting and surveillance. The lessons learned from reviewing the 1974-76 situation from the Tatek Military Training Centre outbreak in 1977 and from the great epidemic of 1981 contributed tremendously to the rapid development of a more effective and better organized system as demonstrated by the management of the epidemics of 1982 and 1983. improved reporting and surveillance have confirmed that there has been a change in the epidemiology of meningococcal meningitis in Ethiopia.

earlier reports on the CSM : Belt (1) noted that outbreaks occured every 10 years, but in the northern,central and western regions of Ethiopia there have been almost yearly outbreaks since 1974. This trend that epidemics are not occuring in the typical cyclic pattern -needs to be considered carefully with particular attention paid to climatic changes, socio-economic conditions, and changes in management of the disease,
especially the use of vaccines.

Prior to 1981 (5), solid information was not available on the distribution of cases by age and sex. Data from 1981, and especially 1982 and 1983, (Tables 5 and 6) have remedied this. Like other researchers in Africa (12), this study found that the one to 14 years age group accounted for two-thirds of the cases.

Case fatality ratios hall been very high, e.g in 1977, 15% in Wollega and 3OC!o in Gojam (5). Since 1981, case fatality rates have dropped to less than 5% (Tables 5 and 6) through improved management of outbreaks The organizational structure recommended in 1981 has proved to be a practical approach, especially in early detection of epidemics, active surveillance of cases and early treatment.

Since 1977, all possible strategies to combat epidemics of meningococcal meningitis have been considered. Various recommendations have stemmed from the 1974 Brazilian experience (13), in particular on orientation and motivation of the public. In the last ten years, the following developments in strategy have occurred:

- more effective use of vaccination, i.e. not only for young adults as had been the case, but for all potentially vulnerable sectors of the population and more rational use of. drugs for treatment;
- early detection of epidemics through passive surveillance;
- early treatment of cases through active surveillance and treatment in health stations and field shelters: and,
- improved motivation of health workers (especially through the November, 1981 workshop/symposim) and extensive orien1ation of workers actually helping to control the epidemics.

The most important development is that each region has become self-sufficient in handling epidemics. Of course, there are still problems, e.g. transport and camping facilities, but not to the extent that they seriously hinder the management of outbreaks. The work is not left totally to the

regions, however; the Communicable Diseases Control Division and its consultants regularly analyze regional reports, give direction and advice and generally keep a close watch on the situation.

Meningococcal meningitis is still a very serious problem nationally and internationally (14) despite advances in the use of treatment drugs and vaccines. Complete information on many aspects is still lacking, e.g. the epidemiology of the disease, the changing pattern in the type of outbreaks, a possible change in the serogroups A to serogroup C, the question of carrier status, the changing sensitivity of the microorganism to sulphonamides etc. Although in Ethiopia we have developed practical control strategies, much research remains to be done. Rapid diagnostic methods that are feasible in rural areas need to be introduced. Serological techniques (latex agglutination and coagglutination methods) which are established in the Black Lion Hospital in Addis Ahaha will be given field tests shortly. As mentioned earlier, studies to determine the cause (serogroups) of N. meningitis and its drug sensitivities, have been done but need to be repeated regularly in a more extensive manner.

Although we still need to introduce or expand the utilization of various technologies, the experience gained in the last ten years has been tremendously significant in enabling us to control meningococcal disease at both regional and national level.

Progress has been achieved since 1981 in the management of outbreaks by: (a) having each region become self-sufficient in the overall organization, with local government agencies, of the technical aspects of control; (b) getting government and non-government institutions to work together with regional and awraja health departments in logistical and technical aspects; and (c) promoting active community participation in active surveillance and case detection, transportation of patients, building of treatment shelters, provision of food and other necessary items for patients, and in health education. We believe this is an example of the Primary Health Care approach in the management of an acute, seasonal, highly prevalent and fatal communicable disease.

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We would like to express our thanks to the Communicable Diseases Control Division of the Ministry of Health for their encourage ment and support in conducting the workshop on mallagement of meningococcal
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