In carrying the analysis to a county level, statistical criteria appropriate for small areas were established as follows:

- Number of Deaths: Unless a county showed a total of four or more deaths during the "summer months" of 1946 and 1947 combined, it was eliminated for further study.
- 2. Season: A S/W ratio of 2 to 1 or greater.
- 3. Mortality Rates: Age-specific summer dysentery-diarrhea rate of 200 or more per 100,000 estimated population under 2 years of age, based on 1946-1947 "summer" deaths.
- 4. Age at Death: If a total of 25 percent or more of the 1946-1947 deaths among children under 2 years of age were under 1 month of age, it was considered presumptive evidence that the dysentery-diarrhea mortality figures reflected epidemics among the newborn.

The data for all States were examined by county and by population-size groups within each county. In 12 States there were 68 counties in which the problem appeared to be one of urban areas, and 28 counties in which the dysentery-diarrhea deaths occurred primarily in the rural areas. Of these 96 counties, there was evidence in 4 that the mortality figures might be a reflection of nursery epidemics.

In the remaining 36 States, there were 24 counties with indications of a dysentery-diarrhea problem in urban areas; but among these counties, there were 9 in which the deaths among infants 1 month or younger accounted for 29 - 59 percent of the total number of dysentery-diarrhea deaths under 2 years of age. The 36 States showed only three counties in which the problem was one of the rural areas.

The list of States and counties, with all pertinent information, was transmitted to Engineering Services for their use in field study and investigation. The following suggestions with respect to the consideration of environmental factors were made by the epidemiologist:

That field studies should not be undertaken unless

- 1. The community, or substantial areas within it, has privies or other accessible and widely disseminated sources of human excreta with which flies might become contaminated.
- 2. The population lives in an urban-type environment where effective fly control operations can be instituted and maintained.

Since mortality data as a measure of incidence have their obvious limitations, field investigations must supplement the conclusions of the statistical analysis.

Figures available for 1948 (for all ages) show an increase in mortality from the diarrheal diseases as compared with the figures for 1947. The total number of deaths for all ages in 1947 was 8,938, of which 6,527 or 73 percent were among children 2 years of age or younger. The total figure for 1948 is 9,909 or an increase of 971 deaths from these diseases over 1947.

'Iwo accompanying tables show the total number of deaths from dysentery-diarrhea for all ages for 1948 by State; and the change from 1947 by State.

## DYSENTERY-DIARRHEA (FLY) CONTROL PROGRAM

April 1, 1950, marked the official opening of a new operational program for the Communicable Disease Center, namely, the Dysentery-Diarrhea Control Program in which fly control measures will play an important part. The new program is the outgrowth of the well-known studies of Watt and Lindsay in Hidalgo County, Tex., [Pub. Health Rep. 63(41): 1319-1334 (1948)] from which it may be concluded with reasonable certainty that in JOSEPH H. COFFEY, Sanitary Engineer

areas of high dysentery-diarrhea morbidity and high fly density, a significant reduction in disease transmission may be effected by control of domestic flies.

The new program is organized in the same manner which has worked so successfully in the malaria and typhus control programs; that is, the projects are operated through the State and local health departments.

On the basis of the findings by the Statistics Section, Epidemiologic Services, only those communities which showed an age-specific dysenterydiarrhea rate in excess of 500, and a summerwinter ratio in excess of 2.0 are presently being considered for operations. These communities are concentrated largely in New Mexico, Arizona, Texas, and Kentucky. However, during the course of the program, localized centers in other States will be investigated for possible inclusion in the program in subsequent years.

In those States where CDC activities are existent, dysentery-diarrhea fly control projects are added as integrated functions of existing CDC supervisory and administrative personnel. In the States and localities not previously served by CDC activities, arrangements have been made to provide additional technical and/or administrative services as required.

Arrangements with all local communities have not yet been completed; but the general pattern is that the community provides for the sanitation activities, the insecticides, and spray labor, while Federal funds provide for technical and supervisory personnel, spray equipment, and vehicles as required. The unit cost for the local community is expected to be on the order of from \$0.25 to \$0.50 per capita per year. The principal variables affecting this unit cost range are existing level of community sanitation and length of fly breeding season and prevailing wage scales. Except for extreme conditions, local costs should tend toward the lower end of the unit cost range.

Because fly control is a relative newcomer in the field of insect vector control, present control measures as yet are adaptable only in reasonably compact communities. Costs become prohibitive if ventures are made into sparsely populated areas. This situation is somewhat at odds with the facts indicated by the analysis of the mortality data wherein it appears that the higher summer-winter death ratios occur in the rural areas and in the smaller communities. Accordingly, it is expected that the greatest effort of the program will be expended in communities of approximately 10,000 population. Communities of this size represent a reasonable marginal overlap between decreasing summer-winter death ratios and sharply rising unit costs of fly control operations.

As is the case with the other fly control pro-

grams operated by CDC, the prime effort will be directed at the elimination of fly-breeding sources and the general lifting of the level of environmental sanitation in the operational area. Within communities, however, past experience indicates that the greatest dysentery-diarrhea mortality and highest fly densities are usually found in the areas of lowest economic level. In such substandard areas, the maintenance of domestic livestock, inadequate facilities for storage of garbage, and the existence of insanitary privies occur more frequently than not. It is obvious, therefore, that a sound program of environmental sanitation is not only costly but considerable time will be required to bring about significant improvement. Since sanitation is a frame of mind and must come from within the people of the community, educational programs must be developed to cause the citizens of the community to realize that improved sanitary practices are something to be desired for their own personal well being.

In the past, some sanitation programs have died "a-borning" because those people in the well sanitated areas of the community have felt secure in their isolation from the "wrong side of the railroad tracks" and have failed to support the program either financially or in spirit. In the smaller communities especially, such isolation affords little protection from infectious flies. There is much evidence to show that under certain ecological conditions large numbers of flies may migrate considerable distances, a mile or more.

For these reasons — that is, the time required to bring about significant sanitary improvements and the migratory habits of flies — the early efforts of the program will be directed toward the immediate reduction of fly populations by chemical means. It is fully realized that the control of flies by chemical applications is but temporary in nature and is, therefore, a never-ending operation. It does, however, afford a means of obtaining an immediate reduction in high fly densities and may be regarded as a delaying action to hold the line while the sanitation measures are being introduced.

From past experience, chemical fly control serves another very useful purpose. Because of its spectacular nature, it focuses attention on "The Fly," a currently popular subject, and provides impetus to the sanitation program in that it promotes sanitation for a definite purpose and removes it from the realm of abstractions. The new program is small in comparison with other operation programs of CDC; probably no more than a dozen projects can be activated this year with the limited funds available. In contrast to its size, the following results expected from the program appear prodigious:

- (a) The focusing of attention on the areas of exceptionally high mortality rates of dysentery and diarrheal diseases.
- (b) The acceleration of "general" sanitation programs by introduction of an additional motive, namely, fly control.
- (c) The more rapid spread of technical information concerning fly control as a health measure, thus bringing relief to certain areas of high morbidity years in advance of the normal turn of events.
- (d) The increase of fly control programs in areas of high dysentery-diarrhea morbidity and high

fly density is expected to broaden the base of the findings of the work of Watt and Lindsay in Hidalgo County, Tex.

- (e) The pilot projects introduced with Federal assistance and guidance are expected to induce similar practices in nearby communities having similar problems.
- (f) The operation of fly control projects in numerous States under a variety of conditions should produce new techniques and advances in present fly control procedures.

Taken as a whole, the new dysentery-diarrhea fly control program may be regarded as another undertaking for CDC in the fields of epidemiology, entomology, and engineering.

Whereas the new program is starting out in a very small way, its implications for the future are very broad. The possible expansion in this field of endeavor will depend largely on the success attained during this coming season.

## A Preliminary Report of Studies on the EFFECTS on FLY ABUNDANCE of IMPROVED MUNICIPAL GARBAGE COLLECTION and DISPOSAL

During the summer of 1948 considerable attention was given by the authors to an investigation of the sources of fly production in municipalities. This investigation was prompted originally by the overemphasis then placed upon the chemical control of flies. Failures of the most widely used of the chemical insecticides, DDT, in maintaining satisfactory fly control provided an added incentive to the study. Fly breeding sources in municipalities in New Mexico, Texas, and Georgia were investigated.

## CONDITIONS PROMOTING FLY BREEDING IN MUNICIPALITIES

Although no startling or unsuspected discoveries were made, it was determined that in most of the DALE R. LINDSAY, Scientist and

## DUFFY E. McBRAYER, Sanitary Engineer

small cities the production of flies was due in large part to the improper handling of household garbage, both by individuals and by the municipalities, and of animal refuse by individuals. In the larger cities an additional fly production source was found in various organic wastes from such industries as canneries and other fruit and vegetable processing plants, and from meat packing plants. In the Southeastern States fly breeding conditions are enhanced by normal climatic conditions which provide moisture as well as a relatively