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SMALLPOX ERADICATION IN IRAN

Imperial Ministry of Health and Welfare
Government of Iran

World Health Organization

WHO/SE/78.120
Global Commission WP/78.28

FOREWORD

It is with a sense of deep satisfaction that I present this report on "the Eradication of Smallpox in Iran" to the honourable members of the Global Commission for the Certification of Smallpox Eradication.

Although smallpox has not been an endemic disease in our country for many years, we are very pleased with the excellent work of the World Health Organization and Member Countries whose combined efforts have succeeded in ridding the world of this terrible disease.

We are pleased to cooperate in the final worldwide certification of the first disease in history to be eradicated.

This report has four parts: Part A gives some background information on Iran; Part B tells the history of smallpox in this country; and Part C documents the efforts made during the years (1961-1977) to keep the country free of smallpox. Because of the unique position of Iran in the history of smallpox, however, the most important part of this document is Part D: the special programme to prepare for confirmation of smallpox eradication in Iran.

The special programme lasted 6 months, during which efforts were made to report all chickenpox cases and to comb the country for any children under the age of five years with facial scars.

I would like to take this opportunity to extend my heartfelt thanks and appreciation to all the staff in Teheran and in the provinces for the excellent work that they have done during this special programme on certification. They have worked long and hard to certify that this terrible disease has been eradicated in Iran, and to them go the thanks of all of us working in the field of smallpox eradication for their conscientious and dedicated work.

I also express my deep and heartfelt thanks and appreciation to Dr E. Shafa (WHO Headquarters, Geneva) and Dr L. Brilliant (WHO Short Term Consultant) for their support and guidance in compiling this report.

I wish the Commission members a successful and satisfying visit to Iran.

Dr. P Rezai

Dr Parvez Rezai
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A. BACKGROUND INFORMATION

1. Country and People

1.1 Geography

With an area of 1,626,520 square kilometres, Iran is situated between 25-40 degrees north latitude and 44-64 degrees east longitude. The country is bounded on the north by the USSR and the Caspian Sea, on the west and north-west by Turkey and Iraq on the south by the Persian Gulf and the Gulf of Oman and on the east by Pakistan and Afghanistan.

Topographically, Iran is largely a semi-arid plateau, with high mountain ranges and much barren desert. Two ranges of mountains, the Alborz which extend north-west to north-east and the Zagros which extend north-west to south-east divide the country into three geographical regions. (Figure 1).

(a) Northern Region: The northern region of Iran is situated between the Caspian Sea and the USSR on the north and the Alborz mountain range on the south. Rain-bearing clouds, driven by the prevailing northerly winds against the high barrier of the Alborz mountains shed their burden almost exclusively on the northern slopes of the Alborz, giving the Caspian littoral a rainfall which varies from 50 to 60 inches a year in Gilan to 20 inches a year in Gorgan but which may be as much as 100 inches in places. The northern slopes of the Alborz are densely wooded with a wide variety of trees including elm, ash, oak, beech, maple, walnut and box. The fertile soil of the Caspian littoral produces good crops of rice, cotton, tea and wheat. The fertile nature of this area has led to a great expansion of agricultural activities in the region. The population density of the area has also increased during the past years.

(b) Central Plateau: Iran's central plateau is located between the Alborz and Zagros mountain ranges. Due to the altitude of the plateau, the climate of this region is extreme. Summers are hot with temperatures reaching in places from 100°F to 115°F; winters are correspondingly severe with heavy snowfalls, particularly in the mountainous areas. Rainfall varies widely from place to place but rarely exceeds 10 inches a year except in Azarbaijan. Most of the rain falls in March and April. The desert and semi-desert areas of this region have served as an inhibitor to a high population density.

(c) Southern Region: Southern Iran is bordered on the north by the southern Zagros slopes and on the south by the Persian and Oman Gulfs. The region is humid in summer, its eastern section being affected by the south-west monsoon. This is the hottest region in Iran.

1.2 Demography

1.2.1 Population and Age Group

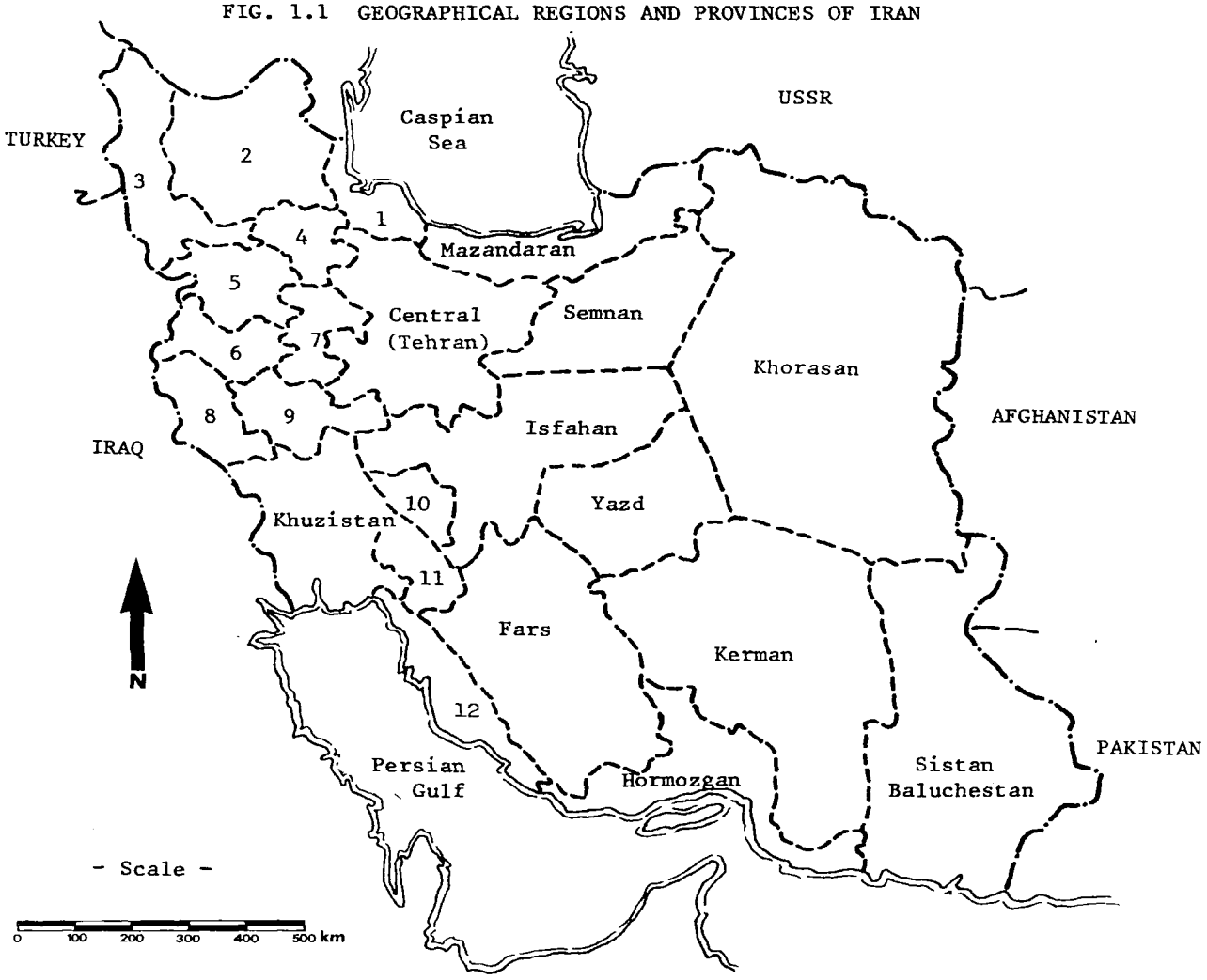
Iran has 23 administrative provinces (ostan), 186 districts (shahrestan), and 72,000 villages. (Fig.1.1) The most recent census in 1976 reported a total population of 33,591,875. The population density for the whole country is 20.6 persons per square kilometre. 47 per cent of the total population (15,715,338) live or work in the urban areas and 53 per cent (17,876,537) reside in the rural areas. (Table 1) There are an estimated 6,714,114 families averaging 5.0 persons per family.

Before 1976, the population increase was running at about 3.1 per cent per annum, while the 1976 census shows an annual population increase at 2.7 per cent per year. Usually population growth is higher in the villages and rural areas than in towns. The unbelievable increase of the urban area population during 1976 and 1977 is mostly due to severe in-migration of rural inhabitants to the cities and towns.

TABLE 1 - AREA AND DISTRIBUTION OF THE POPULATION BY PROVINCE
IRAN, 1976

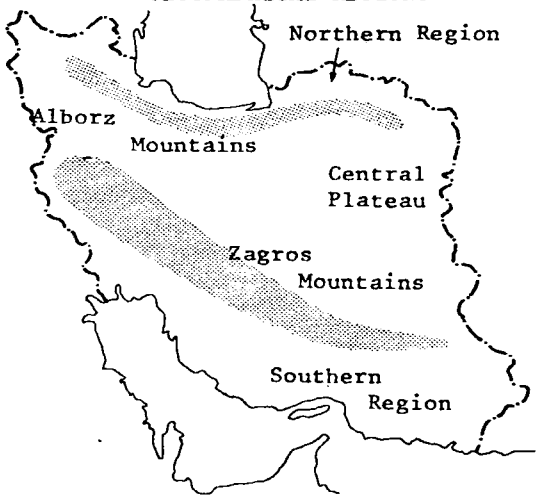
No	PROVINCE	AREA KM^2	POPULATION IN THOUSANDS		
			TOTAL	URBAN	RURAL
1	Gilan	36557	1578	459	1119
2	Mazandaran	47365	2384	777	1607
3	E. Azarbaijan	67102	3194	1159	2035
4	W. Azarbaijan	43660	1405	451	954
5	Kermanshah	25549	1016	441	575
6	Khuzistan	64654	2177	1265	912
7	Fars	133298	2021	853	1168
8	Kerman	192978	1088	342	746
9	Khorasan	313337	3267	1251	2016
10	Isfahan	94903	1975	1243	732
11	Central	69681	6921	5513	1408
12	Sistan Baluchestan	181578	660	161	499
13	Kordestan	24998	782	189	593
14	Lorestan	31383	925	394	531
15	Zanjan	21848	579	144	435
16	Hamedan	20172	1087	310	777
17	Yazd	56896	356	218	138
18	Chaharmahal and Bakhtiari	14820	394	140	254
19	Boushehr	27653	345	118	227
20	Hormozgan	66557	463	124	339
21	Ilam	18162	244	48	196
22	Semnan	81598	486	184	302
23	Boyerahmad	14261	245	31	214
TOTAL		1.648000	33502	15315	17777

FIG. 1.1 GEOGRAPHICAL REGIONS AND PROVINCES OF IRAN



1 Gilan
2 East Azarbaijan
3 West Azarbaijan
4 Zanjan
5 Kordestan
6 Kermanshah
7 Hamedan
8 Ilam
9 Lorestan
10 Chaharmahal and Bakhtiari
11 Boyarahmad
12 Boushehr

GEOGRAPHICAL REGIONS



The age structure of the population of Iran is characterized by a high proportion of people in the young and middle age groups. The age pyramid is almost triangular in shape, revealing, a high birth rate of 42 per thousand. The 0-14 age group accounts for 47.6 per cent and the working age group 15-59 years for about 46.0 per cent of the total population. The population under 5 years is 5,926 000 (17.7 per cent).

Iran's crude death rate is estimated to be 15 per thousand.

1.2.2 Population Migration

Iran has a small population of migrating farm workers who usually migrate south in the winter and north in the summer following the harvest of Iran's agricultural crops.

In addition, there is migration of tribal populations despite governmental efforts to permanently settle Iran's nomadic tribes on farms. More than one million nomads continue their seasonal migrations travelling hundreds of miles a year between the northern and southern slopes of the Zagros Mountains. The tribes usually stay about five months in warm weather regions and about three months in the colder areas. Approximately four months of the year is spent travelling. Figure 1.2 shows the areas affected.

1.3 Language

The official language of Iran is Persian. The language has changed so little in the last 1,000 years that the Shahnameh of Ferdowsi written about 1000 A.D., is still understandable to a majority of the people, even though it is almost pure Persian as compared with the current speech, which has many Arabic and other foreign words and phrases. Azeri, Turkish and Kurdish are spoken in the north-east and eastern parts of the country. In isolated valleys and separated localities there are also scores of vernacular dialects related to Persian at various stages of its development.

1.4 Religion

The official religion of Iran is the Ithna Ashari (Jaafari) rite of the Shiite sect of Islam. Approximately 98 per cent of all Iranians profess the official religion. In addition to the Shiite Moslems, there are groups of Sunnite Moslems, notably among the Kurds, Baluchi and tribesmen of Turkish stock.

There are also a number of non-Moslem minorities in Iran. The Christian minority numbers more than 150,000 and consists mainly of Armenians, Orthodox and Nestorians with smaller numbers of Greek Orthodox, Roman Catholics and Protestants. Approximately 20,000 Zoroastrians remain in the country as representatives of the classic religion of pre-Islamic Iran. This group is centred predominantly in Yazd and Kerman. The country also has a Jewish population of about 60,000 persons.

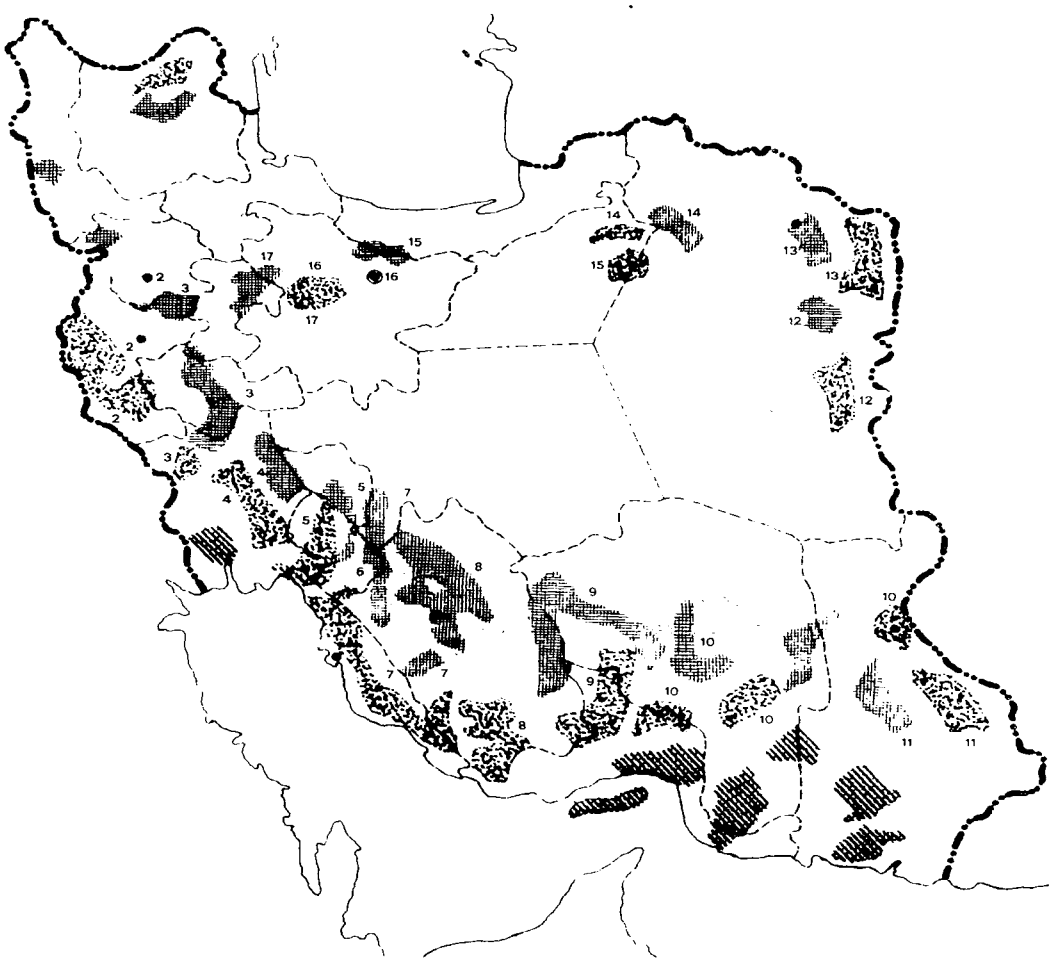
All of these groups are recognised religious communities and are accorded religious freedom by law.

1.5 Socio-Economic Level and Development

In ancient times Iran traditionally served as a distribution centre for trade between Asia and Europe but this activity disappeared as trade shifted to the sea after 1500 A.D. Succeeding wars and invasions reduced much of Iran to near destitution by the 20th Century.

The modern revival of the Iranian economy began in 1925 with the accession of a new ruler, Reza Shah the Great. Vigorous policies were adopted aimed at the development of industry and agriculture by improving communications, introducing new crops (jute, tea, sugar, beets), establishing new manufacturing centres to process agricultural products and by locating these centres in key production areas.

FIGURE 1.2 AREAS AFFECTED BY TRIBAL MIGRATION IN IRAN



Summer quarter Winter quarter Local migration

Tribes:

1 Shahsan, Hadji Alilu
2 Poshte Kuhi
3 Lor
4 Bakhtiari
5 Kohgilouyeh
7 Ghashghai
8 Khamsahbasseri
9 Roodbari
10 Beluch
11 Ghomshazai
12 Sarakhsi and Torbat Jami
13 Sarakhsi
14 Kord Bojnourd and Beluchgharakani
15 Sangsari
16 Mish Mast
17 Shahsovan

Economic development has proceeded by five multiyear plans, the first two of seven years each and subsequent plans of five year duration, the most recent being 1974-1979.

Emphasis was given to industry, mineral exploitation, transportation, communication, water, power, public health,welfare and the private sector respectively. Most of the plans were financed from oil revenues. Agriculture and mining have also played a great part in the economic development of the country.

1.6 Education

During the 5th Development Plan, Iran has greatly expanded educational services. The first eight years of schooling are free for Iranian children and secondary schooling is conditionally free providing the student agrees to work for a specified number of years after graduation.

In 1977, 8,225,437 persons were attending 48,035 school facilities in Iran.

1.7 Transportation

At the end of 1971, Iran had about 11,603 kilometres of asphalt roads, 22,799 kilometres of gravel roads, and 8,360 kilometres of dirt roads.

The Trans-Iranian railroad's original line from Bandar Shahpur on the south coast to Bandar Shah on the Caspian Sea was completed in 1938. It now has extensions from Tehran to Tabriz and from Tabriz to the USSR System at Julfa, and to Mashhad in the east. Extensions are in progress via Rezaiyeh to Turkey, and via Yazd and Kerman to Zahedan.

The national Iranian airline, HOMA, flies to all of Iran's provincial capitals and to 23 cities outside of Iran's borders. All but three of the provincial airports have facilities for handling large Boeing jets while the airports in Teheran, Shiraz and Abadan are classified as international airports capable of handling jumbo-jets.

1.8 Communication

During the Pahlavi Dynasty era, a comprehensive communications network has been established in Iran. At the present time 230 radio broadcasting and relaying stations provide 100% coverage of the nation.

A private television system was initiated in 1958. In 1970 the system was nationalized and expanded to include radio and television broadcasting. By 1977, television services were available to 68% of the population. This figure includes 100% of Iran's urban population and 33% of its rural population. Iran's telephone system allows direct dialling between Teheran and the provincial capitals and between Teheran and some European and North American cities.

2. Administrative and Health Structures

2.1 The Civil Administration

Iran was granted a constitutional monarch in 1906. His Imperial Majesty Mohammed Reza Pahalvi Aryamehr Shahanshah of Iran who ascended the throne in 1941 is the present monarch. The Shahanshah is the chief of state and commander-in-chief of the armed forces.

According to the constitution the government is composed of three independent branches: Legislative, Judicial and Executive.

Legislative power resides in two houses, the National Consultative Assembly and the Senate. Members of the National Consultative Assembly are selected through popular elections which occur every four years. However, only half of the Senate members are elected and the others are appointed by the Shahanshah. Legislation must be approved by both the National Consultative Assembly and the Senate and signed by the Shahanshah before attaining the force of law.

The judicial branch is composed of the courts and the justice department. The Supreme Council of State is the highest judicial authority responsible for investigating the legality of sentences passed by courts of law. It also certifies that all legislation passed by the parliament conforms to constitutional principles.

The Executive power resides in the cabinet. The Prime Minister is chosen by the Shahanshah, and Cabinet Ministers are chosen by the Prime Minister and appointed by the Shahanshah. The cabinet is composed of 19 Ministries: Court, Housing and Urban Development, Information and Tourism, Energy, Economics and Finance, Foreign Affairs, Education, Science and Higher Education, Health and Welfare, War, Justice, Culture and Art, Labor and Social Affairs, Interior, Commerce, Industries and Mines, Agriculture and Natural Resources, Roads and Transportation, and Post, Telegraph and Telephone.

2.2 The Health and Medical Care System

2.2.1 Health and Medical Services

Medical services are provided in Iran both by the private sector and the state. There are many private hospitals and clinics, chiefly in Tehran and other major cities. (Figure 2.1) Most pharmacies are privately owned, and the private sector is heavily involved in the import and production of pharmaceuticals. Considerable expansion of physical facilities in the private sector took place in the early 1970's when the Health Ministry made low-cost, long-term loans to the private sector for the construction of hospitals and clinics under legislation approved by Parliament.

In the public sector, the government provides medical services through a number of organizations and channels. The Ministry of Health and Welfare operates a number of hospitals. Government financed hospitals are attached to the medical schools at the major Universities, and the Red Lion and Sun Society also operate hospitals and clinics throughout the country. In addition, the Imperial Organization for Social Services operates a number of clinics. (Figures 2.2 and 2.3) The Ministry of Health and Welfare also runs institutions for the physically handicapped and mentally disabled, and other services are extended by various charity and welfare organizations.

FIGURE 2.1 HOSPITALS, CLINICS, MEDICAL UNITS - BY PROVINCE 1974 - 1975

	Hospitals	Beds	CLINICS		Pharmacies	Laboratories	Radiology Units
			Urban	Rural			
Central	146	20 874	401	148	717	259	156
Khorasan	51	4 229	132	109	131	32	30
Isfahan	40	2 734	99	155	119	44	20
East Azarbaijan	30	2 724	86	76	107	65	23
Khuzistan	36	3 205	118	57	103	23	40
Mazandaran	29	1 664	63	107	131	34	32
Fars	34	2 259	96	89	68	48	26
Gilan	21	1 594	52	63	91	14	14
West Azarbaijan	19	1 060	40	42	55	13	16
Kerman	15	790	57	66	49	19	16
Kermanshah	13	934	41	52	36	5	11
Southern Ports	2	142	25	39	13	4	5
Sistan and Baluchistan	10	400	36	40	16	18	5
Kordestan	10	410	74	17	27	9	6
Hamadan	12	954	40	55	32	8	13
Lorestan	6	398	34	54	25	8	8
Yazd	6	362	25	21	11	9	3
Boushehr	3	176	14	34	9	2	2
Chaharmahal and Bakhtiari	3	196	40	19	9	5	2
Zanjan	2	140	21	24	19	3	3
Ilam	1	48	7	16	8	-	1
Semnan	8	311	24	33	22	37	6
Boyerahmad and Kohkiloyeh	-	-	18	20	3	1	2
TOTAL	498	45 604	1 543	1 338	1 791	616	426

Source: Iran Statistics Centre

FIG. 2.2 NUMBER OF HOSPITALS BY ORGANIZATIONAL AFFILIATION; IRAN 175 (TOTAL: 498)

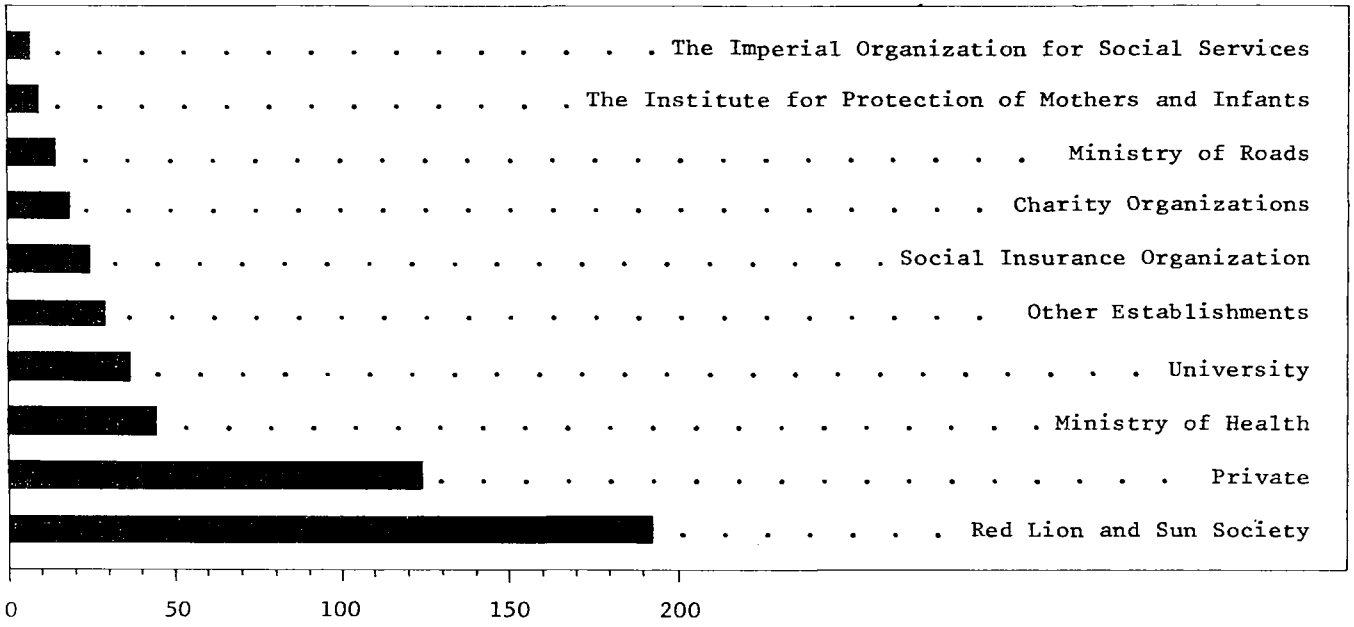
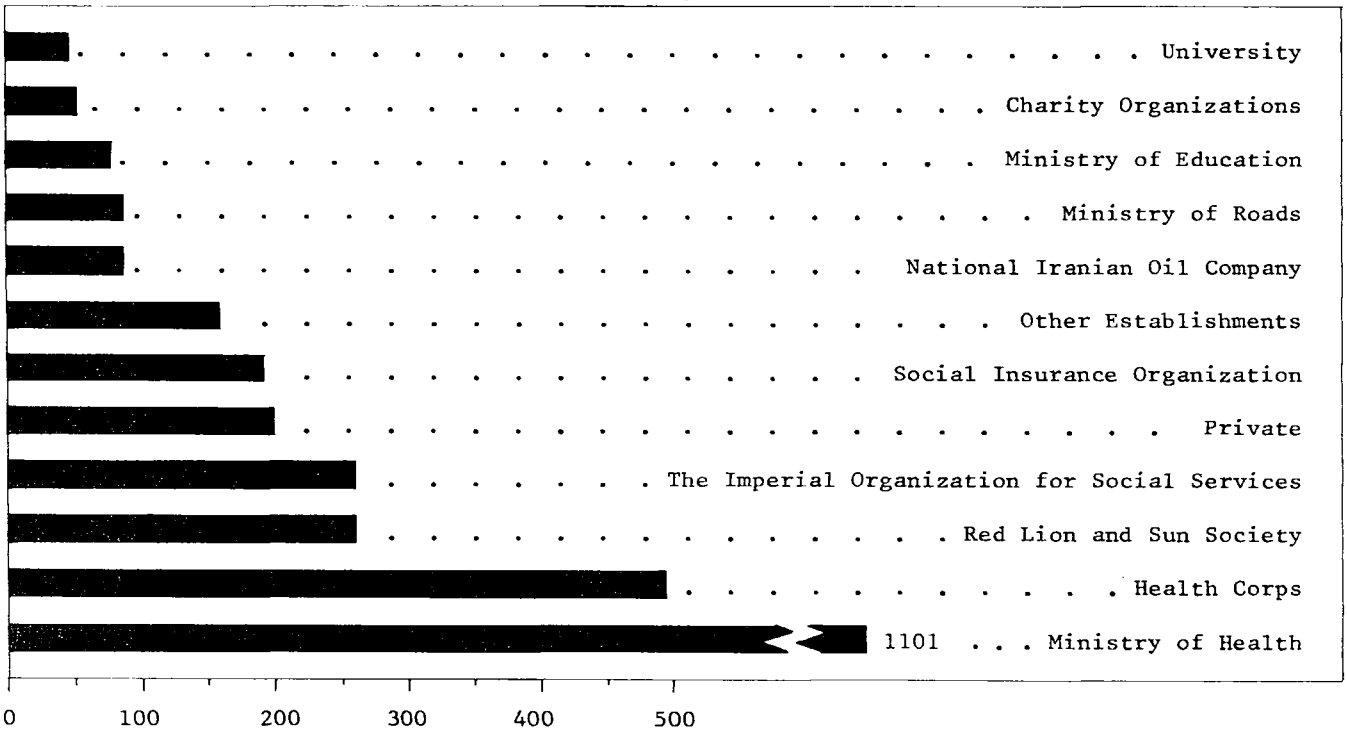


FIG. 2.3 NUMBER OF MEDICAL AND HEALTH CENTRES
BY ORGANIZATION AFFILIANTION; IRAN 1975 (TOTAL: 2 879)



In 1975, the country had just over 45,000 hospital beds; of this total about 6,200 beds were in private hospitals, and some of the rest were operated by the following organizations:

- Ministry of Health - 7,800 beds
- Social Insurance Organization - 4,800 beds
- University medical schools - 6,200 beds
- Miscellaneous non-governmental organizations - 6,250 beds
- Other government organizations - 2,300 beds

In 1975 the country had just over 2,900 clinics scattered in rural and urban areas of the provinces.

The basic health services of M.C.H., family planning, vaccination, and health education are provided to the people through several establishments:

(a) Rural medical and health centres:
During the fourth plan and first three years of the fifth development plan (1968-1976) 537 rural medical and health centres were established.

(b) Secondary health centres:
133 secondary health centres located in urban areas were established during the first three years of the fifth plan.

(c) Main health centres:
Depending on the population of an area, there are three different types of main health centres: There are 18 Type 1 centres located in the provincial capitals, while Type 2 and Type 3 (of which there are 124) are usually situated in small cities or towns.

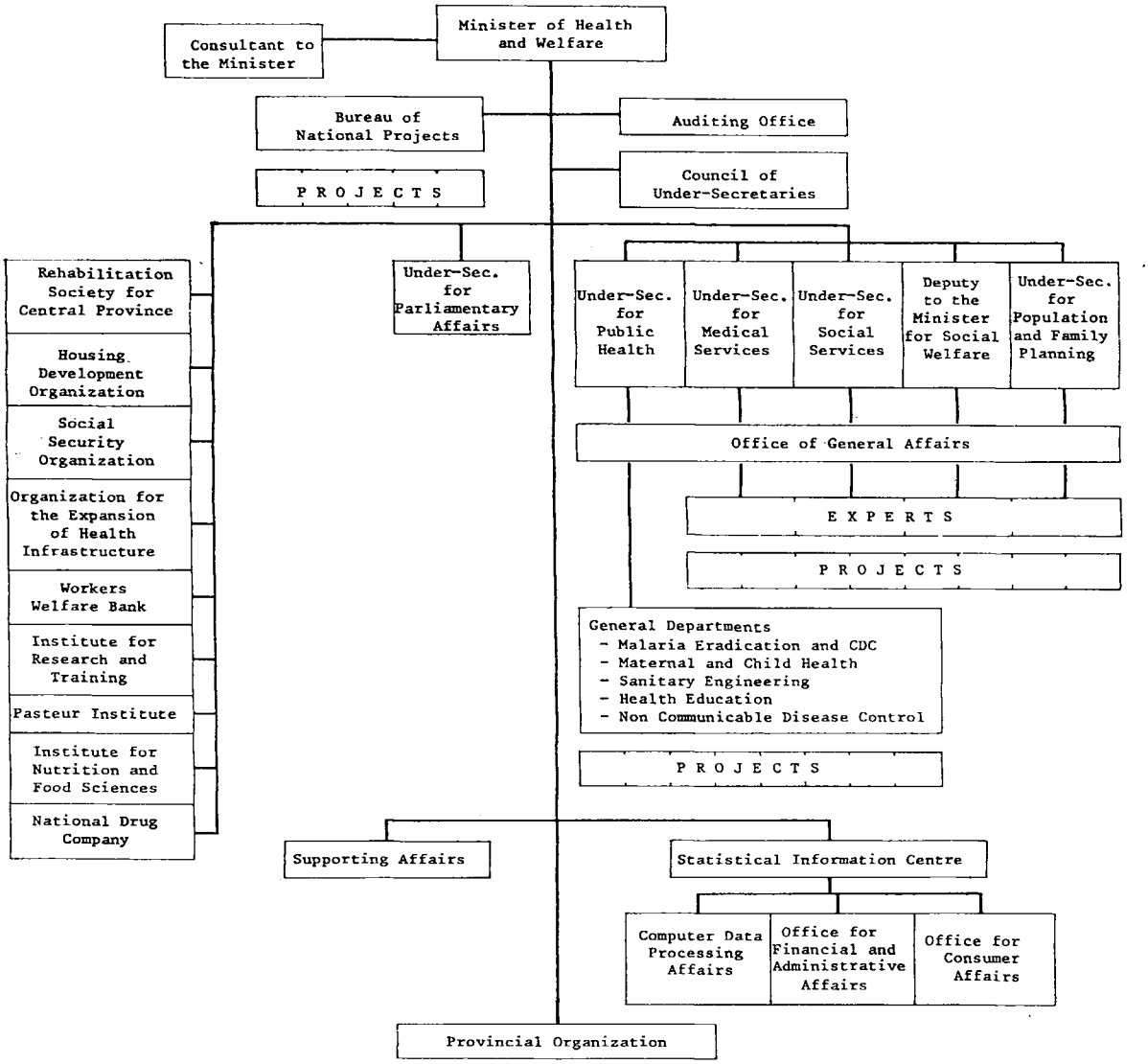
2.2.2 Organization of the Ministry of Health

Until April 1974, all health and medical affairs fell under the purview of the Ministry of Health. Other Governmental organizations, such as the Imperial Organization for Social Services and the Red Lion and Sun Society were also active in the medical field. In April 1974, a separate Ministry was created to supervise and administer activities in the welfare field. The Minister was charged with bringing together hitherto scattered activities in areas such as rehabilitation, care for the physically and mentally handicapped, charity and social service work, as well as the already extensive network of social insurance. In March 1976, a further organizational change took place when the Ministry of Health and the Ministry of Social Welfare were merged to form a new Ministry, the Ministry of Health and Welfare.

Today, this Ministry is responsible for all health, medical and welfare activities in the country, as well as medical insurance, although organizations such as the Red Lion and Sun and the Imperial Organization for Social Services continue to carry on their special activities.

Figure 2.4 depicts the new organizational chart for the Ministry of Health and Welfare.

FIGURE 2.4 ORGANIZATION OF THE IMPERIAL MINISTRY OF HEALTH GOVERNMENT OF IRAN



2.2.3 Health Manpower

The total number of personnel working in the country's health and welfare services is estimated to be about 62,223, 32% of whom (19,921) are engaged in providing ambulatory health and medical services in settings such as health and medical centres, clinics, mobile centres etc. The rest (43,302) work in hospitals and relevant clinics.

The total number of physicians in the country in 1977 was 13,428. For all Iran, there is about one physician per 2,500 population. The best ratio is in Tehran (758 per physician) while the poorest ratio is found in Ilam province where where is one physician per 7,631 population.

The attached tables show the number of physicians and dentists by provinces. The total number of dentists in the country in 1977 was 1,965. There are 4,657 specialists in Iran, of which 3,169 (68%) reside in Tehran and 1,117 in the capital cities of the provinces. 371 specialists reside in other towns or cities. Out of the total number of 13,428 physicians, only 1,123 are female (8.4%). Female dentists comprise 17.8% of the total number of dentists.

FIGURE 2.5 HEALTH MANPOWER IN IRAN

Speciality	1972	1973	1974	1975	1976	1977
Physicians	8742	9535	10285	11373	12440	13428
Dentists	1290	1347	1730	1864	1803	1965
Pharmacists	3370	3532	3794	3850	++	4322
Midwives	1450	1620	1713	1881	1412	2027
Nurses	3807	3818	4265	4544	4105	5510
Assistant Nurses	7707	9600	10700	11747	++	14410
Lab. Technicians	++	++	++	++	++	1455
Radiology "	++	++	++	++	++	1133
Pharmacist "	++	++	++	++	++	410
Physiotheraphy "	++	++	++	++	++	221

++ = not available

Health Manpower in the Employment of the Ministry of Health and Welfare

The health manpower of the Ministry of Health and Welfare are divided into four categories according to the duties performed: (1) Health and medical (2) Social affairs (3) Services (4) Administrative and Financial.

The Health and Medical category is composed of 12 branches:
(a) Medical services (b) Nursing and midwifery (c) Dentistry (d) Physiotheraphy (e) Hospital administration) (f) Sanitation (g) Pharmaceutical (h) Nutrition, food and drug control (i) Veterinary services (j) Radiological (k) Health and medical laboratory (l) Health and medical Research. These personnel are occupied in different Health and Medical establishments in both urban and rural areas. Moreover a large number of these personnel participate in field activities in mobile teams. An up-to-date list of selected categories of health manpower employed by the Ministry of Health and Welfare is attached (Figure 2.6).

FIGURE 2.6 HEALTH MANPOWER IN THE MINISTRY OF HEALTH AND WELFARE BY PROVINCES IN 1978

Province	Physicians	Dentists	Pharmacists	Nurses & Midwives	Nurse Assistants	Health Workers	Health Eng. Personnel	Laboratory Technicians	Administrative & Financial Staff
Central	1 171	114	111	1 065	1 265	2 000	1 275		7 307
Khorasan	335	33	22	265	917	558	179	158	2 394
East Azarbaijan	241	19	36	88	416	387	159	104	1 823
Mazandaran	243	31	29	109	634	545	99	143	1 004
Khuzistan	335	31	22	91	687	261	28	93	361
Fars	187	37	15	208	516	348	107	160	3 150
Isfahan	510	35	32	113	747	270	90	147	NA
Gilan	158	22	21	143	387	264	20	95	275
West Azarbaijan	102	14	11	38	241	201	33	62	378
Kerman	195	7	5	91	289	274	43	72	695
Hamadan	74	11	6	36	283	197	31	43	768
Kermanshah	109	10	10	100	158	230	NA	31	1 287
Lorestan	68	7	6	15	159	217	27	41	608
Koredestan	91	7	8	42	180	128	41	45	577
Sistan and Baluchistan	44	4	3	16	166	326	34	19	160
Zanjan	104	16	11	22	126	155	34	33	556
Semnan	105	14	6	29	168	115	36	42	593
Hormozgan	78	5	6	30	107	330	36	14	798
Chaharmahal & Bakhtiari	68	3	2	12	90	120	27	52	86
Yazd	78	7	10	25	129	118	41	58	482
Boushehr	52	5	1	7	68	86	23	25	376
Boyerahmad and Kohkiloyeh	47	6	2	NA	18	122	18	17	203
Ilam	54	5	3	17	43	126	5	11	44

2.2.4. Health Training

The Ministry of Health and Welfare has supported the development of many training courses for various categories of medical and public health personnel. A summary of some of these are listed below.

Master of Public Health

Each year a group of physicians assigned to the Preventive Medicine and Malaria Eradication Unit are nominated to attend a one year course for the Master of Public Health at Tehran University. During the first semester of their study programme, basic public health courses are taught. Selected areas within the public health field are emphasized during the second semester. The summer term is spent on field visits to medical and technical research facilities and in laboratory work. Courses in the following subject areas are required of M.P.H. candidates: immunology, public health statistics, industrial health, nutrition, health education, environmental health, hospital administration, radiation, pathobiology, vector control. Courses in epidemiology and management are offered as electives. Similar M.P.H. courses are arranged for veterinarians, nurses, and B.S. holders of related public health subjects.

Short-term Training Courses for Physicians

The Ministry of Health organizes refresher courses for health department physicians at the provincial level. These courses are of two months duration and are taught by professors from the School of Public Health. Health problems relevant to the provinces are discussed and principles of communicable disease control are reviewed.

Training Courses for Health Workers

New employees of the preventive medicine and malaria control units assigned to the provinces are given a three month training course to orient them to their new responsibilities.

The first two months of this course are devoted to theoretical subjects while the last month is devoted to technical matters. The theoretical instruction includes 270 hours about the following subjects: epidemiology, malaria eradication techniques, personal health care, nutrition, statistics, first-aid, environmental health, communicable disease control. These courses are conducted by physicians and Ministry experts.

During 1977, 2050 persons attended these training courses. To date, 4954 graduates of this programme are active in malaria eradication and communicable disease control activities.

On-the-Job Training Programmes

Because many health workers are involved in providing mobile services to rural populations, they cannot attend the three-month orientation training course. Therefore a one-month on-the-job training programme has been developed for these personnel. Thus far 2904 health workers have completed this type of training.

Teacher Training Courses

The Ministry of Health and Welfare has recently developed a new category of health worker who is to provide primary health care services to rural populations. By the end of the 6th Development Plan 21,670 of these workers are to be employed throughout Iran. In order to accomplish this, the Ministry launched a training course for nurses, sanitary engineers and social workers who will train the new health workers. This training course for trainers lasts for one month.

2.2.5. The Communicable Disease Control Unit

The Communicable Disease Control and Malaria Eradication Unit (Figure 2.7.) is one of the General Departments under the jurisdiction of the Undersecretary for Health and Family Planning. For many years this unit was responsible for planning, executing and evaluating all communicable disease control activities conducted within Iran. However, according to present policy, the communicable disease control and malaria eradication unit is limited to planning, evaluating, advising and supervising activities which are now actually executed at the provincial level.

The objectives of the General Department of Malaria Eradication and Communicable Disease Control (M.E.&C.D.C.) are as follows:

- to control communicable diseases in endemic areas in an effort to prevent any expansion of incidence and epidemic conditions.
- to increase the level of the immunity of the population against preventable communicable diseases by the implementation of a mass vaccination programme.
- to follow up and strengthen malaria eradication activities to reduce malaria as a serious health problem in the country.
- to estimate incidence and prevalence rates of communicable diseases in Iran.
- to estimate the mortality rate attributable to communicable diseases.
- to set priorities for communicable disease programmes.
- to control, and subsequently to eradicate, communicable diseases in areas with favourable epidemiological and ecological conditions.

The duties and responsibilities of the General Department of Malaria Eradication and Communicable Disease Control are as follows:

- to prepare and propose short-term and long-term programmes in the field of communicable disease control and malaria eradication.
- to define policies and guidelines for the implementation of various proposed projects.
- to control and evaluate the execution of programmes concerning malaria eradication and C.D.C. at the provincial level.
- to co-operate with provincial health authorities in implementing malaria eradication and C.D.C. in special circumstances.

- to provide necessary facilities and supplies for malaria eradication and C.D.C. programmes whenever such items (i.e. Vaccines - Insecticide - Prophylactic and Therapeutic Drugs - Antitoxins) are not available at the province.

- to assist in the development of training programmes for health manpower.

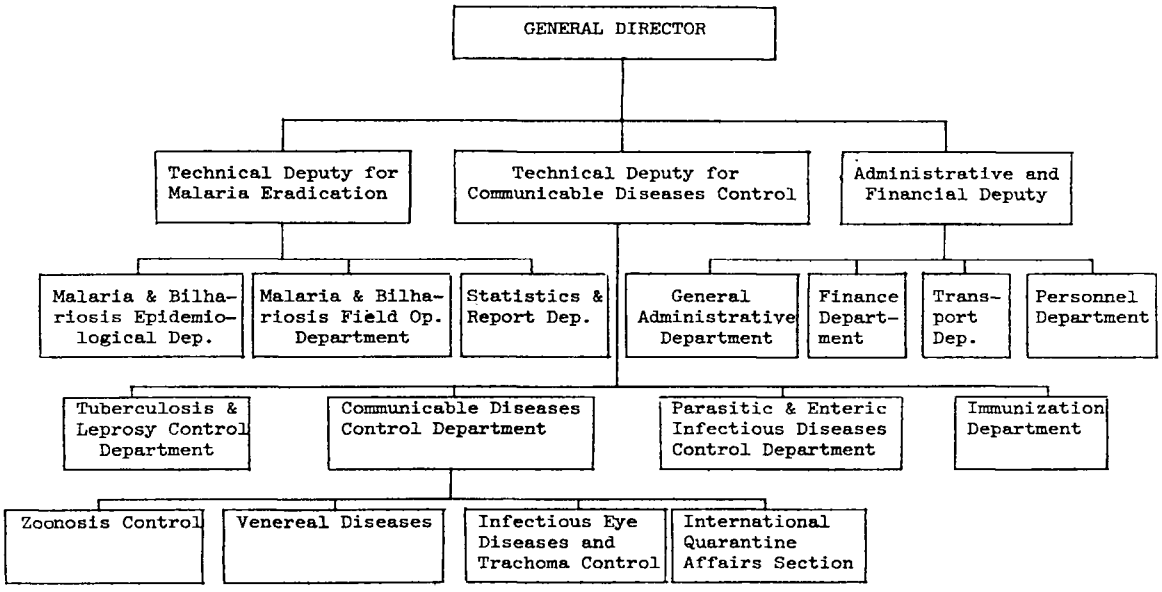
- to co-operate with national and international institutions involved in public health research by exchanging information pertaining to malaria eradication and C.D.C.

- to prepare training courses for technical personnel.

- to receive reports regarding malaria eradication and C.D.C. activities conducted in provinces.

- to continuously report the above named activities to the responsible authorities.

FIGURE 2.7 THE ORGANIZATION OF THE GENERAL DEPARTMENT OF MALARIA ERADICATION AND COMMUNICABLE DISEASE CONTROL



B. THE HISTORY AND EPIDEMIOLOGY OF SMALLPOX IN IRAN

3. History of Smallpox

Smallpox has been present in Iran since ancient times. Mohamed Zakaia Razi, an Iranian physician of the 8th Century discussed smallpox and its symptoms in the seventh chapter of his medical encyclopedia, The Alhavi. This book was published in Venice in 1529. However, even though for hundreds of years much was known about the nature and course of this disease, activities aimed at preventing smallpox in Iran date back only about fifty years.

Initially, smallpox vaccines were imported for inoculation purposes. Gradually, however, Iranian laboratory facilities began producing vaccines locally which permitted a broader based inoculation campaign. By 1941 the Ministry of Health had appointed a group of 200-400 vaccinators whose purpose was to vaccinate children less than one year of age in the major cities, towns and villages of the nation.

In June 1941, the Iranian Parliament passed an act which stressed the importance of vaccination against smallpox. According to the 16th article of this law, infants were to be vaccinated against smallpox during the first two months after birth and booster shots were to be administered at the ages of 7, 13 and 21. Parents were held legally responsible for ensuring that their child was properly vaccinated. Educational authorities were required to obtain vaccination certificates for all students prior to their registration for school and all employers in both the government and private sectors, were required to obtain similar certificates from their new employees. Non-adherence to these regulations on the part of school authorities, employers and parents was punishable by a fine of 10-50 Rials and a prison sentence of 3-7 days. According to Article 18 of this same law, variolation was forbidden and violators of this section were liable to a fine of 51-500 Rials and a prison sentence of 8-30 days.

In spite of its excellent intent, the Parliamentary Smallpox Vaccination Act of 1941 had little impact in reducing smallpox incidence. This was due to the following constraints:

- There was a lack of trained smallpox vaccinators.
- An inadequate road system caused many towns and villages to remain inaccesible to vaccinators.
- Due to limited electrification especially in rural areas, it was difficult to refrigerate and thus to preserve the vaccine.
- Inadequate health centre facilities made it difficult to isolate new smallpox cases.
- Many people erroneously believed that vaccination against smallpox increased the spread of the disease.
- Many people held negative attitudes towards vaccination in general and women were especially reluctant to be vaccinated by male health workers.
- Lack of a well organized immunization programme.

In 1952 the Public Health Co-operative Organization (PHCO) was established with the assistance of the Ministry of Health. The PHCO encouraged innovative approaches towards health problems and was a pioneer in promoting preventive medicine. Smallpox prevention was one of the efforts of the PHCO in this area.

As a result of the PHCO's interest in smallpox eradication, a new campaign against smallpox was initiated in 1953. During the next decade smallpox was effectively eradicated in Iran. Because this programme was so successful in reaching its objectives, a detailed description of its organization, administration and methodology follows.

4. Organization of the Smallpox Eradication Programme, 1953-1961

4.1 Administrative Structure

In order to implement this programme an effective administrative set-up had to be organised.

At the central level, responsibility for the programme was entrusted to the Chief, Preventive Medicine, Communicable Diseases Control and Quarantine Services, supported by an adequate staff. Guidance, supervision and co-ordination of all smallpox eradication activities, as well as development of standard methods and forms, collection and analysis of reports and their distribution were the main functions of the central headquarters.

At the provincial level, in 13 provinces ranging in population from half a million to two million, specific roles were assigned to the following staff.

(a) A full-time medical officer was responsible for all technical and administrative matters related to the programme, epidemiological investigation of reported cases, surveillance activities, supervision of all vaccination, recording and reporting activities, as well as direct supervision of assessment activities through direct monthly checking of one-eighth of the work carried out.

(b) An operations technician (known as the technical secretary) was responsible for:

- Collection of reports from vaccination units in the field and compilation of weekly and monthly reports.
- Compilation of operations statistics and calculation of the percentage of vaccination coverage.
- Direct supervision of the vaccination units through monthly field tours (15-20 days per month).
- Recording and filing all necessary data and forms regarding activities carried out in each locality.
- Testing the potency of vaccine batches received from headquarters.
- Random selection of the villages where the assessors were to be assigned.
- Replacement of the medical officer during the latter's absence.
- Distribution of equipment and supplies to vaccination units in the field.

(c) An administrator (known as the administrative secretary) was responsible for:

- Compilation of staff attendance sheets and other personnel matters.
- Financial matters such as payment of salaries and per diem, procurement, book-keeping, etc. (This was sometimes done on a part-time basis by an accountant employed by the general health services).
- Management and transport facilities.

(d) One or two assessors (known as inspectors) were responsible for:

- Quantitative and qualitative assessment of vaccinations performed.
- Mopping up activities and vaccination of the still unvaccinated population.

(e) A number of vaccinators proportionate to the provinces's population. (Roughly 1 vaccinator per 90,000 of population or 1 unit per 400,000 of population). Five or six vaccinators formed a unit. According to seniority and/or qualifications, one of them was appointed as "unit supervisor" and hence, apart from carrying out vaccinations, was also responsible for immediate supervision of the unit, for health education activities, contacts with village elders, logistics problems, recording of the number of vaccinations performed daily by the unit, preparation of reports on the unit's activities, giving full details on the villages visited (population, number of household, location and accessibility, etc).

Another member of the unit, the so-called "enumerator" apart from performing vaccinations, was also responsible for marking on the wall or the door of each house the number of tenants.

An important factor of the campaign's success was undoubtedly the simplified administrative system adopted. The existence of a separate budget, with funds which could be quickly made available, facilitated immediate procurement of supplies and other similar arrangements.

Furthermore, the authorization granted to the smallpox eradication services at all levels to communicate directly, without having to route their correspondence through the complicated channels of the general health services, avoided unnecessary delays and was therefore another asset.

4.2 Manpower

The personnel employed in the smallpox eradication programme varied from year to year, according to the circumstances. The staff employed in provinces during 1961 is representative:

13 medical officers	13 accountants (part-time)
13 operations technicians	205 vaccinators
13 administrators	76 drivers
14 assessors (2 in the Tehran province)	

The number of vaccination units amounted to 46.

The assessors were recruited among energetic young men with at least a twelfth grade education. They were given a three-month theoretical and practical training in all aspects of smallpox eradication, with particular emphasis in reading of vaccination reactions at different stages.

Vaccinators were recruited, after careful screening, among those permanently employed by the national health services. The best young workers were assigned to the mass vaccination campaign; additional young men with at least a ninth grade education were recruited as vaccinators, given a one-month theoretical and practical training, and employed in their respective provinces. The remaining permanent vaccinators were entrusted with maintenance activities (vaccination of newborn, floating population, etc.) and were either stationed in towns or large villages (when over 50 years old) or assigned for this purpose to field work (each vaccinator was expected to visit 200/250 villages per year). Their activities were solely concerned with maintenance vaccination; they did not participate in the systematic vaccination effort.

4.3 Vaccine and Vaccination Techniques

Glycerinated smallpox vaccine produced by the Pasteur Institute, Teheran, was employed. The vaccine was kept in store by the Institute until the smallpox eradication services airshipped it (in thermoflasks) to the various provinces, according to their requirements.

At the provincial smallpox eradication offices, the vaccine was stored in refrigerators where it was kept for use during two weeks. After such period the remainder was discarded, and new batches of vaccine were put into circulation.

To verify vaccine potency, infants were given primary vaccination in the MCH clinics and other health centres. The addresses of the vaccinees were recorded and reactions were checked after nine days. The vaccine potency was considered adequate if 8 of 10 primary vaccinees showed successful takes.

The vaccine was then sent in limited quantities (normally 3-4 days requirements) to the district smallpox eradication offices (where refrigerators were also available) and to the vaccination units in the field. Its transport presented a problem during summer. Whenever possible, thermoflasks and ice were used. Otherwise the vaccine was packed in three cotton bags (one inside the other) separated by layers of cotton wool, which were moistened frequently in order to keep the temperature comparatively low through evaporation.

For vaccination, the scratch method was employed. The scratches (about 6 mm in length) were made with ordinary stationery pins. A new pin was used for each person and the used pins were kept as a means of recording the vaccinations performed daily. The pins were used only once. The upper deltoid area of the left arm was used as vaccination site. No cleansing of the site was performed and the use of alcohol or even soap was forbidden. The two ends of the vaccine tube were broken, a drop of vaccine was spread on the arm and then the scratch was made with a pin. While in house-to-house vaccination both the spreading and the scratching were performed by the same person. When vaccination was performed in schools, army camps, etc. one vaccinator spread the vaccine and another did the scratching. No serious local infections were reported.

As an additional check, each unit was expected to send back to the provincial office a sample (1/3 of the hundred tubes contained in each box) of the vaccine used for field vaccination. The vaccine was tested again to ascertain its potency.

4.4 Operations

In most cases all the units of the provinces operated jointly to cover a given area.

A preliminary reconnaissance of the localities to be vaccinated was performed by the medical officer or, more often, by the operations technician. Maps were made available by local authorities and by the malaria eradication services. They were completed and up-dated as much as possible.

Normally each locality was covered by a single unit. In order to avoid dissatisfaction and complaints on the part of units assigned to particularly inaccessible and unpleasant spots, assignment were made by drawing lots.

Each unit employed a jeep pick-up. Each jeep was equipped with a loudspeaker (for health education purposes) and had sufficient space for five vaccinators and some camping equipment. To avoid interruption of activities and unnecessary travelling to and from the place of residence, end of week holidays were abolished and the units worked 24 days per month continuously, followed by one-week leave to deal with personal and family matters. While on field trips, the members of the units were housed in classrooms and local health stations, or were the guests of the village elders.

Since no accurate population figures were available, an estimate of the number of inhabitants was obtained by a member of the unit (enumerator) who first went through the village inscribing on the door or on the wall of each house a progressive number, number of the tenants and an arrow indicating the direction of his progression. Subsequently, he assumed responsibility for reaching and vaccinating the villagers who could not be found at home but who were working in the vicinity.

When 83-85% of the village's population were vaccinated, the unit proceeded to its next assignment. Only obviously sick persons were not vaccinated. The enumerator then put at the entrance of the village a poster indicating the village's name and number, the number of inhabitants, the number of households, the number of vaccinations performed, the date of vaccination, number of the unit, next village to be covered.

Health education was carried out through all available media, mostly by the vaccination units. News about the vaccination campaign, however, was spread from one village to the other by word of mouth.

Only the number of vaccinations performed in each locality was recorded by the vaccinators (on the basis of the used pins in their possession). No other details were registered, such as sex and age distribution of the vaccinees, primary vaccination or re-vaccination, etc. This system, although disregarding data which might be employed to analyse the extent of coverage in different age groups, saved time and avoided the necessity of attaching a recorder to each unit.

Vaccination of migrating nomads was a difficult problem. They were vaccinated only if the vaccination unit came into contact with them, while moving from one place to another, or if the tribe was temporarily settled in a specific location.

In most provinces where nomads migrated according to a regular schedule, a vaccination unit would be assigned to meet them at the right time in the right place.

Efforts were made to train tribal vaccinators who moved with the tribe, but this proved impractical due to the difficulties of providing fresh potent vaccine regularly.

Reports on the respective units' activities were prepared by the supervisors and collected by the operations technician at pre-established meeting places during weekly field trips. Information thus gathered was compiled at the provincial level. Factual data (such as total population encompassed by the operation, number of villages vaccinated, number of villages assessed, number of persons submitted to a check-up for assessment purposes, total expenditure, remaining cash in hand) were relayed each week to the central office in Tehran by cable. More detailed information was transmitted later through monthly reports. Table 5 shows the total annual number of vaccinations (mass campaigns and maintenance) during 1955-64.

4.5 Assessment

Due to the unavailability of accurate statistical data, a special assessment system had to be devised to:

(a) determine the population covered
(b) ascertain the potency of the vaccine used in the field.

Assessment was carried out by assessors nine days after vaccination. Only primary reactions and vaccinoid reaction (major reactions) were registered; equivocal reactions were considered as unsuccessful vaccinations.

Assessment was done through sampling of the population covered. Although the sampling method was simple, it proved to be adequate. Thirty to forty per cent of the localities which had been visited by vaccination units and five to ten per cent of the families living in such localities, were selected for sampling purposes by drawing lots.

In determining the number of families to be sampled in selected localities, the following proportions were observed:

- in localities with 20 families, 3 were sampled
- in localities with 21-100 families, 10% of the families were sampled
- in localities with more than 100 families, 5-7% of the families were sampled

Lots were drawn in the field, in the presence of the assessor, the operations technician and/or the provincial medical officer. None of the staff could therefore know in advance which localities would be selected for sampling.

This method reduced as much as possible the logistic problem and enabled the assessor to assess each day the work carried out by the 20 vaccinators (4 units) assigned to the province. Supposing that each village accounted for an average 250 inhabitants grouped in 50 families (of 5 members each), 8 villages of the province would be vaccinated daily. The assessor had thus to visit 30-40% of these eight villages (i.e. 3 villages) and in each village 10% of the vaccinated families (i.e. 5 families). He therefore had to examine daily all persons in 15 families, approximately 75 persons in all, a quite feasible undertaking.

A list of the localities and of the families to be sampled was prepared in duplicate; one copy was given to the assessor for his work schedule, the other was kept in the central office.

When the assessment showed that vaccination of a selected locality had not covered at least 80% of the population, the fact was reported to the central office. The unit which had performed the vaccination was instructed to pay a second visit to the locality and complete the vaccination. No per diem was paid when it was proved that incomplete coverage was due to negligence.

When vaccine potency was found to be inadequate in any of the selected localities, the assessor extended his tour to some other localities (not included in the previous sampling) where vaccination had been carried out 8-10 days earlier employing the same vaccine batch.

If these visits also revealed an unsatisfactory take rate, the assessor reported the fact to the provincial medical officer by telephone or by cable. Eventually, the operations technician or the provincial medical officer himself visited the "incriminated" localities for confirmation and, if necessary, the itinerary of the unit that had performed the vaccination was interrupted. The unit, provided with a fresh supply of vaccine, was entrusted with re-vaccination of the same localities.

According to this scheme, the assessors had to record comprehensive and detailed information in order to: make available as much data as possible for further epidemiological investigations; depict as clearly as possible the quality of the vaccinations performed and the immunity level of the various communities; provide a basis for appraising the assessors' capabilities and efficiency.

The forms used for recording purposes were therefore rather complicated, and the information therein covered:

- Locally assessed - name of locality, sub-district, district, and province and code number.

- Vaccination unit - code number of unit - name of supervisor - name and signature of assessor.

- Vaccination coverage - number of inhabitants - number of persons vaccinated - date of vaccination - number of persons examined by the assessor and resulting coverage - number of persons eventually vaccinated by the assessor - date of assessment.

- Houses and persons examined - number of families examined - name, surname, age and sex of each person examined.

- History of previous vaccination or infection - date of previous vaccination or smallpox infection - whether the person had been vaccinated during the mass campaign or, eventually, reasons for abstention.

- Description of the reaction seen - form and length of the scratch - papule, vesicle, pustule, scab. On the basis of the above and according to the assessor's judgement, classification of the reaction as: no response, primary or vaccinoid.

Assessment revealed that the vaccine induced 90.0% major reactions among primary vaccinees under 5 years of age; 46.3% major reactions among vaccinees who had undergone primary vaccination within the previous ten years; and 58% when primary vaccination had been performed earlier.

During the first three years of the mass vaccination campaign 30,743 localities were covered; 11,976,000 vaccinations were performed in a population of 14,848,979 (80.7%). 34.0% of the above-mentioned localities (10,512 were assessed). During assessment about 5.5% of their population were examined and their reactions checked.

In Iran, from July 1955 to September 1959, 18,573,699 vaccinations were performed in a population of 19,723,000. The number of vaccinations per vaccinator per year was 22,000. Assuming that each vaccinator worked 300 days per year, the average daily output was about 80 vaccinations.

5. Smallpox Incidence

By waging a vigorous campaign against smallpox, Iranian health authorities succeeded in reducing the incidence of this disease from a high of 2,500 cases in 1955 to zero cases in 1964.

In 1962 and 1963 and again in 1971 and 1972 limited outbreaks occurred as a result of importations of smallpox from neighbouring countries. The year 1961 is considered as the last year of endemic smallpox in Iran. Since that time, a programme of routine prevention has been continued in order to maintain the smallpox-free condition of the country, and with the exception of the imported outbreaks mentioned, has been successful in preventing reoccurrence of the disease. Reported smallpox cases and deaths for the years 1931 to 1972 are shown in table 2.

5.1 Incidence by Geographical Regions

During the period 1956-1963 the provinces of Khorasan and Sistan Baluchistan have been the geographical areas most contaminated by smallpox infections. The continued existence of smallpox in these regions can be attributed to several factors. Both of these areas are border provinces and thus experience a great deal of in migration from neighbouring countries. In addition, Sistan Baluchistan Province is inhabited by Baluchistani nomads who because of their migratory life style often elude vaccinators. The large incidence of smallpox in Khorasan province, especially within its capital city Mashhad is attributed to the fact that Mashhad is one of the Shiite Moslems' most holy cities and thus is a pilgrimage centre not onl for Iranians but also for Moslems from surrounding countries.

Table 5.1 REPORTED SMALLPOX CASES AND DEATHS

Year	Cases	Deaths	Case Fatality Rate %
1931	552	234	42
1932	1745	809	46
1933	765	387	51
1934	203	42	21
1935	91	29	32
1936	84	24	29
1937	34		
1938	25	6	24
1939	278	180	64
1940	316	37	12
1941		43	
1942	384	197	51
1943	1150	487	42
1944	1341	240	18
1945	266	47	18
1946	114	24	21
1947	849	238	28
1948	1182	195	16
1949	509	31	6
1950	439	23	5
1951	295	8	3
1952	237	7	3
1953	142	1	1
1954	98		
1955	2500	48	2
1956	1900	164	8
1957	1100	42	4
1958	540	10	2
1959	253	32	13
1960	341	40	12
1961	96		
1962	16 [a]		
1963	6 [a]		
1964-1970	0		
1971	29 [a], [b]		
1972	2 [a], [b]		
1973-1978	0		

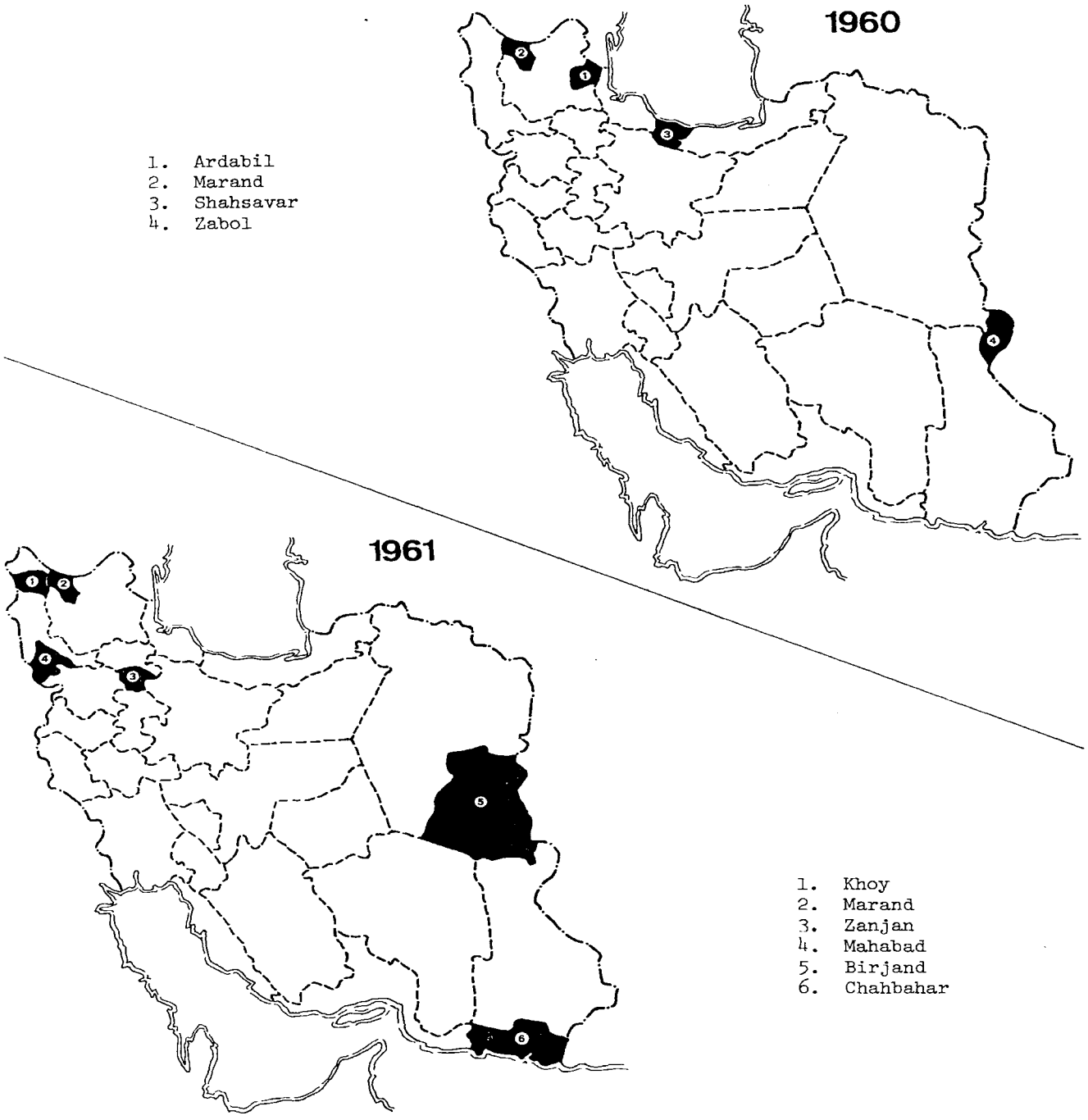
[a] Resulting from imported infection.

[b] Reporting may have been incomplete.

Source: From 1920 to 1950, Epidemiological and Vital Statistics Report 1953,Vol.VI, No.8.

From 1955 to 1972, information related to the number of cases from the Ministry of Health, Government of Iran

IRAN: AREAS AFFECTED WITH SMALLPOX (1960-61)



Geographical distribution of cases and other epidemiological details of the 1970-72 outbreak is the subject of a separate report provided to the Global Commission members visiting Iran.

5.2 Incidence by Age, Sex and Vaccination Status

(a) Age and Sex

Smallpox has been found among all age groups in Iran from a 2-month old infant to a 60-year old woman. Unfortunately national data regarding age and sex distribution of smallpox cases among the population is not available. However records from some epidemics show that females and children under 14 years are the most affected groups. During an epidemic in Tabriz in 1954, 66% of 123 cases recorded were females, 62.6% were children in the 1-14 age group and 13% were infants (Table 5.2). The higher rates in women may be explained by the reluctance of Moslem women to accept vaccination administered by male vaccinators except in emergencies.

Table 5.2: DISTRIBUTION BY AGE AND SEX OF SMALLPOX CASES EPIDEMIC IN AMIR KAYZ, TABRIZ, IRAN, 1954

Age (Years)	Male	Female	Total	Deaths Total
1	9	7	16 (13%)	3
1-4	11	21	32 (26%)	7
5-14	13	32	45 (37%)	5
15+	9	21	30 (24%)	2
TOTAL	42 (34%)	81 (66%)	123 (100%)	17 (14%)

(b) Vaccination Status

As with age and sex distribution data, no national records are available regarding smallpox incidences among vaccinated populations. Most cases of smallpox occurred among non-vaccinated persons. However records show that a few persons previously vaccinated did contract the disease. These cases were found among persons who had been vaccinated during the early phase of the incubation period or who had been vaccinated many years prior to the contraction of the disease.

C. ACTIVITIES TO MAINTAIN SMALLPOX-FREE STATUS (1962 - 1977)

6. Smallpox Surveillance

6.1 Introduction

Iran's successful smallpox eradication programme was mainly based upon mass vaccination. The last year of endemic disease - apart from secondary spread following importations - was in 1961, almost a decade before surveillance-containment became the recognized strategy for smallpox eradication in countries which remained endemic.

Surveillance and outbreak control was introduced, however, during the last years of the eradication campaign, when the number of cases decreased dramatically. Every reported case was investigated and isolated and all the necessary control measures were enforced. Relevant epidemiological data were analysed and distributed to health authorities concerned.

There were no separate fire-fighting teams assigned to deal with epidemic situations. When the need arose, routine work of one or two units (depending on the magnitude of the problem) was interrupted and vaccination of the whole population in that area was carried out. The staff of the local health services in affected areas was also called upon to help for the isolation of cases and other preventive measures. The provincial smallpox medical officer was always in charge of these epidemic controls.

Quite apart from the "special programme for certification" described in Part D of this report, a system of surveillance has been built up during the last five years in order to guard against importations. Surveillance may be thought of as having four components: the reporting system, a system of quarantine, investigation of suspect cases, and laboratory diagnosis of any suspect case.

6.2. Reporting System

In the past the statistical units at the local level cabled weekly reports regarding communicable disease data to the provincial statistical units. These units prepared weekly reports of communicable disease incidence for the province and cabled this data to the central ministerial statistical department. A second copy of the provincial report was forwarded to the preventive medicine department at Ministry Headquarters.

These weekly reports were published and distributed to appropriate governmental authorities.

As this system was complicated and non-uniform, the Departments of Statistics and Preventive Medicine developed a standardized weekly report format. With the adoption of this revision, suspected communicable disease cases were reported on a daily basis by telephone or cable. A follow-up letter would confirm these telephone or cable reports thus preventing misunderstandings at the Ministerial level.

A similar reporting system is used today with the replacement of monthly reports for the previous weekly ones.

6.3. Quarantine

Because Iran's eastern and western neighbours were foci of quarantinable diseases and were known to be infected areas, the danger of entrance of smallpox infection from these neighbours to Iran was always present.

The proper use of quarantine rules and regulations on Iran's boundaries was emphasized so that the probability of outbreaks of such diseases was minimized. With regard to this emphasis, the following points were considered:

- A boundary with a radius of 150 kilometres from the eastern and southern ends of the country was established and 95% of the population within these areas were vaccinated.
- Quarantine posts were established particularly along the eastern and southern boundaries in order to control the arrival of persons from infected countries.
- Four groups of quarantine officers were trained for six months each and were then assigned to staff quarantine centres in the country.
- Border guards were given orientation training in health rules and regulations and other technical points, so that they could help in an emergency.

6.4. Investigation of suspect cases

All known cases of skin rash accompanied by fever are regarded as possible smallpox cases until clinical and epidemiological studies and a laboratory diagnosis confirm otherwise. The Ministries of Agriculture, Education, Interior and Rural Co-operatives, the Red Lion and Sun Society, the Imperial Organization for Social Services and the Gendarmerie co-operate with the Ministry of Health in identifying suspect cases of skin rash.

For suspect smallpox cases the following procedures are conducted:

- if medical findings support a smallpox diagnosis, the patient is isolated until laboratory reports can be completed;
- skin lesion specimens are taken from rashes and pustules and then forwarded to a laboratroy for culturing;
- the suspect's immediate family members and other persons with whom he has had close contact are vaccinated against smallpox;
- if a smallpox suspect lives in a village, all village residents are vaccinated against smallpox;
- the health condition of the family members of a suspect case is monitored on a daily basis for 28 days, the equivalent of two incubation periods;
- studies are conducted to determine the original source of infection;
- the neighbours of suspect cases are investigated in an effort to identify and isolate additional cases that may exist.

During the past five years, 309 suspect cases of smallpox have been investigated, all of which proved to be negative according to laboratory diagnosis by the Pasteur Institute.

The geographical distribution of smallpox suspects during the past five years and their age and sex distribution are shown in Tables 6.1 and 6.2

TABLE 6.1 SUSPECT SMALLPOX CASES REPORTED AND INVESTIGATED[a] BY PROVINCE 1973 - 1978[b]

PROVINCE	1973	1974	1975	1976	1977	1978 UP TO JUNE	TOTAL
Central	18	21	12	10	2	5	68
Gilan	-	1	1	1	-	-	3
Mazandaran	4	6	3	4	1	3	21
E. Azarbaijan	-	1	3	-	-	-	4
W. Azarbaijan	2	-	-	-	-	-	2
Kermanshah	15	16	2	8	1	-	42
Khuzistan	29	11	17	3	3	-	63
Fars	13	2	1	2	1	-	19
Kerman	-	-	-	-	-	-	-
Khorasan	-	7	10	1	4	1	23
Isfahan	1	6	4	-	2	-	13
Sistan Baluchestan	4	-	-	-	2	-	6
Kordestan	10	3	2	-	-		15
Hamedan	-	5	5	1	2	2	15
Chaharmahal Bakhtiari	1	-	-	-	-	-	1
Lorestan	-	-	2	-	-	-	2
Ilam	1	-	-	-	-	-	1
Boyerahmad	-	-	-	-	-	-	-
Boushehr	-	-	2	1	-	-	3
Zanjan	-	-	1	-	-	-	1
Yazd	-	1	-	1	-	-	2
Semnan	-	-	-	-	1	-	1
Hormozgan	1	-	3	-	-	-	4
TOTAL	99	80	68	32	19	11	309

[a] All cases confirmed negative by laboratory examination

[b] Kerman and Boyerahmad provinces did not report any suspect smallpox cases during this period

TABLE 6.2 SUSPECT SMALLPOX CASES REPORTED AND INVESTIGATED - AGE AND SEX DISTRIBUTION (IRAN, 1973 - 1978)

AGE	SEX			TOTAL
	M	F	UNKNOWN	
0-1	10	9	-	19
1-4	22	21	2	45
5-14	62	61	6	129
15+	17	20	5	42
Unknown	36	29	9	74
TOTAL	147	140	22	309

6.5. Laboratory Diagnosis

6.5.1. Policy

In any suspected case of smallpox, laboratory samples should be collected and forwarded to a qualified laboratory for diagnostic testing.

6.5.2. Collection of Specimens

Laboratory samples of skin lesions are collected in the following manner:

(a) If the lesion is in the vesicle-pustule stage, the water content of some of the lesions is taken with a Pasteur pipette and is then transferred to a small bottle or a test-tube and properly sealed. The sample is then sent to the laboratory. Sometimes the narrow end of a filled Pasteur pipette is broken, dropped into a test-tube which is then sealed and sent to the laboratory.

(b) If the lesion is in the peeling stage, some of the scab's crust is taken with tweezers and transferred to a bottle or test-tube which is then properly sealed and forwarded to a laboratory. All specimen samples are marked with complete patient identification information including name, age, sex, address, vaccination status and the date of the onset of the illness.

WHO often provides a special specimen collection kit which is used by investigators for lesion collection and transferral to the laboratory.

6.5.3. Laboratory Diagnostic Techniques

The Pasteur Institute analyses and diagnoses suspected skin lesions using one of the following methods:

(a) C.A.M. Test or Injection of Contaminated Material into a Chicken Foetus

(b) Paul Test or Innoculation of Rabbits with Pustule Contents

(c) Culture by Innoculation into Human and Rabbit Kidney Cells

6.5.4. Results of Testing

During the past five years (1973-1978), 309 suspect smallpox specimens were sent the Pasteur Institute for laboratory analysis and diagnosis. Eight of these specimen samples were vaccinia positive and all were smallpox negative.

7. Smallpox Vaccination

7.1 Policy

The present smallpox vaccination policy is aimed at maintaining the eradication of smallpox in Iran. A high priority has been assigned to infant vaccination. This is accomplished in Iran's rural areas by mobile teams of vaccinators attached to the malaria eradication programme. Mobile teams are also targeted to vaccinate one third of all rural inhabitants each year. This activity serves to increase the smallpox immunization rate in these areas.

In urban areas where mobile vaccination teams are unnecessary, smallpox vaccinations are administered through health centres and outpatient clinics.

By law all children must present a valid smallpox vaccination certificate to education authorities before they can enter school. Through this means all school age children receive effective protection against smallpox. Additionally, the revaccination records of all school children are complete. This is especially noteworthy in that revaccination procedures are often considered unnecessary by uninformed persons.

These policies will continue until Iran has been certified to be smallpox free.

7.2 Vaccination Technique

From the beginning smallpox vaccinations were performed using the scratch and/or multiple pressure method. Ordinary straight pins were utilized for this purpose. Usually the multiple pressure method was used by health centre personnel and the scratch technique was used by the mobile vaccination units. Presently, vaccinators use bifurcated needles instead of straight pins. The bifurcated needles are sterilized by being boiled inside plastic capsules.

7.3 Vaccine Storage and Distribution

In accordance with the assumption that one-third of the Iranian population will be vaccinated against smallpox each year, the Pasteur Institute prepares 12 million doses of freeze-dried smallpox vaccine annually. These vaccines are sent to the Communicable Disease and Malaria Eradication Section of the Ministry of Health and Social Welfare where they are distributed among the provinces according to pre-arranged allotment.

The vaccines are then transported by mobile cold storage units or airplane to the nation's twenty-three provinces.

Vaccine allotments are quickly transferred to the provinces upon their reception from the Pasteur Institute. Vaccine preparations not required by provincial health authorities are preserved in cold storage houses supervised by central communicable disease and malaria eradication authorities.

Upon their arrival in the provinces, vaccine stocks are placed in the province's central cold storage unit until they are dispersed (by request) to the local health centres. The vaccines are transported by mobile cold storage units and are transferred to local cold storage facilities or to ordinary refrigerators where they are kept until they are utilized for vaccination purposes. When vaccination teams are working in remote and isolated areas, the vaccines are transported to the field vaccination site in special kits.

7.4 Maintenance Vaccination 1961 - 1978

The following steps were taken in an effort to maintain the non-occurrence of smallpox in areas in which the disease had been eradicated:

- Non-mobile immunization centres were established in all towns and districts.
- Young and active vaccinators were employed.
- Technicians equipped with motor cycles for travelling along bad roads in rural areas were employed.
- The vaccination programme was extended to include diptheria, tetanus, whooping cough and, when necessary, typhoid and other vaccinations in the country's rural areas.
- Health and Literacy Corps personnel were trained in vaccination techniques.
- Health education programmes aimed at acquainting the people of the country with the purposes of vaccination were extended.
- All vaccination centres were equipped with refrigerators and other necessities.

Moreover to maintain 80-90% coverage in rural areas and to boost the resistance of town populations against smallpox, from 1965 to 1969 vaccination activities were combined with a cholera vaccination campaign, with the malaria control programme, and further assisted by members of the Iranian Health Corps.

During the past ten years a total of 112,577,497 doses of smallpox vaccine have been administered by Ministry of Health personnel (Table 7.1). This includes vaccine administered by both the central vaccination unit and the mobile vaccination units. The following table gives a breakdown of vaccinations by year and by vaccination status.

TABLE 7.1: NUMBER OF SMALLPOX VACCINATIONS PERFORMED 1968 - 1977

YEAR	VACCINATIONS PERFORMED		
	PRIMARY	REVACCINATION	TOTAL
1968	786,376	3,131,424	3,917,800
1969	1,062,933	3,229,425	4,292,358
1970	2,027,382	10,503,146	12,530,528
1971	2,941,829	16,832,218	19,774,047
1972	2,387,071	18,311, 736	20,698,807
1973	2,250,261	7,388,591	9,638,852
1974	3,432,270	12,889,939	16,322,209
1975	2,329,279	6,967,836	9,297,115
1976	2,597,069	5,614,930	8,211,999
1977	2,292,299	5,601,483	7,693,782
TOTAL	22,106,769	90,470,728	112,577,497

7.5 Cultural and Religious Resistance to Smallpox Vaccination

Smallpox vaccination was readily accepted by Iranians just as persons from a variety of religious and cultural backgrounds welcomed this immunization method to replace variolations.

The mass media played an important role in informing Iranians about the presence of vaccination teams and in persuading them to accept the new vaccination method. The health education efforts of the vaccination team members were also especially effective in this regard.

In the initial stages of the vaccination campaign, a great deal of resistance did exist among certain tribal groups inhabiting Iran's central deserts. Religious beliefs and tribal customs were the basis for this resistance. Examples are listed below:

Villagers in the province of Sistan Baluchistan considered any infusion of chemicals into the body filthy and against their religious beliefs. Therefore they resisted smallpox vaccination as long as they could.

In the villages near Iranshahr and Seravan, a group of women known as Setrie used to wear particularly enveloping garments which covered their whole body. Any persons including all family members excepting their husbands were forbidden to look upon their bodies. This group of women thus resisted smallpox vaccination on religious grounds.

In very rare cases, certain tribes would hide all their children under 2 years of age. As the vaccinators would not be aware of how many children less than 2 years of age should be residing within his area of responsibility, large numbers of very young children remained un-vaccinated.

Sometimes rumours were spread by religious leaders purporting that it was the Government intent to sterilize men and women by vaccinating them. These rumours were soon stopped and the villagers then readily accepted smallpox vaccinations.

7.6 Vaccine Production

Initially the Pasteur Institute in Tehran prepared liquid vaccines. However, in 1967 liquid vaccine production was replaced by the production of freeze-dried vaccines. Current smallpox vaccine preparations of the Pasteur Institute meet WHO standard requirements for potency, stability and bacteriological count. Production of vaccine using the Lister strain of vaccinia virus started in 1970 and since then the strain has been maintained by repeated passages in calves (not more than 5 passages) and stored in the form of crude pulp at -70°C. A true seed lot system is systematically used. Tests to ascertain bacterial contamination and potency of suspensions used as seed virus, are routinely performed. Smallpox vaccine produced in Iran has been donated to WHO for use in eradication programmes in other countries.

D. SPECIAL OPERATION FOR CONFIRMATION OF ERADICATION

8. Plan of Operations

The WHO "Recommendations of the Consultation on Worldwide Certification of Smallpox Eradication" have established Iran in Group II: "Countries Requiring Visits by Global Commission Members. Other countries in this group are Iraq, Syria, Thailand and China.

The requirements for preparation for the visit by Commission members are given in WHO document SME/78.6 "Methodology for Preparation of Appropriate Data for the 31 Countries Remaining to be Certified Free of Smallpox". According to this document, methodology "B" is indicated for Iran; this methodology includes a "minimum information report" as well as pock mark surveys in priority areas and special surveys in certain instances. The WHO recommendations suggest that laboratory specimens be taken only from suspected smallpox cases.

In view of the history of smallpox in Iran, it was felt advisable by Government Health officials to carefully prepare for the visit of the Global Commission by undertaking a special programme which is even more vigorous than the WHO recommendations. An English translation of the original plan of operations for this special "campaign" is included in Annexe 2 of this report. In brief, the plan outlines four activities to be conducted over a six-month period of preparation (March 21 - September 23, 1978) for certification:

1. Chickenpox Surveillance

   a. Compulsory reporting of all Chickenpox cases during the 6-month period.

   b. Epidemiological investigation of all chickenpox cases which are considered "high risk" i.e. cases without smallpox vaccination, cases occurring in adults, cases occurring in outbreaks with a death associated, and severe or atypical cases.

   c. Specimens taken for laboratory examination from as many cases as possible that may be considered "high risk"; samples to be sent to a WHO reference laboratory for confirmation of diagnosis.

2. Special Investigation of Suspect Smallpox Cases

   In addition to epidemiological investigation and laboratory specimens collection, a senior epidemiologist from Teheran will visit and report on any cases suspected of being smallpox.

3. Special Facial Scar Survey

   This survey concentrated on areas nearby known cases of smallpox during 1970-72. In addition to such villages, other high risk areas were "oversampled" and additional villages chosen at random to make up no less than a 2% sample of all villages in the country and an overall one percent sample of all children under age of 5 years. Any children found with facial pockmarks were to be specially examined by senior health officials.

4. Preparation of detailed documentation for the Global Commission visit, of which this document is a part.

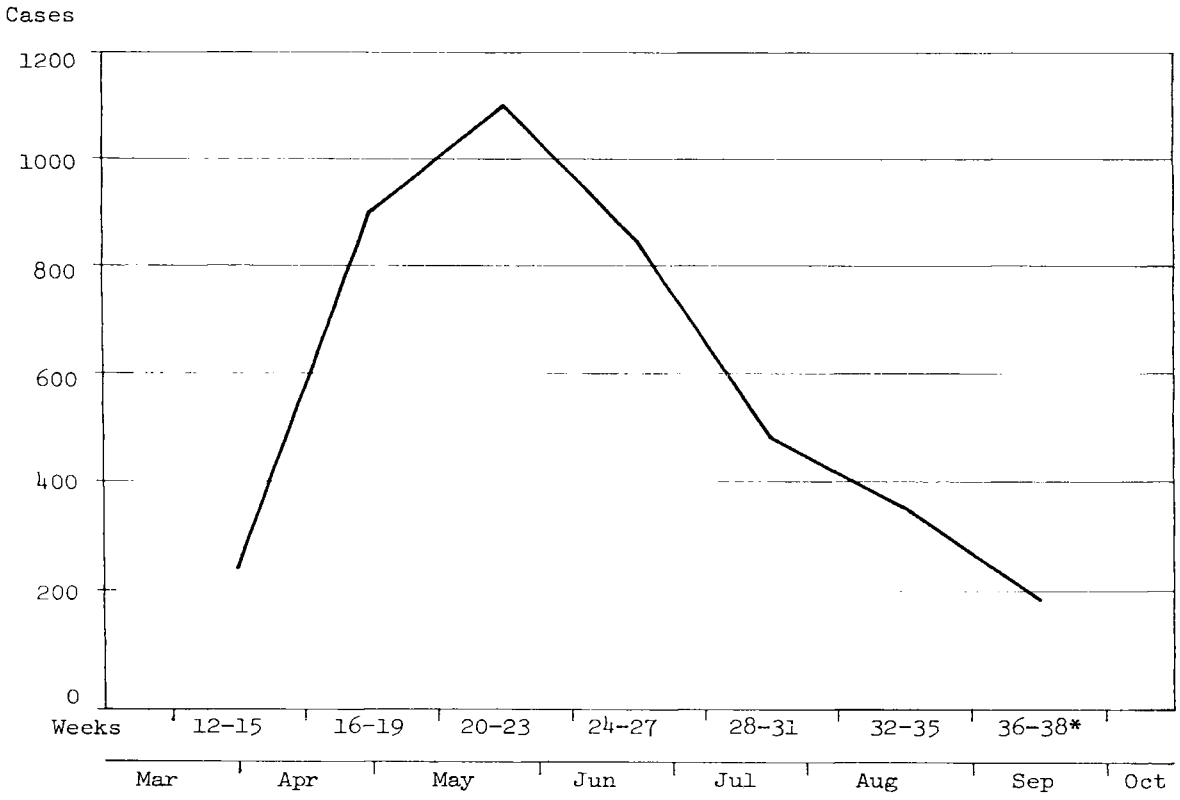
9. Chickenpox Surveillance

There were three components to chickenpox surveillance activities. First, all cases of chickenpox were to be compulsorily reported, and second, a detailed clinical and epidemiological report was to have been completed for each case reported. Finally, laboratory specimens were to be taken from all suspicious cases, from cases occurring in adults, and from as many unvaccinated patients as possible.

9.1. Compulsory Reporting of Chickenpox Cases

A total of 4074 cases of chickenpox were reported telegraphically during the period March 21 - September 23, 1978. Table 9.1 shows these cases for each province. Since the special programme covered only six months, and began with the start of the Iranian new year, these cases have been shown by the corresponding international reporting weeks and are aggregated in four week periods, as shown in Figure 9.1.

FIGURE 9.1 REPORTED CHICKENPOX CASES BY FOUR-WEEKLY PERIODS
21 MARCH - 23 SEPTEMBER 1978



*Includes reports for first three weeks only.

TABLE 9.1 CHICKENPOX REPORTED IN IRAN BY WEEK OF REPORT (MARCH 23 - SEPTEMBER 21, 1978 WEEKS 12 - 38) SHOWN IN 4-WEEK PERIODS

District (Ostand)	Week of Report							
	12-15	16-19	20-23	24-27	28-31	32-35	36-38	TOTAL
Central (Tehran)	-	79	160	190	66	3	14	512
Gilan	37	124	131	76	70	26	7	471
Mazandaran	20	85	132	86	34	30	2	389
E.Azarbaijan	3	85	100	84	36	15	20	343
W.Azarbaijan	-	16	19	4	-	-	-	39
Kermanshan	15	11	22	22	6	11	2	89
Khuzistan	24	73	37	18	16	2	4	174
Fars	11	67	59	73	61	12	2	285
Kerman	-	3	-	2	-	-	-	5
Khorasan	21	48	68	22	25	33	17	234
Isfahan	16	38	25	33	59	125	47	343
Sistan Baluchestan	-	22	48	5	15	2	-	92
Kordestan	-	8	18	22	1	1	-	50
Hamedan	12	31	87	71	28	17	20	266
Charmahal Bakhtiari	1	23	12	19	5	9	-	69
Lorestan	2	5	-	3	3	-	1	14
Ilam	41	72	17	-	-	-	-	130
Boyerahmad	-	-	-	-	-	7	3	10
Boushehr	11	14	23	16	-	-	2	66
Zanjan	5	18	43	20	9	3	3	101
Semnan	13	53	68	52	25	22	10	243
Yazd	10	16	30	13	9	17	22	117
Hormozgan	-	9	1	4	6	10	4	34
TOTAL - IRAN	242	900	1,100	835	474	345	180	4,076

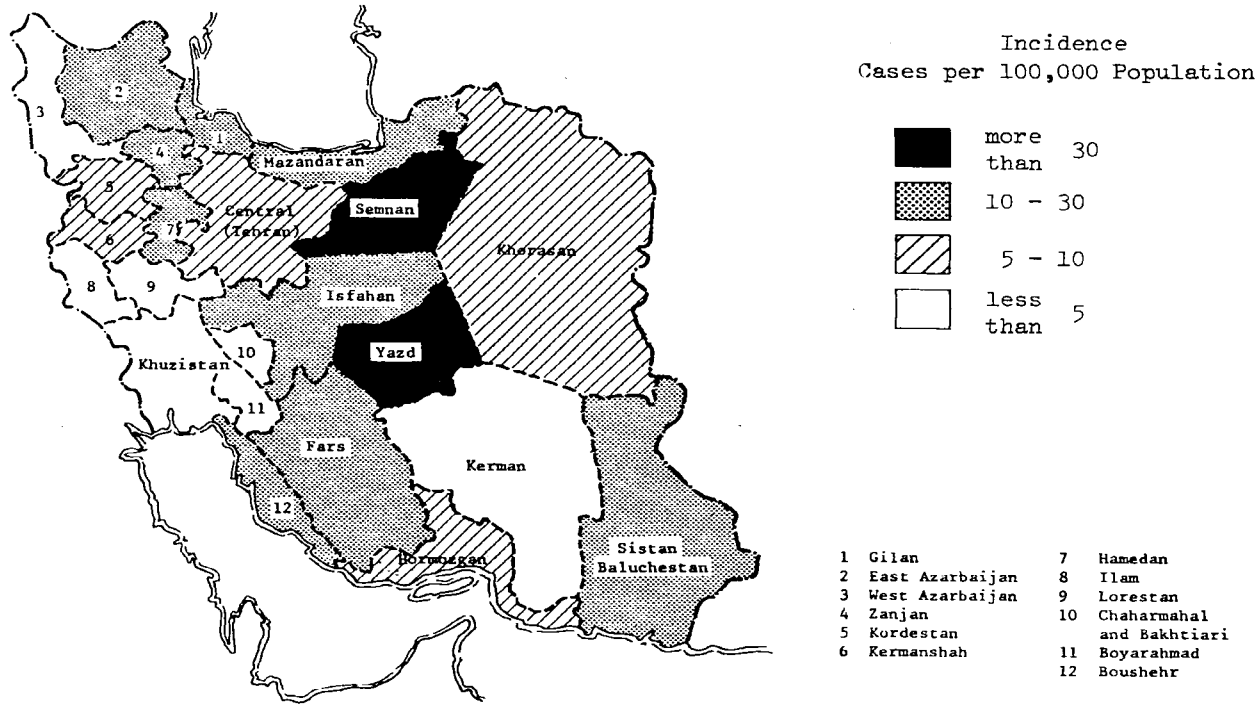
TABLE 9.2 CHICKENPOX REPORTED IN PROVINCES OF IRAN
(MARCH 21, 1978 TO SEPTEMBER 23, 1978)

Province (Ostand)	Population		Chickenpox cases telegraphically reported	Incidence (cases per 100,000 population)	Percent Chickenpox cases verified and epidemiologically analysed
	Number (thousands)	Density (people per km^2)			
Central (Tehran)	6921	99.3	512	7.40	99.4%
Gilan	1578	43.2	471	29.85	100.0
Mazandaran	2384	50.3	389	16.32	100.0
E Azarbaijan	3194	47.6	343	10.74	100.0
W Azarbaijan	1405	32.2	39	2.78	100.0
Kermanshah	1016	39.8	89	8.76	100.0
Khuzistan	2177	33.7	174	8.00	44.3
Fars	2021	15.2	285	14.10	100.0
Kerman	1088	5.6	5	0.46	100.0
Khorasan	3267	10.4	234	7.10	48.7
Isfahan	1975	20.8	343	17.37	66.5
Sistan Baluchistan	660	3.6	92	13.94	100.0
Kordestan	782	31.3	50	6.39	98.0
Hamedan	1087	53.9	266	24.47	100.0
Charmahal Bakhtiari	394	26.6	69	17.51	100.0
Lorestan	925	29.5	14	1.51	71.4
Ilam	244	13.4	130	53.28	0.0
Boyerahmad	245	17.2	10	4.08	100.0
Boushehr	345	12.5	66	19.13	71.2
Zanjan	579	26.5	101	17.44	97.0
Semnan	486	6.0	243	50.00	99.2
Yazd	356	6.3	117	32.87	100.0
Hormozgan	463	7.0	34	7.34	94.1
TOTAL - IRAN	33,502	20.3	4,076	12.16	87.7%

The overall six month incidence of 12.2 for Iran as a whole compares well with annual chickenpox incidence rates reported in other countries: Thailand 1.29 cases per 100,000 per year, Sudan 7.26, Burma 7.96, Syria 13.91, Iraq 47.15, India 70.50 and Bangladesh 139.00 . (The six month incidence figure for Iran has not been coverted into an annual incidence figure because there are marked variations in monthly incidence, and it is not possible to estimate the September-March incidence).

Table 9.2 shows incidence figures for each province, as well as the percentage of reported cases that were actually investigated. Provinces vary a great deal both in reported incidence of chickenpox as well as in percentage of cases investigated. The highest incidence was reported from the provinces of Ilam (53.3 cases per 100,000) and Semnan (50.0) while a low of 0.46 was reported from Kerman. This variation may be attributed both to geographical variation as well as to reporting efficiency as is illustrated in figure 9.2.

FIGURE 9.2 REPORTED CHICKENPOX INCIDENCE, IRAN
21 MARCH - 23 SEPTEMBER 1978



9.2. Case Investigations

As of the time of completion of this report to the Global Commission, 3575 of the 4076 chickenpox cases in Iran (87.7%) had been clinically verified and a special epidemiological report (Form No. 1 shown in Annex 2) completed. Twelve provinces completed all case investigations, while an additional five provinces investigated more than 90% of the chickenpox reported from their areas. Six provinces failed to complete their investigations: Khuzistan (44.3% investigated), Khorasan (48.7%), Isfahan (66.5%), Lorestan (71.4%), Ilam (none) and Boushehr (71.2%). In a few of these provinces, the case investigations were in fact completed, but the proformae did not reach the central Headquarters in Tehran due to postal strikes at the time of completion

of this report.

An analysis of the 3575 case reports is shown in Table 9.3 by age and sex. Chickenpox in Iran is clearly a disease of childhood (only 2% of the cases occurred in individuals over 15 years of age). Males (51.9%) and females (48.1%) are affected approximately equally.

TABLE 9.3 CHICKENPOX CASES IN IRAN (MARCH-SEPTEMBER 1978) BY AGE AND SEX

Age	Male	Female	Unknown	TOTAL
-1	86	91	-	177 (4.9%)
1-4	632	548	1	1,181 (33.0%)
5-14	1089	1040	2	2,131 (59.6%)
15+	43	32	-	75 (2.0%)
Unknown	5	6	-	11 (0.3%)
TOTAL	1855 (51.9%)	1717 (48.1%)	3 -	3,575 (100%)

One of the major purposes of this chickenpox surveillance programme was to identify chickenpox cases that might be mis-diagnosed smallpox cases if any smallpox cases had existed in Iran. For this reason, special efforts were made to locate all cases of chickenpox in unvaccinated individuals. Table 9.4 shows the breakdown of chickenpox cases by vaccination status.

TABLE 9.4 CHICKENPOX CASES IN IRAN (MARCH-SEPTEMBER 1978) BY AGE AND VACCINATION STATUS

	Vaccination Scar			
Age	Present % Vaccinated	Absent	Unknown	TOTAL
-1	59 (33.3%)	112	6	177
1-4	922 (78.0%)	242	17	1181
5-14	1,986 (93.2%)	98	47	2131
15+	69 (92.0%)	6	-	75
Unknown	8 (72.7%)	1	2	11
TOTAL	3,044 (85.2%)	459	72	3575

It is interesting to note that 85.2% of all chickenpox cases occurred in vaccinated individuals. While no attempt was made during the special certification programme to systematically assess vaccination coverage in Iran, this figure seems a reasonable estimate of the national level of immunity since there should be no reason for chickenpox to be non-randomly distributed with respect to smallpox vaccination status. The age-specific vaccination levels are also of interest; over 90% of children and adults above the age of five show evidence of at least a primary vaccination scar.

9.3 Laboratory Investigations of Clinically Apparent Chickenpox Cases

According to the plan of operations, there were two categories of chickenpox cases that were to have specimens taken if investigators reached the patient before the lesions had completely cleared. All unvaccinated chickenpox cases were in one such category, while all "Suspicious" chickenpox cases formed the second group.

The 459 chickenpox cases which occurred in unvaccinated individuals (12.8% of the total chickenpox cases) comprised a priority group of cases for epidemiological investigation and laboratory confirmation. 209 of these unvaccinated cases (45.5%) were reached by investigators in time to take specimens. Since adult unvaccinated pox cases diagnosed as chickenpox formed a special high-risk group, additional emphasis was placed on laboratory confirmation of these cases. Table 9.5 shows that 67% of unvaccinated cases over age 15 were sampled, while specimens were taken from 50% of children (5-14 years of age) who contracted chickenpox and were unvaccinated.

TABLE 9.5 UNVACCINATED INDIVIDUALS WITH CLINICAL CHICKENPOX, SHOWING SPECIMENS COLLECTED FOR LABORATORY CONFIRMATION OF DIAGNOSIS

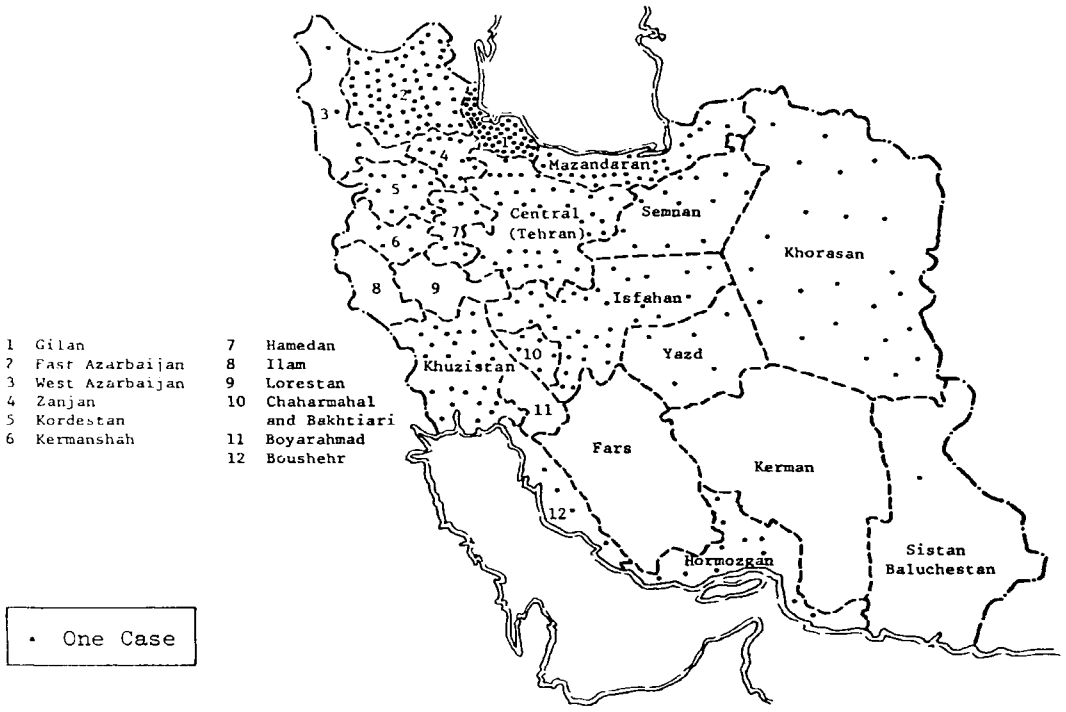
Age	Total Unvaccinated Individuals With Chickenpox	Specimens for Laboratory Confirmation	
		Taken (%)	Not Taken
Less than 1 Year	112	42 (37.5%)	70
1 - 4	242	114 (47.1%)	128
5 - 14	98	49 (50.0%)	49
Over 15	6	4 (66.7%)	2
Age Unknown	1	0 --	1
TOTAL	459	209 (45.5%)	250

The second category of chickenpox cases which were to have specimens taken were those whom, although vaccinated, were still in a high risk group whether clinically severe, atypical, or occurring in an adult. A total of 140 additional specimens were taken from such high risk chickenpox cases. Table 9.6. shows the overall make-up of all chickenpox cases selected for laboratory specimen collection, and Figure 9.3. shows the geographical distribution of specimen collection. An effort was made to take samples from all over the country. The 349 specimens were collected from every province except for four: Kerman, Lorestan, Ilam and Boyerahmad.

TABLE 9.6 SPECIMENS TAKEN FROM CLINICALLY DIAGNOSED CHICKENPOX CASES, BY AGE AND VACCINATION STATUS

Age	No. of Specimens Collected	Vaccination Scar	
		Yes	No
Less than 1	43	1	42
1 - 4	131	17	114
5 - 14	119	70	49
15 +	56	52	4
TOTAL	349	140	209

FIGURE 9.3 LOCATION OF 349 CASES CLINICALLY DIAGNOSED AS CHICKENPOX, FROM WHICH SPECIMENS WERE TAKEN FOR LABORATORY TESTING IRAN, 1978



The laboratory results further confirmed that there is no smallpox in Iran. Three hundred and eighteen reports had arrived in Iran at the time of writing this report. Eighty-eight of these specimens were confirmed to be chickenpox, two were diagnosed as molluscum contagiosum, and in the majority (228 cases) no virus was isolated. These results are shown by age and diagnosis in Table 9.7.

TABLE 9.7 THE LABORATORY RESULTS OF 318 SPECIMENS TAKEN FROM PATIENTS WITH RASH AND FEVER CASES IN IRAN (MARCH - SEPTEMBER 1978)

	DIAGNOSES						
AGE (Years)	Smallpox	Chickenpox	Herpes Simplex	Vaccina	Molluscum Contagiosum	No Virus Isolated	TOTAL
Less than 1	0	10	0	0	1	27	38
1 - 4	0	30	0	0	1	96	127
5 - 15	0	35	0	0	0	87	122
15 +	0	13	0	0	0	14	27
Unknown	0	0	0	0	0	4	4
TOTAL	0	88	0	0	2	228	318

10. Special Investigations of Unusual Cases

According to the plan of operation, any unusual case of pox disease would be visited by physicians from the Communicable Disease Unit in Tehran, entered into a "rumour register" and specimens collected for laboratory examination. During the special programme, four such cases of suspected smallpox were investigated.

10.1 Case No. 1:

Mahnaz Abedie is a 2 year old girl who lives in Babolsar City of Mazandaran Province. She developed fever on 3 April 1978 and rash the following day. On April 7, a health worker visited and took a specimen from this unvaccinated girl. This specimen (Iran 138) was reported as "poxvirus" by the WHO Reference Laboratory, and Dr. Rezai made an urgent visit to see the patient on 16 June. The child was in good health, with no active disease, except for a significant number of verrucose (molluscum contagiosum) covering her trunk. Photographs were taken, the area put under surveillance (there were no further cases) and WHO requested to confirm if the "poxvirus" seen on electronmiscroscopy could in fact have been molluscum contagiosum, a poxvirus which is not a member of the orthopoxvirus group that contains variola. WHO subsequently reported that since the specimen did not grow on CAM or in cell lines. A diagnosis of molluscum contagiosum was very possible. On 2 August Dr. Rezai, accompanied by Dr. Shafa of WHO Geneva made another visit to the case at which time (4 months after the onset of the child's concommitant case of chickenpox) the clinical diagnosis of molluscum contagiosum was confirmed. A second specimen was taken for laboratory examination from lesions which were still active; the laboratory confirmed that this was indeed a case of molluscum contagiosum, presumably with an incidental simultaneous attack of chickenpox four months earlier.

10.2 Case No. 2:

Vali Shafai is a 16 month old boy who developed fever on 14 April 1978, followed by a centripetal rash which developed on 21 April. The health worker who visited the boy on 29 April in Bonekook Village, Gamsar, was suspicious that he might have smallpox, took some crusts as specimens, and reported the case as suspected smallpox because the boy had never been vaccinated. On 5 June, Dr.P. Rezai visited the child and confirmed the diagnosis was chickenpox but also noted that there were also a few verrucose (molluscum contagiosum) on the child's trunk. Laboratory reports on the Specimen No. 87 by electronmicroscopy reported "poxvirus" but was later confirmed to be negative on PPT and CAM. There were no further cases.

10.3 Case No. 3:

Fatemeh Tazehbahar an 11 year old female residing in Boshrouyeh, 524 kilometres south of Mashhad (Khorassam) on the edge of Lout Central Desert.

She developed rash on 9 August and was referred to the local clinic on 12 August. She was first examined by an Indian medical officer (in charge of Sazman Shahanshahi) and subsequently by another Indian medical officer (in charge of Boshrouyeh health clinic) both medical officers diagnosed the case as suspect smallpox and initiated containment measures. They reported the case by cable to Ferdows district health officer.

The Semoir district medical officer visited the case on 13 August. Based on the severity of rash during the first few days of illness, the absence of any vaccination scar and the presence of a few lesions on the palms of her hands, a definite diagnosis could not be made and smallpox could not be ruled out.

Control measures were reinforced, the patient was put under strict quarantine and the provincial communicable control department of Mashhad was informed by telephone on 16 August.

Dr. Rezai and Dr. Shafa WHO Headquarters (Geneva) who happened to be visiting Iran at that time visited the patient on 16 August. On the day of this visit, 7 days after onset of rash, different stages of rash were clear and scabs were forming. The rash was heaviest on the trunk and dorsal areas of the patient, and less on extremities. Two lesions were found on the palms. The distribution of rash on this day was clearly that of chickenpox and the general condition of patient was quite good.

Seventeen close contacts (9 of them members of family) were examined, 5 of them were never vaccinated; there was no history of rash and fever. The residents of 50 households in neighbouring areas as well as all families residing in 25 villages within a 15 kilometre radius were searched for history of rash and fever and for residual smallpox facial scars. None were found.

The diagnosis of chickenpox was established on clinical and epidemiological grounds. Specimens collected on 16 August from scabs and pustules of the patient were examined in WHO Reference Laboratory and the diagnosis of chickenpox was confirmed.

In this operation 5,181 (74%) out of 7,000 residents of the population were vaccinated within the first 48 hours and surveillance activities continued for a period of 6 weeks after onset of the case.

10.4 Case No. 4:

Dr. Kessava Peethambaran Pillai was a 38 year old male dentist who emigrated to Iran from South India in 1975.

On 13 September 1978 the patient developed a fever and on 16 September noticed a rash beginning on his face, trunk and back. He also had a few vesicules on his limbs and a few lesions on the palms of his hands. The rash progressed from maculo-papular lesions to vesicules and pustules by the third day. By 20 September, the fifth day following onset of rash, the patient was severely ill and was transferred to the isolation ward of Shahnaz hospital in Zanjan City. Health officials from Zanjan Province visited the patient, collected specimens, and telephoned Tehran that they thought he was a suspected case of smallpox. On 21 September, the patient's condition had worsened with haemorrhagic exanthems appearing, especially on the mucous membranes. Some scabs had begun to appear and these were collected for laboratory analysis. Despite vigorous medical treatment with Ampicillin, I-V Dextrose, Phenergen, and Vitamin C (but no steroids) the patient continued to deteriorate and on 26 September, ten days after the appearance of rash and 13 days following onset of fever, the patient died.

Dr. Rezai arrived in Zanjan 20 hours after the patient died, examined and photographed the corpse. His examination revealed a rash with distribution typical of chickenpox, but with haemorrhages in the mouth and nares. Additional specimens were taken, all of which were reported by the WHO Reference Laboratory as herpes varicella. Full precautionary measures were taken in the area of the patient's home and at the hospital, with containment vaccination carried out as if this were a case of smallpox.

Dr. Pillai was born in Mangalam district of Kerala State of South India, an area known for an unusually high number of deaths due to chickenpox. He had last returned to Kerala from 3 June to 13 July of this year, two months before developing symptoms. His death due to haemorrhagic chickenpox while in Iran raised several important questions about the Kerala community from which he comes; specifically, the question about a genetic susceptibility to deaths from chickenpox was raised.

Dr. Elizabeth White, a WHO consultant investigated the question of chickenpox deaths in Kerala (WHO unpublished document WHO/SE/76.86). She reported on 260 chickenpox deaths in Kerala in 1975 and 1976; about 30% of these deaths were clearly caused by herpes varicella, while in 70% of the cases death occurred in patients over the age of 60 in whom chickenpox developed at the same time as some other severe concommitant illness. Cause of death in patients less than 60 was frequently either primary varicella pneumonia or secondary respiratory disease. No mention was made in her report of haemorrhagic chickenpox as a major cause of death in Kerala cases. She hypothesized that Kerala is an area where there are large numbers of non-immune adults and chickenpox is a "new" disease in a fairly isolated land of inlets and lagoons where individual families can remain separated from one another for generations. With little contact between communities and a tradition of isolating each chickenpox case without visitors, the disease has historically been of very low endemicity. Herpes zoster is almost unknown in Kerala, further suggesting that primary infection with the varicella zoster virus has not been widespread. Today, however, with rapid development of roads and bridges, a highly infectious disease like chickenpox is making inroads into isolated sections of the community. As more non-immune adults become infected, the pool of susceptibles is dropping and the high number of deaths presently observed will likely disappear over the next few years.

However, the unusual occurrence of a death from haemorrhagic chickenpox in a Kerala native outside his own country raised the question of genetic immunodeficiencies to the varicella virus. Was it not distinctly unusual that the only death from chickenpox in all of Iran occurred in this emigrant from India? Were more chickenpox deaths to have been expected in Iran. In an attempt to answer these questions, WHO and Iranian epidemiologists collected the exact age-distribution of cases of chickenpox in Iran and in Kerala and calculated age-specific death:case ratios in Kerala, and then applied those rates in Iran to estimate the number of "expected chickenpox deaths" which would fit the age-distribution of reported chickenpox cases in Iran. The result, shown in Table 10.1 is that even with the "high case fatality rates" reported from Kerala, only 1 to 3 deaths would have been "expected"in Iran if the data are adjusted for the ages at which chickenpox is contracted in the two respective communities.

Simply stated, the tragic death of Dr. Pillai is in part explained by the fact that he was one of only 9 people in all of Iran over the age of 30 to contract chickenpox during these six months. He was able to reach the age of 39 without an earlier exposure - and hence immunity - because of the unusual history of chickenpox in his native Kerala where he lived until he was 36 years old. In contrast to Iran where 98% of children have been exposed to chickenpox by age 15, in Kerala 30% of the population contracts the disease in adulthood after the age of 30. In Iran, chickenpox is a mild childhood illness while in both countries the disease has a significantly high mortality rate in older age groups.

Table 10.1: "EXPECTED" NUMBER OF DEATHS FROM CHICKENPOX IN IRAN (MARCH-SEPTEMBER 1978) CALCULATED FROM AGE-SPECIFIC DEATH:CASE RATIOS REPORTED IN KERALA, INDIA

Age	KERALA, INDIA				IRAN		
	Estimated Cases* of Chickenpox	Deaths from Chickenpox**	Death:Case Ratio (deaths per 1,000 cases)		Reported Cases of Chickenpox March-Sept 1978		"Expected" Chickenpox deaths March-Sept 1978
0-5	3,085	4	1.30	x	1,358	=	1.760
5-14	15,811	4	0.25	x	2,131	=	0.530
15-20	5,659	2	0.36	x	52	=	0.020
20-30	7,342	1	0.14	x	5	=	0.001
30-40	5,719	9	1.57	x	4	=	0.006
40-50	3,966	19	4.79	x	4	=	0.019
50-60	2,329	13	5.58	x	1	=	0.006
over 60	1,001	53	52.95	x	0	=	0.000
TOTAL	44,912	107	2.38		3,575		1.1 to 3.5 deaths ***

* Chickenpox incidence reported from Kerala in 1974 (Source: WHO/SE/76.86).

** Chickenpox deaths in Kerala in 1975 (Source: WHO document WHO/SE/76.86). Because 1974 case data and 1975 death data have been used, the death: case ratio must be considered only an approximation. However, the incidence rates (197.5 per 100,000 in 1974 and 224.9 in 1975) and the case-fatality rates (2.0 per 1,000 in 1974 and 2.1 in 1975) are virtually the same. Age-specific incidence rates were unavailable for 1975 and age-specific death data was unavailable for 1974, however, necessitating the comparison of the two years' data.

*** $2.34 \pm .62$. A 95% confidence interval was constructed using two standard deviations about the mean $\bar{Y} = E(Y)$

11. Facial Pockmark Survey

According to the methodology of preparation for certification prepared by WHO (WHO document SME/78.6) pockmark surveys are useful both to assess the extent of past outbreaks and to confirm the absence of smallpox in recent years. It was the purpose of the Iran facial pockmark survey to confirm the absence of smallpox during the last five years, and for this reason only children under the age of five were examined for any signs of facial pockmarks.

The order of priority for selecting areas for pockmark surveys are (1) the area around the last known smallpox outbreak (2) the sites of reported chickenpox deaths (3) the sites of reported suspected smallpox cases and (4) remote and border areas. With this in mind, it was agreed to conduct a pockmark survey in 2% of the villages in Iran (1,500 villages). To determine the villages to be included, a list of about 500 high risk villages was first prepared (including villages that had smallpox in 1971-2, villages that had suspected cases of smallpox, or villages in remote or border areas). In addition to these 500 villages another 1,000 villages were chosen by a multi-stage sampling method. Each province health officer (after deducting the number of high risk villages that had been selected by the Tehran headquarters for his area) selected up to ten villages in each district (shahrestan), using a random number table provided for this purpose.

Specially trained operational teams then went to each village which had been selected. Once in the village, it was the duty of these teams to examine children according to the following plan:

Village Population	No. of families to be examined
less than 50	all of resident families
50-100	50% of resident families
100-500	25% of resident families
over 500	20% of resident families

Families were selected again using a random number table, numbers thus chosen were matched to house numbers. In every family thus selected, all children under the age of 5 years were to be examined.

Table 11.1 shows the sampling frame. The goal of 2% of all villages was exceeded, and in addition children were examined in over 96% of the districts of the country. Figures 11.1 and 11.2 respectively show the number of villages and percent of children sampled in each province.

Health workers were asked to report any child under age five found with "five or more depressed facial scars of greater than 2 mm at the base". After examining over 70,000 children, a total of 15 children with pockmarks meeting this criterion was identified for epidemiological investigation. Figure 11.2 shows the distribution of these 15 "suspected smallpoxx pockmark cases".

These 15 children were then visited by an epidemiologist from the Communicable Disease Unit who attempted to reconstruct the illness which had resulted in facial pockmarks. The line-listing of these fifteen cases is given in Table 11.2. None of these cases was found to have been smallpox.

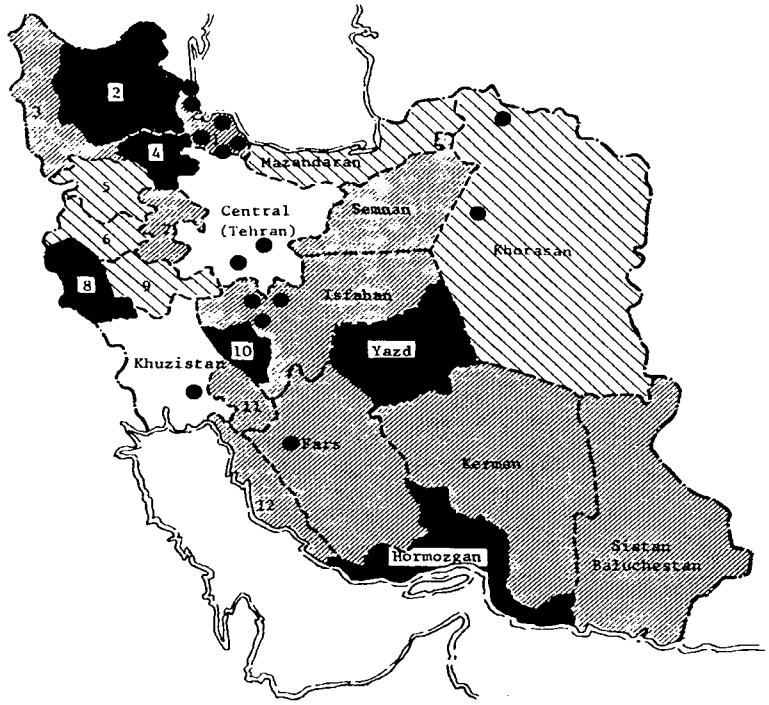
TABLE 11.1 SAMPLING FRAME FOR FACIAL POCKMARK SURVEY - IRAN
(MARCH 23 - SEPTEMBER 23 1978)

Province (Ostand)	Districts (Shahrestans)		Villages		Number of Children under five years		
	Total	Included In Survey	Total	Visited For Survey (%)	Estimated Total	Examined (%)	
Central (Tehran)	9	9	4,785	107 (2.2%)	1,224,000	5,843	(0.5%)
Gilan	10	10	3,928	103 (2.6%)	279,000	4,144	(1.5%)
Mazandaran	10	10	5,395	100 (1.9%)	421,000	3,355	(0.8%)
E Azarbaijan	11	11	4,454	150 (3.4%)	565,000	12,646	(2.2%)
W Azarbaijan	9	9	3,148	90 (2.9%)	248,000	3,425	(1.4%)
Kermanshah	5	5	2,843	50 (1.8%)	180,000	1,152	(0.6%)
Khuzistan	11	11	5,097	110 (2.2%)	385,000	1,707	(0.4%)
Fars	14	14	4,010	140 (3.5%)	357,000	3,577	(1.0%)
Kerman	8	6	5,641	60 (1.1%)	192,000	1,947	(1.0%)
Khorasan	16	16	9,149	160 (1.7%)	578,000	3,434	(0.6%)
Isfahan	10	10	3,682	99 (2.7%)	349,000	6,361	(1.8%)
Sistan Baluchestan	6	6	3,065	60 (2.0%)	117,000	2,093	(1.8%)
Kordestan	6	6	1,844	60 (3.2%)	138,000	1,322	(1.0%)
Hamedan	4	4	1,250	40 (3.2%)	192,000	2,169	(1.1%)
Charmahal Bakhtiari	2	2	1,134	20 (1.8%)	70,000	1,911	(2.7%)
Lorestan	3	3	3,625	30 (0.8%)	164,000	1,054	(0.6%)
Ilam	4	4	637	40 (6.3%)	43,000	1,679	(3.9%)
Boyerahmad	3	3	1,997	20 (1.0%)	43,000	778	(1.8%)
Boushe	2	2	1,020	20 (2.0%)	61,000	1,103	(1.8%)
Zanjan	4	4	1,100	42 (3.8%)	102,000	6,932	(6.8%)
Semnan	6	6	1,516	50 (3.3%)	86,000	1,178	(1.4%)
Yazd	4	4	1,781	40 (2.2%)	63,000	1,648	(2.6%)
Hormozgan	5	5	1,601	44 (2.7%)	82,000	2,879	(3.5%)
TOTAL - IRAN	162	160(96%)	72,702	1,635 (2.2%)	5,926,000	72,337	(1.2%)

FIGURE 11.1 NUMBER OF VILLAGES INCLUDED IN FACIAL POCKMARK SURVEY BY PROVINCE, IRAN 1978

1 Gilan
2 East Azarbaijan
3 West Azarbaijan
4 Zanjan
5 Kordestan
6 Kermanshah
7 Hamedan
8 Ilam
9 Lorestan
10 Chaharmahal and Bakhtiari
11 Boyarahmad
12 Boushehr

FIGURE 11.2 PERCENTAGE OF CHILDREN EXAMINED DURING FACIAL POCKMARK SURVEY BY PROVINCE AND LOCATION OF 15 CHILDREN LESS THAN 5 YEARS FOUND WITH FACIAL POCKMARKS



Percentage of Children Examined

- more than 2.0%
- 1.0 - 2.0 %
- 0.5 - 1.0%
- less than 0.5%
- Location of child with facial pockmarks

1 Gilan
2 East Azarbaijan
3 West Azarbaijan
4 Zanjan
5 Kordestan
6 Kermanshah
7 Hamedan
8 Ilam
9 Lorestan
10 Chaharmahal and Bakhtiari
11 Boyarahmad
12 Boushehr

TABLE 11.2 DETAILS OF 15 CHILDREN FOUND WITH FACIAL POCKMARKS DURING THE FACIAL SCAR SURVEY

Case No.	Date Investigated	Locality Province Sub-District Village	Name	Age (Years)	Sex	Description of Pockmarks	Approx. Date of Illness	Final Diagnosis	Remarks
1.	2 July 1978	Central Arak Kazaz Nahrmian	Haji Ghorban S/o Abas Khalili	1½	M	2 on forehead and 1 on face	1976	Chickenpox	Scars are less than 2 mm
2.	18 July 1978	Central Kashan Niasar Eshaghabad	Abas Akbari S/o Gholamali	5	M	1 on forehead 1 on nose 4 on cheeks	1977	Superinfection of chickenpox vesicles	
3.	5 August 1978	Gilan Rasht Central Gurab	Harizar Ahmad S/o Ali	3	M	4 on forehead and cheeks	22 July 1978	Chickenpox	Rash approx. 4 weeks back mainly on abdomen, back and face. Some of lesions still remaining.
4.	25 July 1978	Gilan Roodsar Central Balamahaleh	Seid Ali Hoseini S/o Seid Ismail	5	M	7 on forehead and cheeks	1977	Chickenpox	
5.	23 July 1978	Gilan Talesh Central Toolgilan	Behrooz Yekta S/o Sheikh Ali	3	M	4 on forehead	1976	Chickenpox	
6.	12 July 1978	Gilan Talesh Central Lisar	Fariba Nateghi D/o Khodavaran	5	F	6 on forehead and cheeks	1975	Chickenpox	

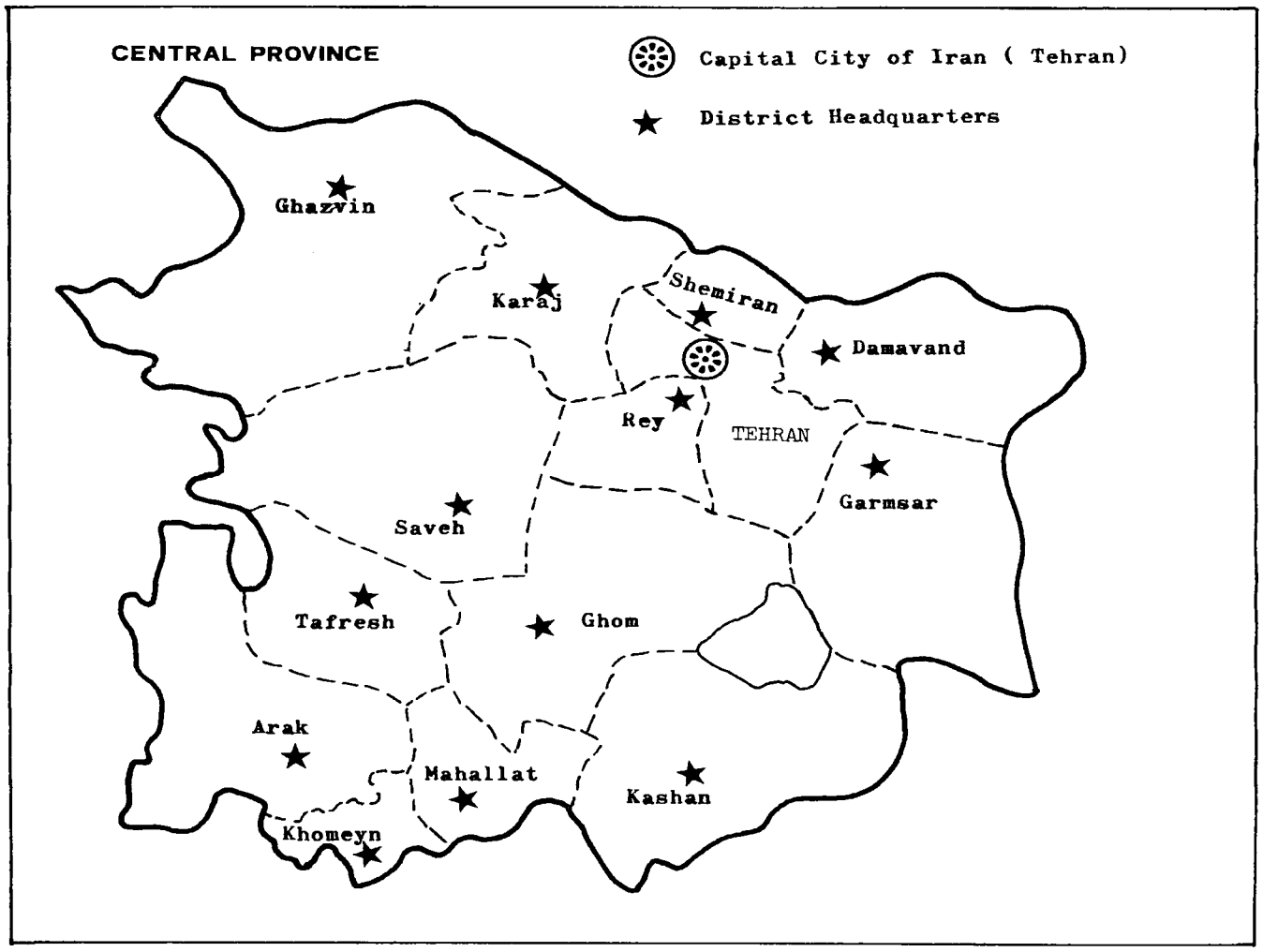
Case No.	Date Investigated	Locality Province Sub-District Village	Name	Age (Years)	Sex	Description of Pockmarks	Approx. Date of Illness	Final Diagnosis	Remarks
7.	12 July 1978	Gilan Talesh Central Lisar	Sheida Nateghi D/o Khodavaran	4	F	4 on cheeks	1978	Chickenpox	
8.	12 July 1978	Gilan Talesh Central Lisar	Fatemeh Seyed-zadeh D/o Mir Yousef	5	F	5 on cheeks	1974	Chickenpox	
9.	14 August 1978	Isfahan Isfahan Barkhar Keshecheh	Mohamad Mazaheri S/o Rajabali	5	M	5 on forehead and cheeks	1974	Boils	Vacc. scar visible. Facial scars very superficial.
10	11 August 1978	Isfahan Homayunshahr Marbin Esferiz	Husein Mehdi S/o Mohamad Ali	5	M	3 on cheeks	1975	Boils	Mother stated her child had smallpox! But vacc. scar was visible on left arm. Vacc.was performed a year after illness.
11.	1 August 1978	Isfahan Natanz Torogh Hamjaveh	Yahya Ghorbani S/o Ali	6	M	6 on forehead		Under investigation	Vacc. scar visible on left arm. Mother is living in Tehran. Full investig. was not poss.

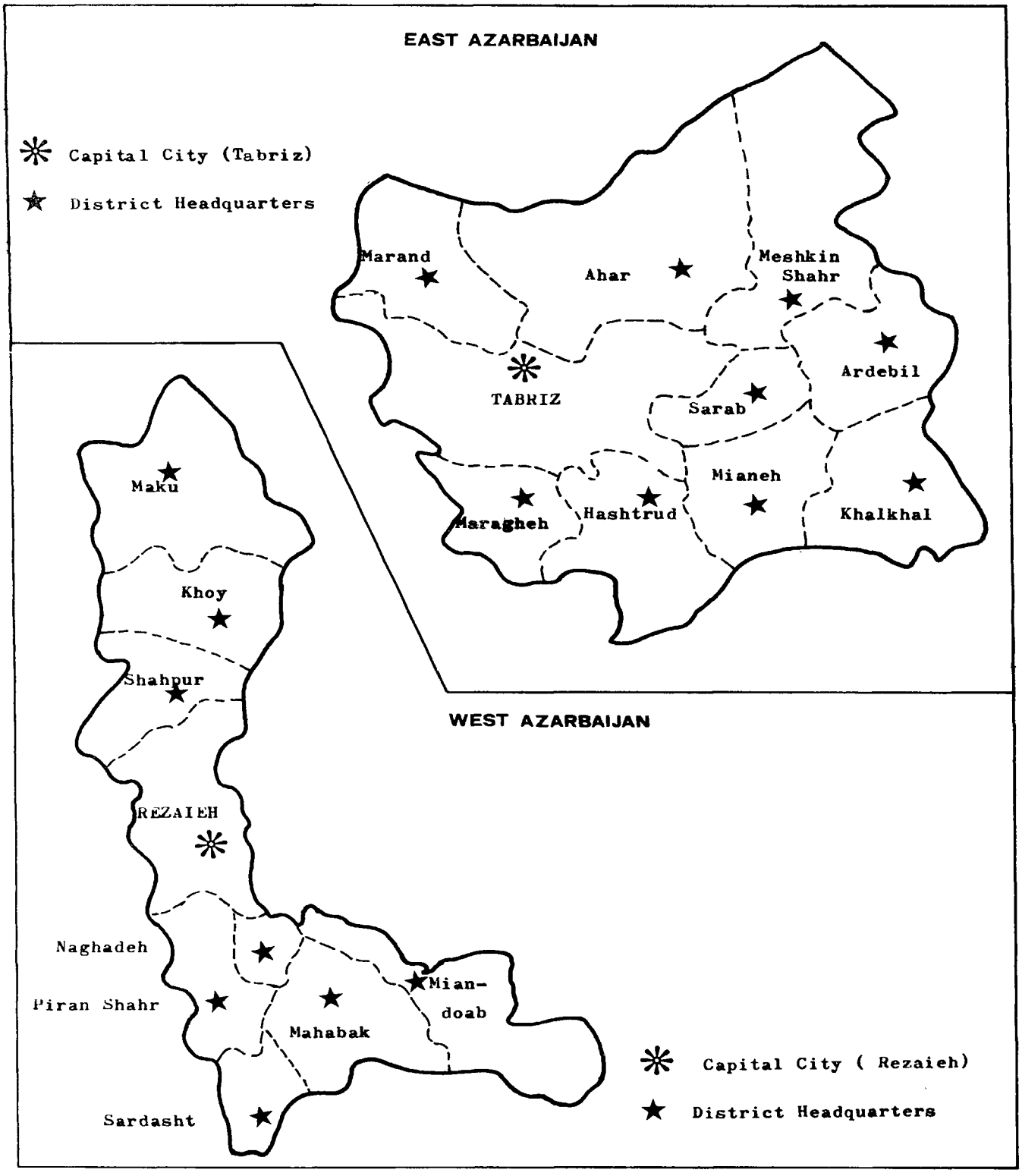
Case No.	Date Investigated	Locality Province Sub-District Village	Name	Age Year	Sex	Description of Pockmarks	Approx. Date of Illness	Final Diagnosis	Remarks
12.	7 May 1978	Khorasan Ghoochan Houmeh Gojeh	Azam Roohparvar D/o Ibrahim	4	F	5 on forehead 4 on cheeks	1976	Chickenpox	
13	4 April 1978	Khorasan Sabzevar Joghtay Bid	Batul Bidi D/o Mohamadreza	4	F	1 on forehead	1975	Chickenpox	
14.	24 May 1978	Fars Shiraz Gharabagh Bidzardsofla	Samanbar Nejat D/o Elyas	3	F	5 on forehead	1975	Boils	
15.	19 July 1978	Khuzestan Behbahan Humeh Borje Molla-Valli Khan	Ziba Zarei D/o Shofer	5	F	1 on forehead and 6 on cheeks	1978	Chickenpox	Onset of rash last month. After one week she was cured. Vacc. scar on left arm visible.

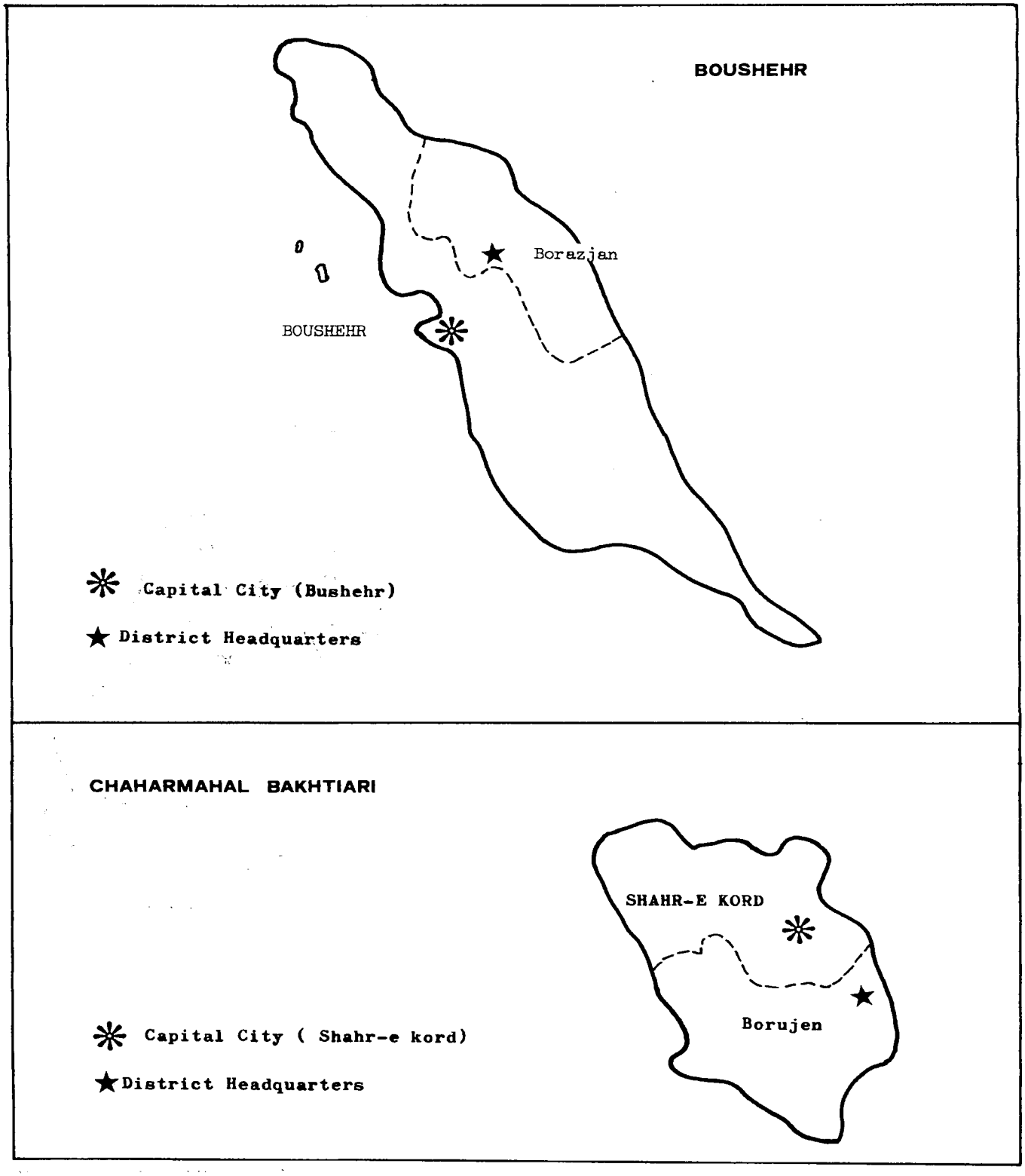
ANNEX 1 MAPS OF THE PROVINCES OF IRAN

Central Province is shown below and the other provinces follow in approximately alphabetical order.

Scale: for all maps - 1:2 800 000 approximately
(10mm represents 28 km approximately)




EAST AZARBAIJAN
Capital City (Tabriz)
District Headquarters
Marand
Ahar
Meshkin Shahr
Ardebil
TABRIZ
Sarab
Mianeh
Maragheh
Hashtrud
Khalkhal
WEST AZARBAIJAN
Maku
Khoy
Shahpur
REZAIEH
Naghadeh
Piran Shahr
Mahabak
Mian-doab
Sardasht
Capital City (Rezaieh)
District Headquarters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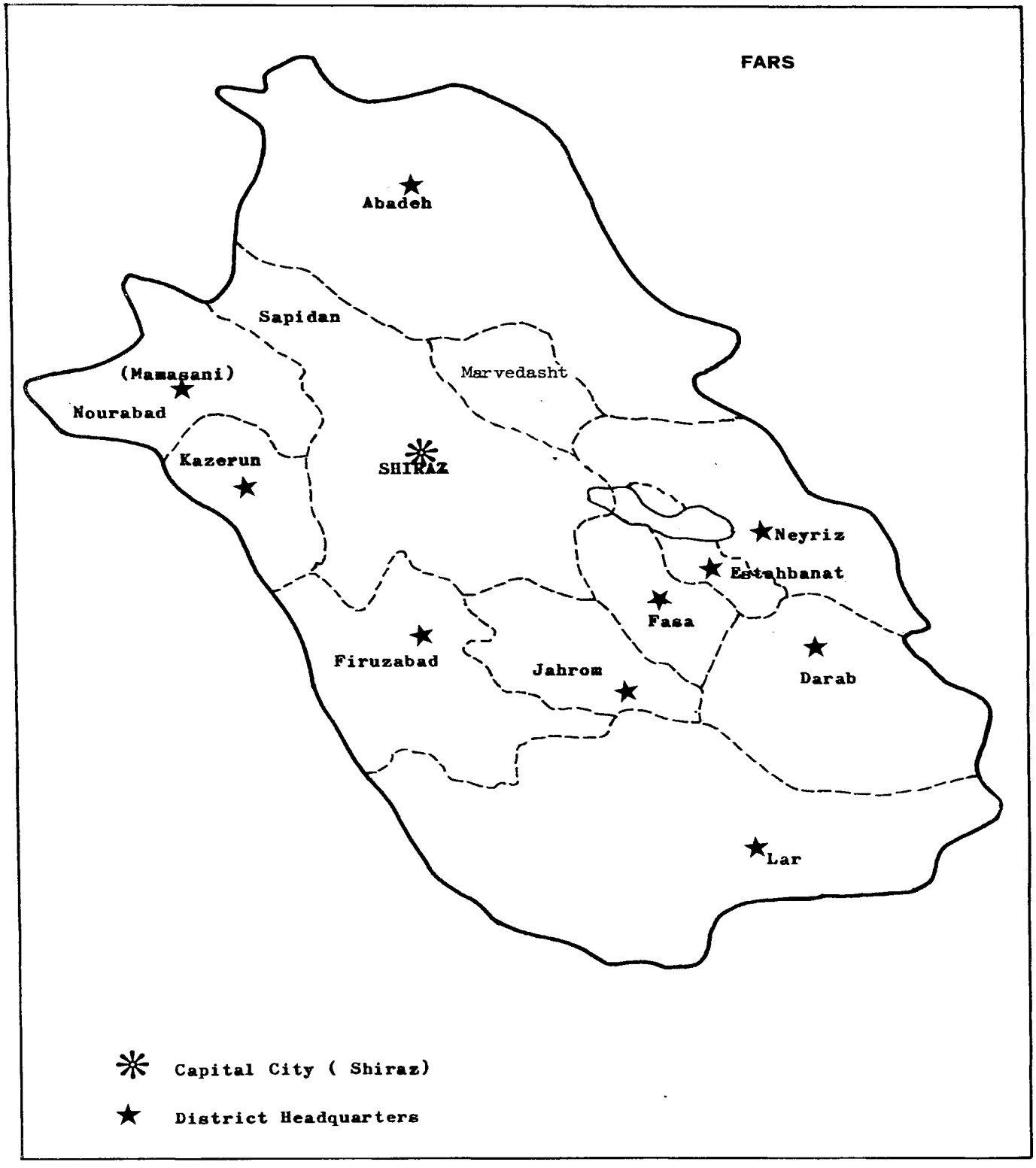
Borazjan
BOUSHEHR
Capital City (Bushehr)
District Headquarters
CHAHARMAHAL BAKHTIARI
SHAHR-E KORD
Borujen
Capital City (Shahr-e kord)
District Headquarters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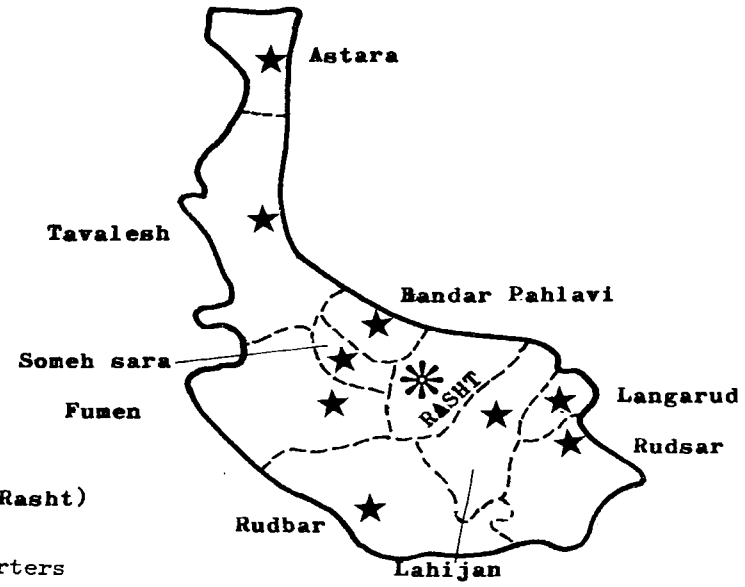
Abadeh
Sapidan
(Mamasani)
Nourabad
Marvedasht
Kazerun
SHIRAZ
Neyriz
Estahbanat
Fasa
Firuzabad
Jahrom
Darab
Lar
Capital City (Shiraz)
District Headquarters

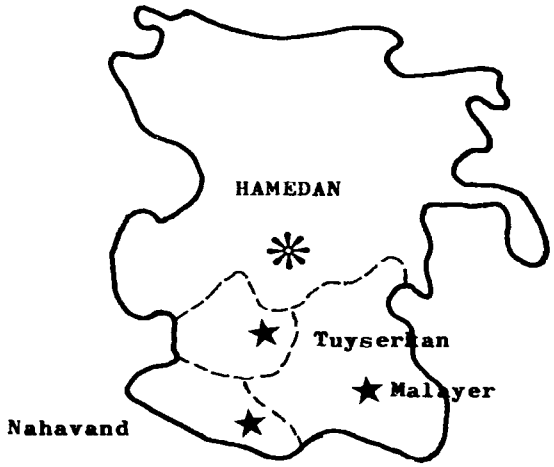
GILAN



Capital City (Rasht)

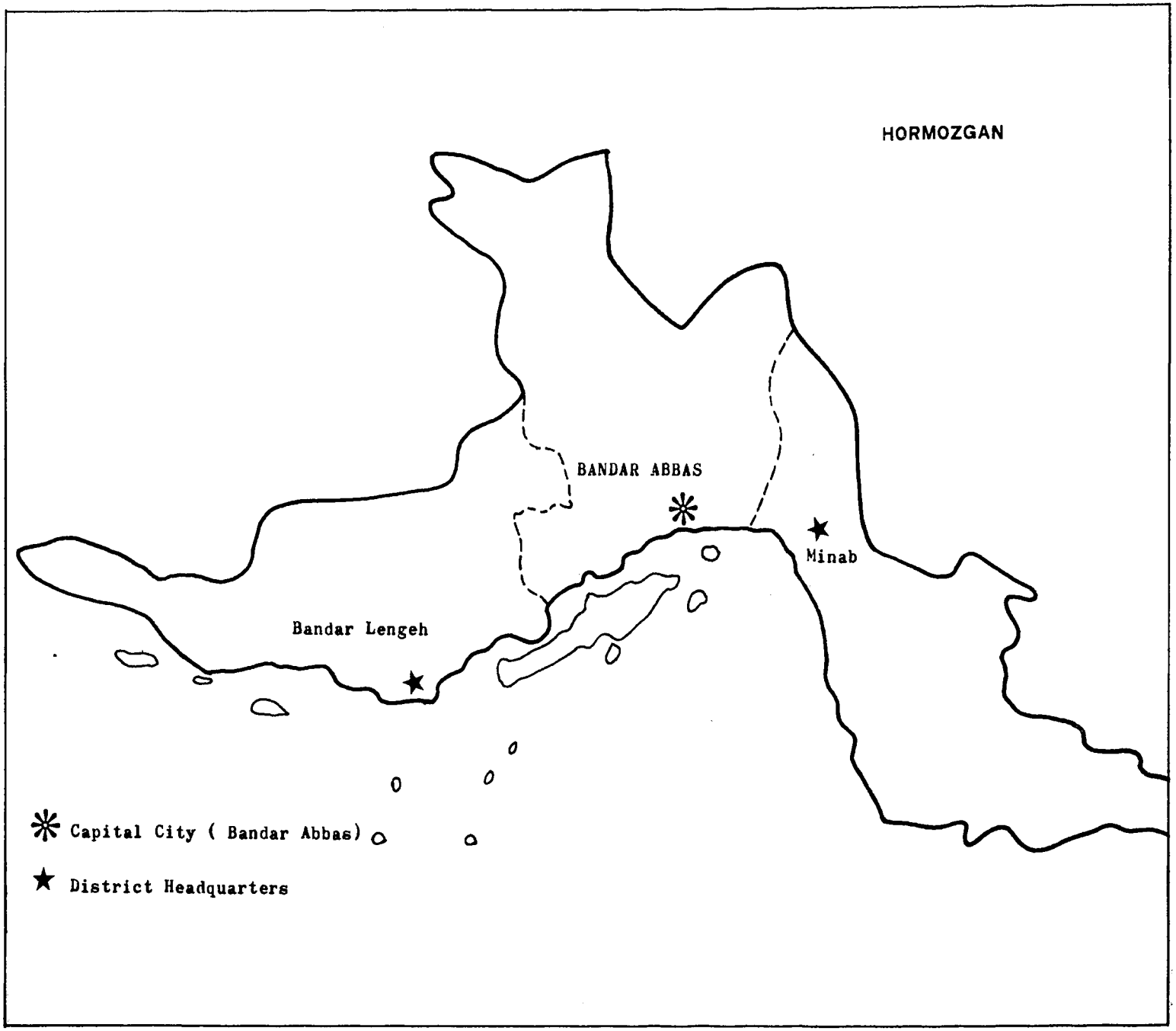
District Headquarters

HAMEDAN



Capital City (Hamedan)

District Headquarters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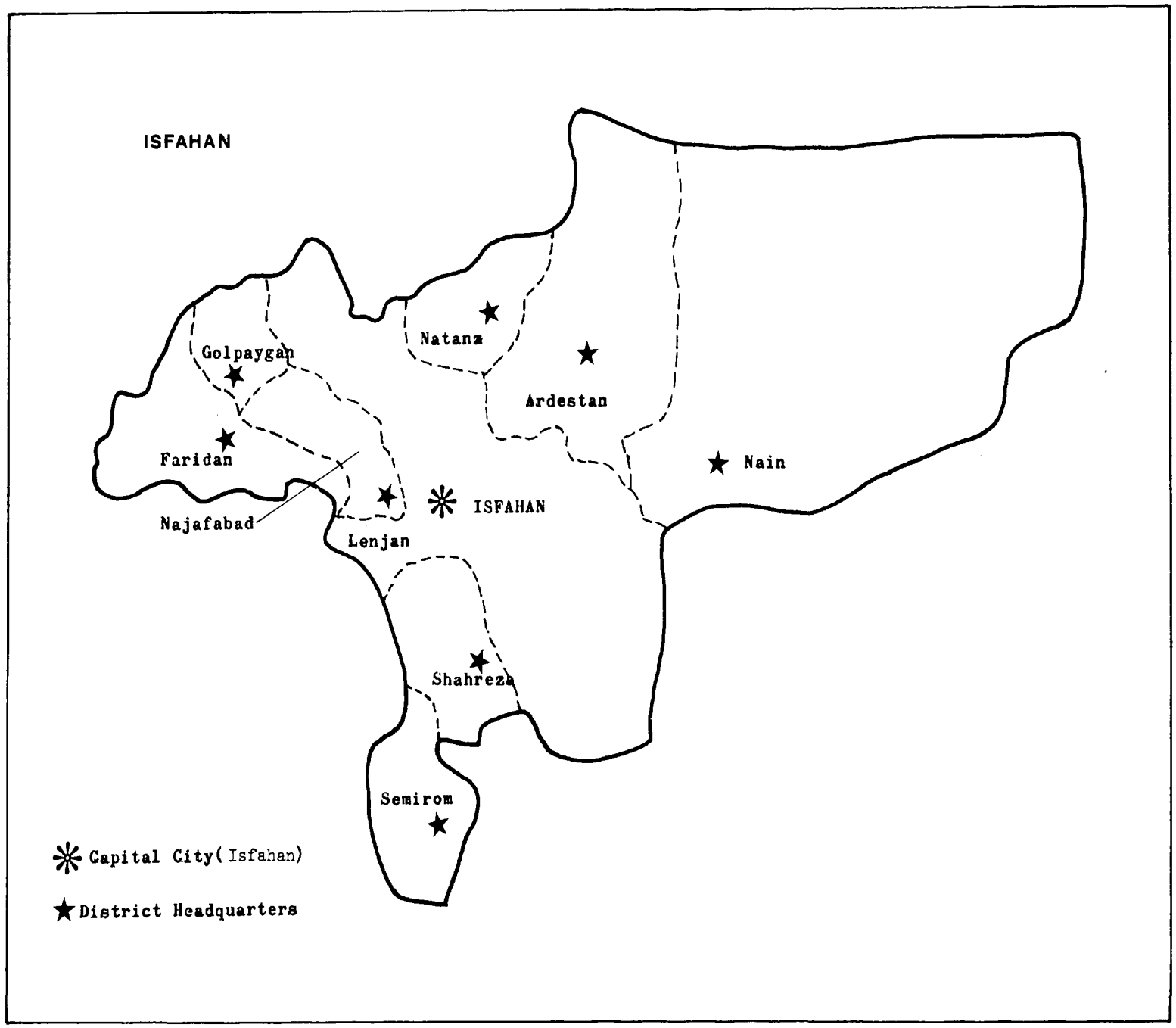
BANDAR ABBAS
Minab
Bandar Lengeh
Capital City (Bandar Abbas)
District Headquarters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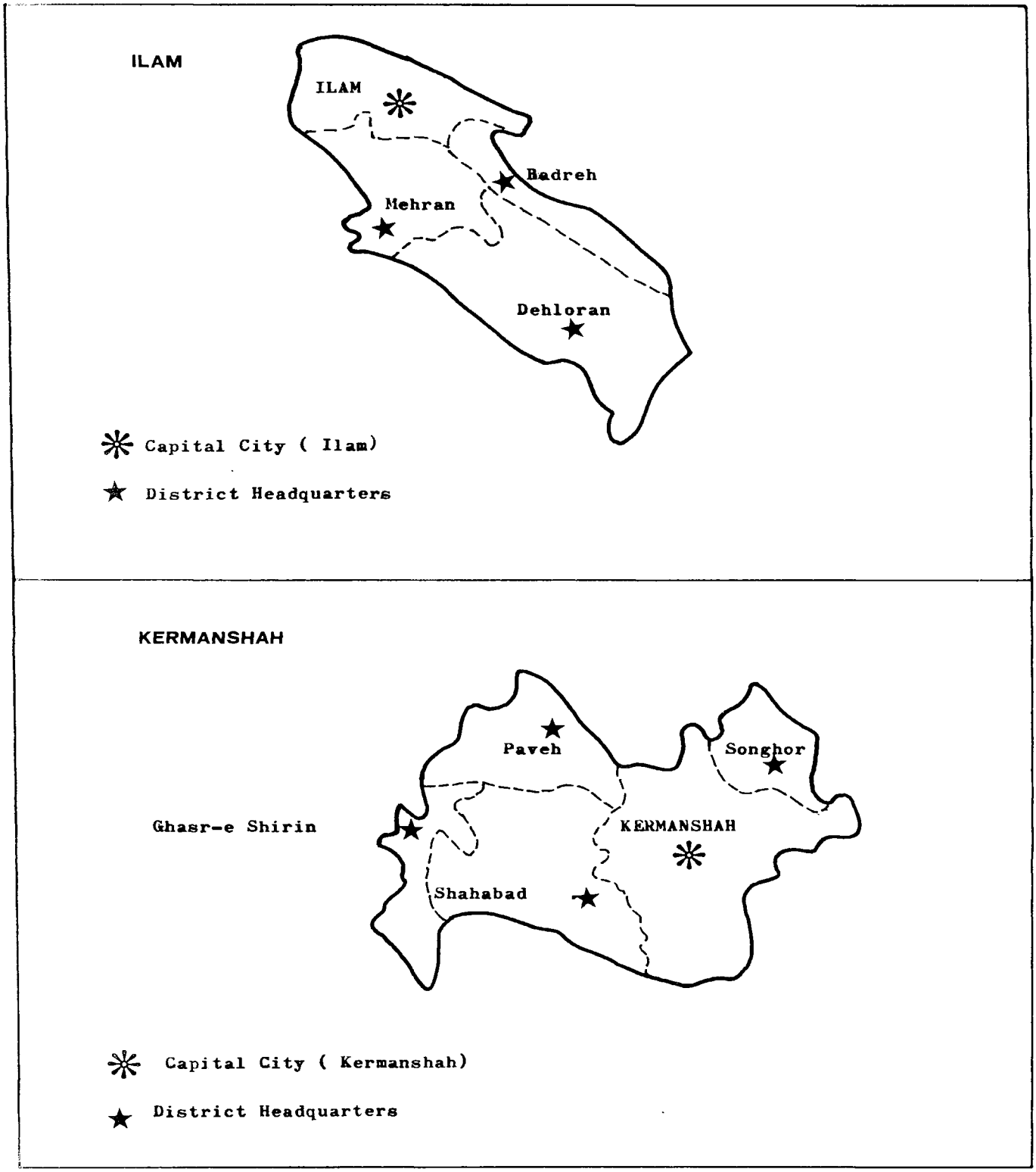
Golpaygan
Ardestan
Faridan
Nain
ISFAHAN
Najafabad
Lenjan
Shahreza
Semirom
Capital City(Isfahan)
District Headquarters


ILAM
ILAM
Badreh
Mehran
Dehloran
Capital City (Ilam)
District Headquarters
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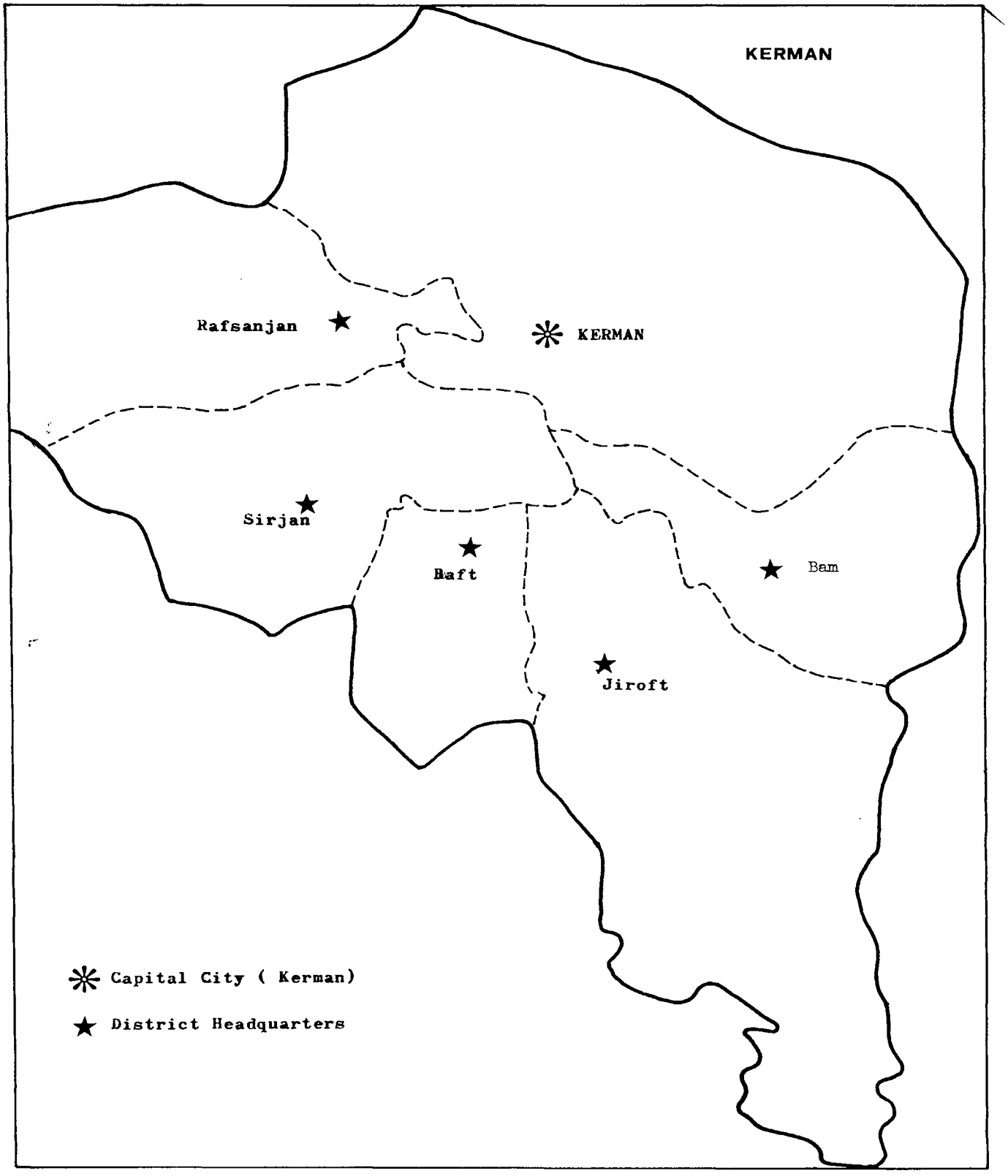
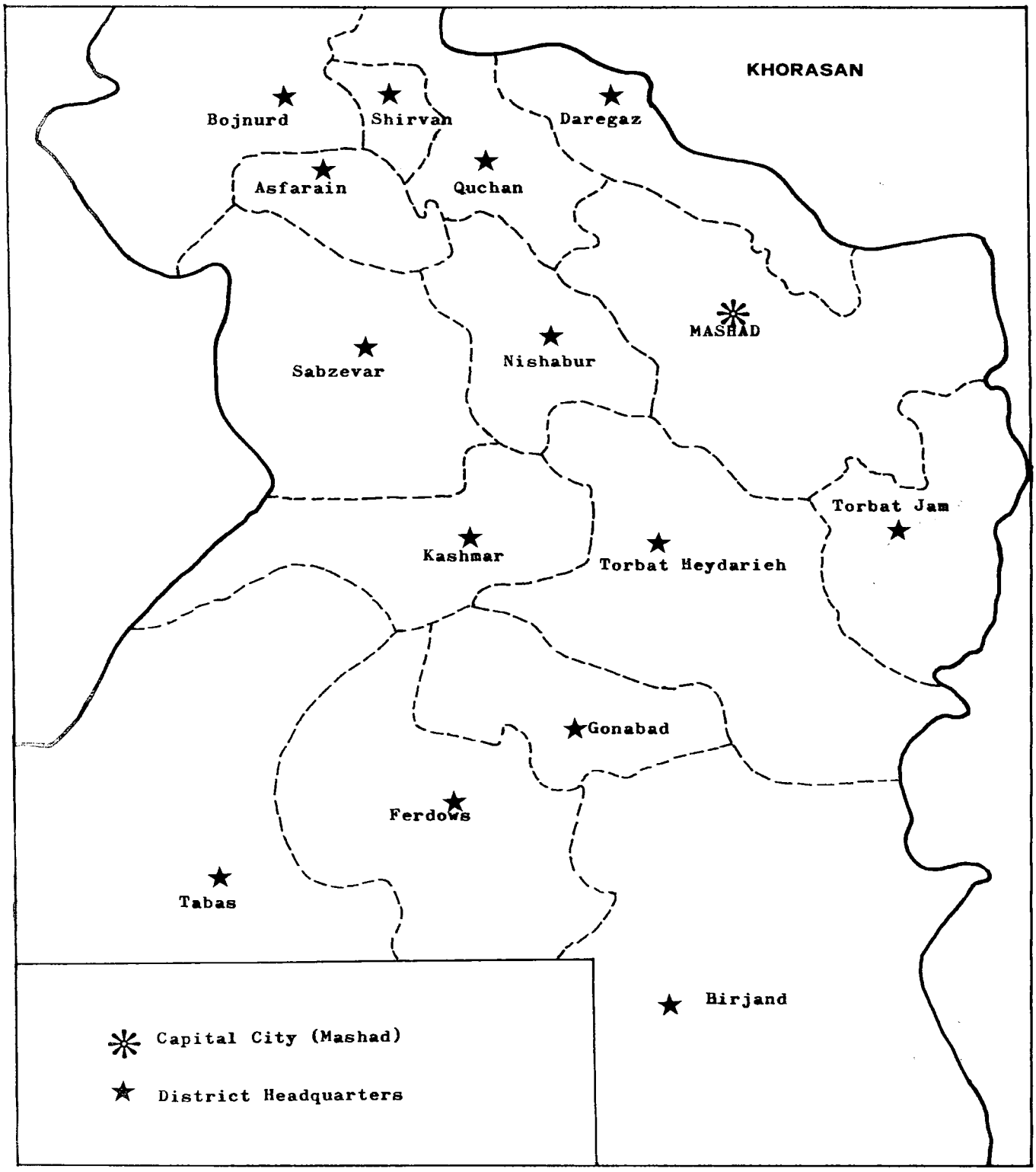
Paveh
Songhor
Ghasr-e Shirin
KERMANSHAH
Shahabad
Capital City (Kermanshah)
District Headquarters


KERMAN
Rafsanjan
KERMAN
Sirjan
Baft
Bam
Jiroft
Capital City (Kerman)
District Headquarters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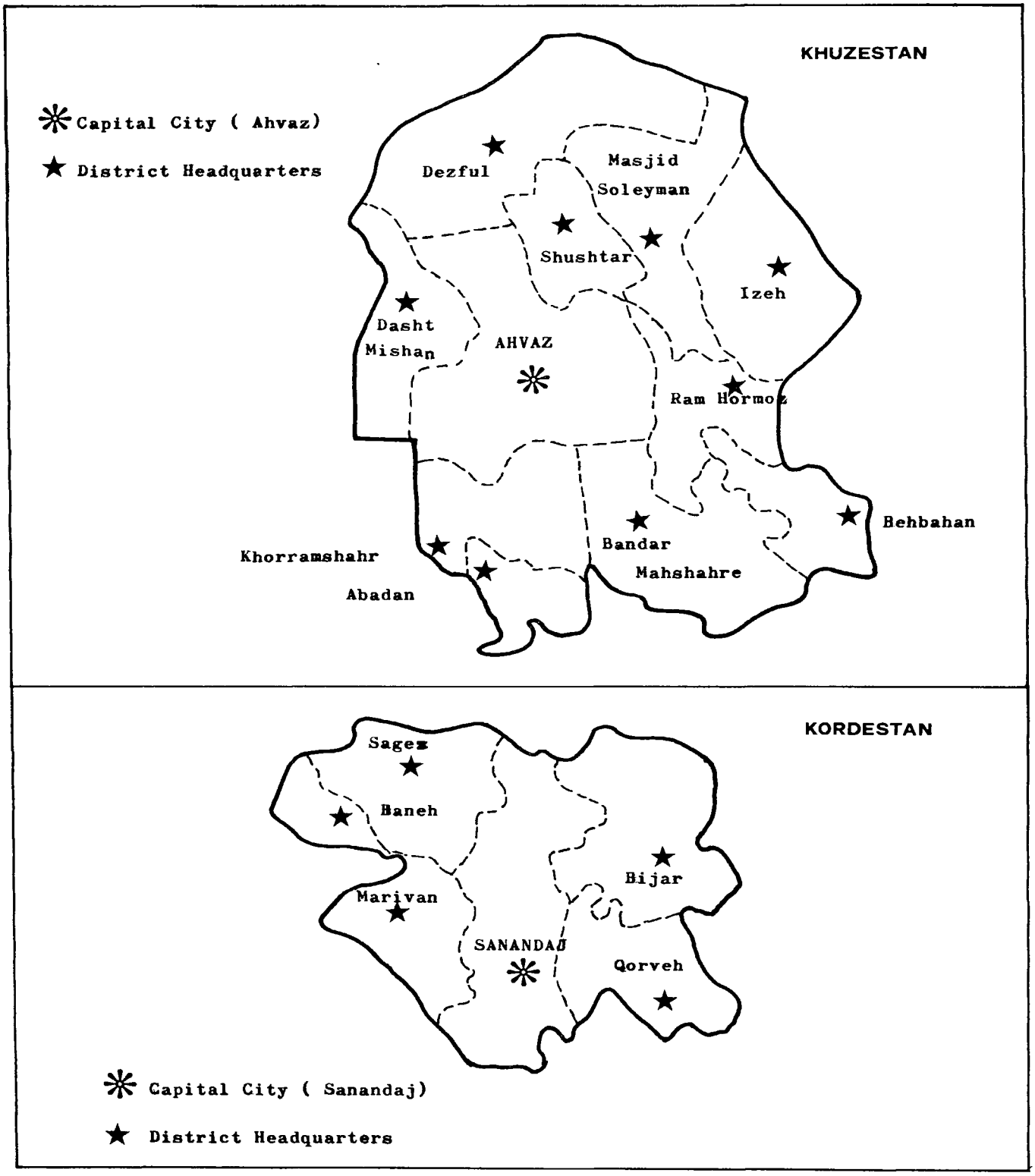
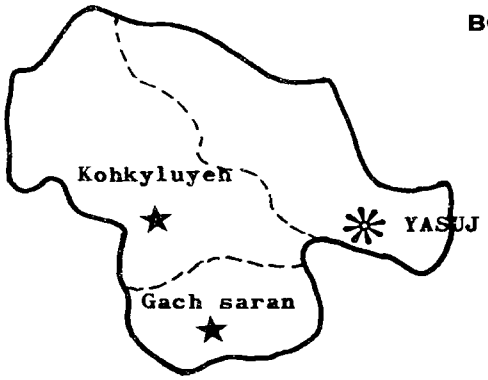
Bojnurd
Shirvan
Daregaz
Asfarain
Quchan
MASHAD
Sabzevar
Nishabur
Torbat Jam
Kashmar
Torbat Heydarieh
Gonabad
Ferdows
Tabas
Birjand
Capital City (Mashad)
District Headquarters


KHUZESTAN
Capital City (Ahvaz)
District Headquarters
Dezful
Masjid
Soleyman
Shushtar
Izeh
Dasht
Mishan
AHVAZ
Ram Hormoz
Behbahan
Bandar
Mahshahre
Khorramshahr
Abadan
KORDESTAN
Sagez
Baneh
Bijar
Marivan
SANANDAJ
Qorveh
Capital City (Sanandaj)
District Headquarters

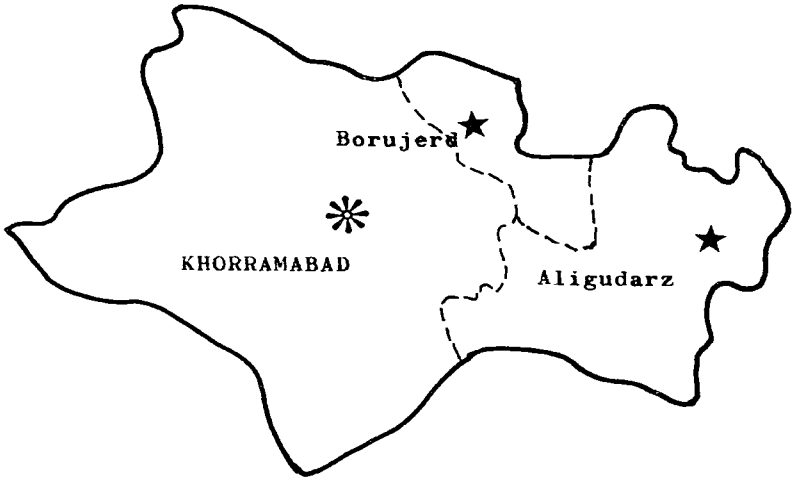
KOHKILUYEH & BOYR AHMAD



✳ Capital City (Boyr Ahmad sardsir or Yasuj)

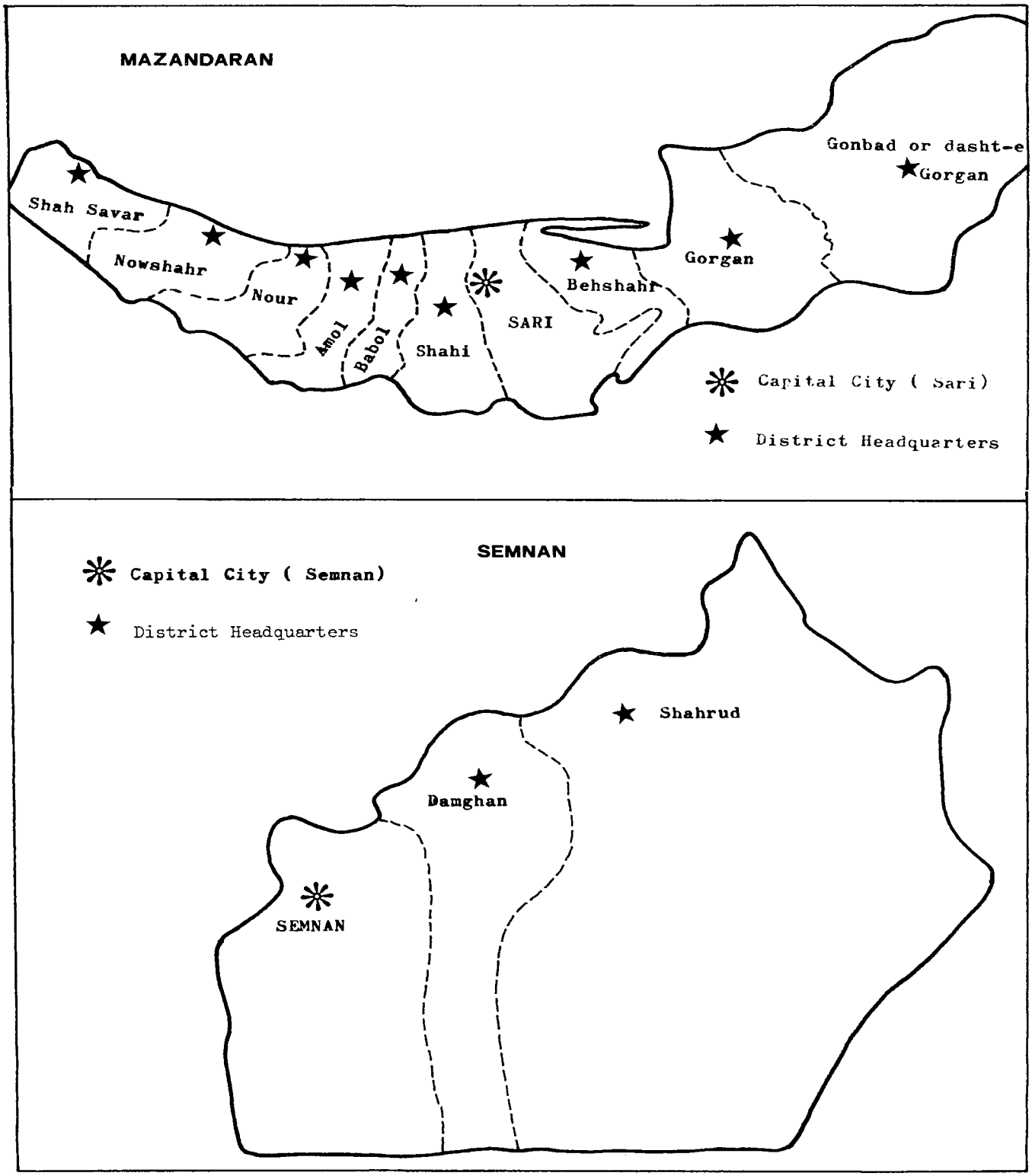
★ District Headquarters

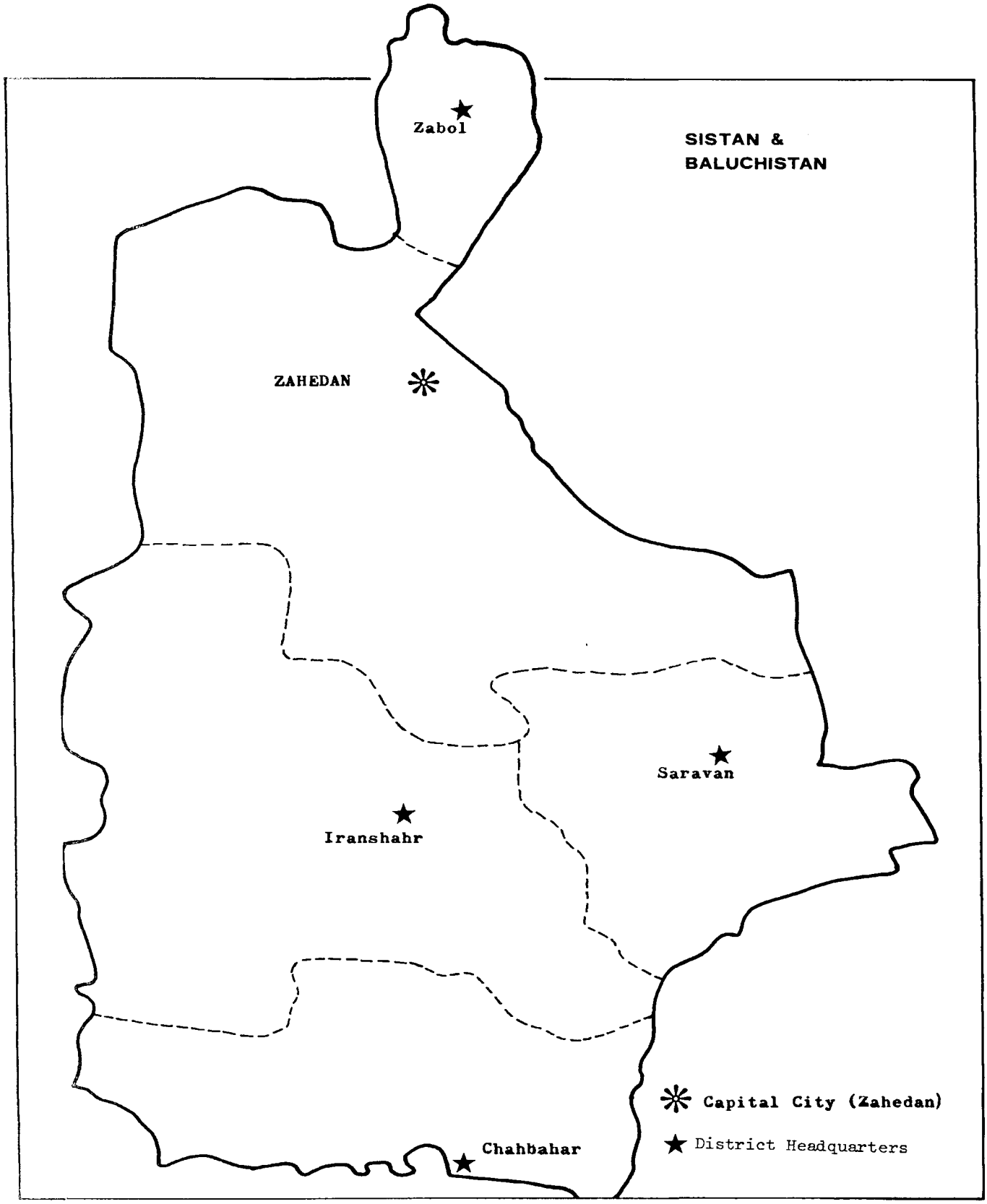
LORESTAN

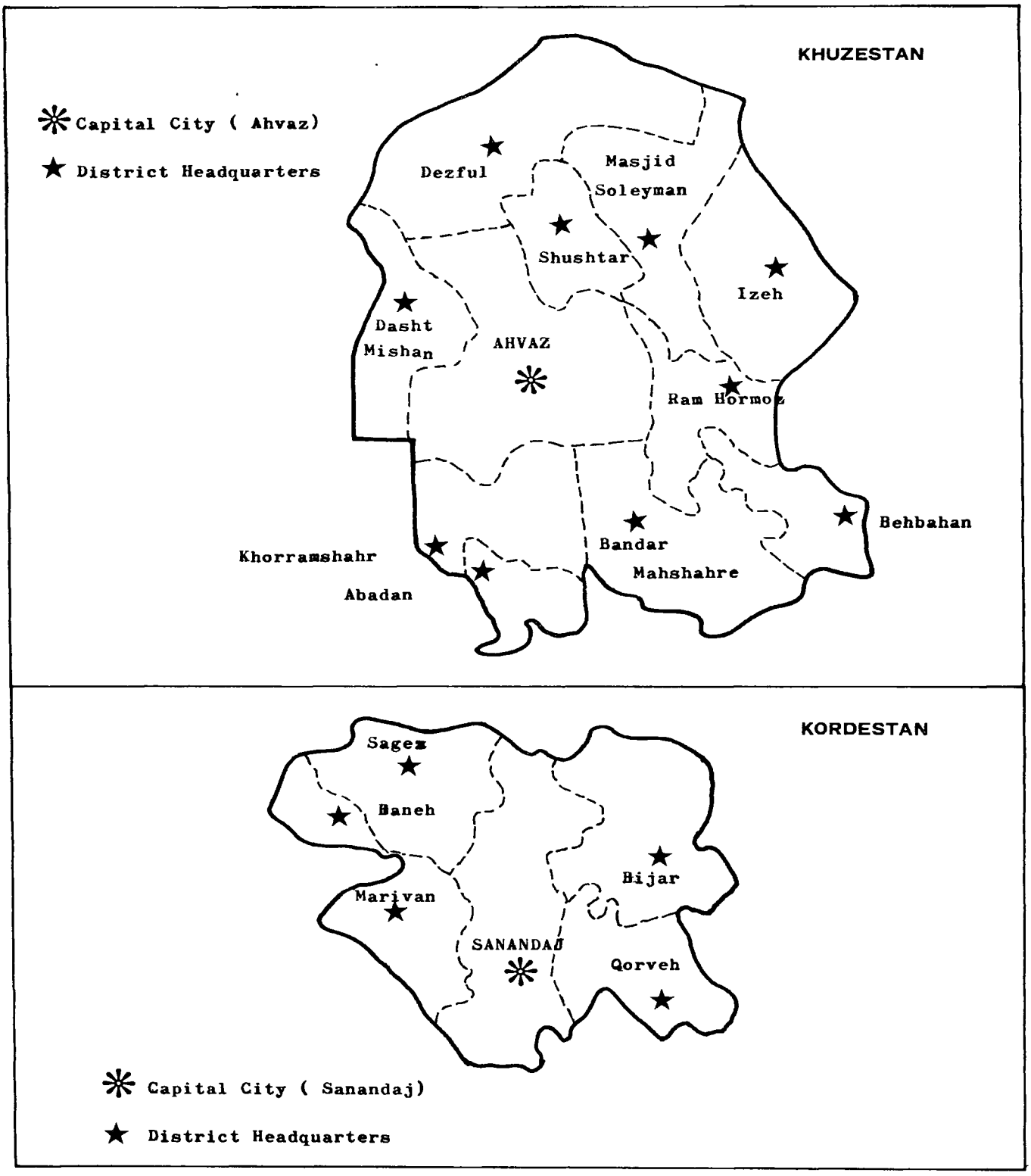


✳ Capital City (Khorramabad)

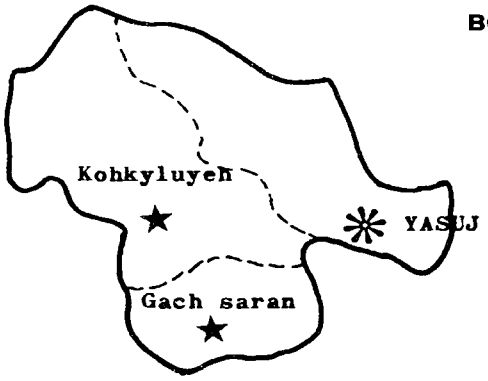
★ District Headquarters


MAZANDARAN
Shah Savar
Nowshahr
Nour
Amol
Babol
Shahi
SARI
Behshahr
Gorgan
Gonbad or dasht-e
Gorgan
Capital City (Sari)
District Headquarters
SEMNAN
Capital City (Semnan)
District Headquarters
Shahrud
Damghan
SEMNAN


SISTAN &
BALUCHISTAN
Zabol
ZAHEDAN
Saravan
Iranshahr
Chahbahar
Capital City (Zahedan)
District Headquarters


KHUZESTAN
Capital City (Ahvaz)
District Headquarters
Dezful
Masjid
Soleyman
Shushtar
Izeh
Dasht
Mishan
AHVAZ
Ram Hormoz
Behbahan
Bandar
Mahshahre
Khorramshahr
Abadan
KORDESTAN
Sagez
Baneh
Bijar
Marivan
SANANDAJ
Qorveh
Capital City (Sanandaj)
District Headquarters

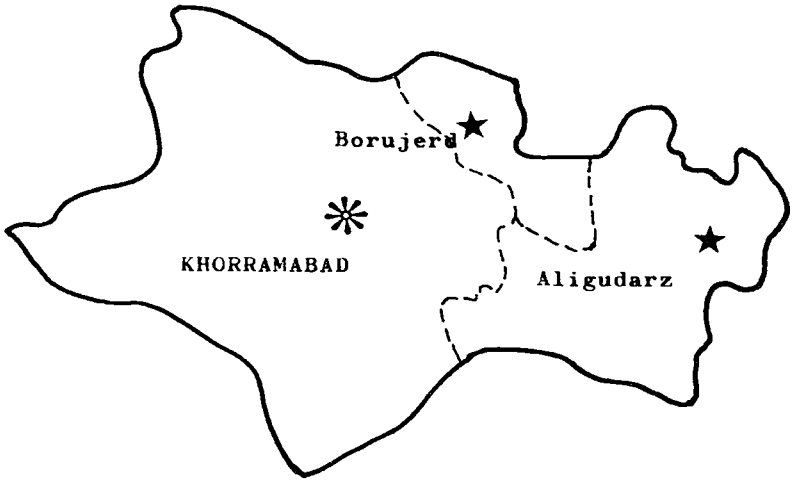
KOHKILUYEH & BOYR AHMAD



✳ Capital City (Boyr Ahmad sardsir or Yasuj)

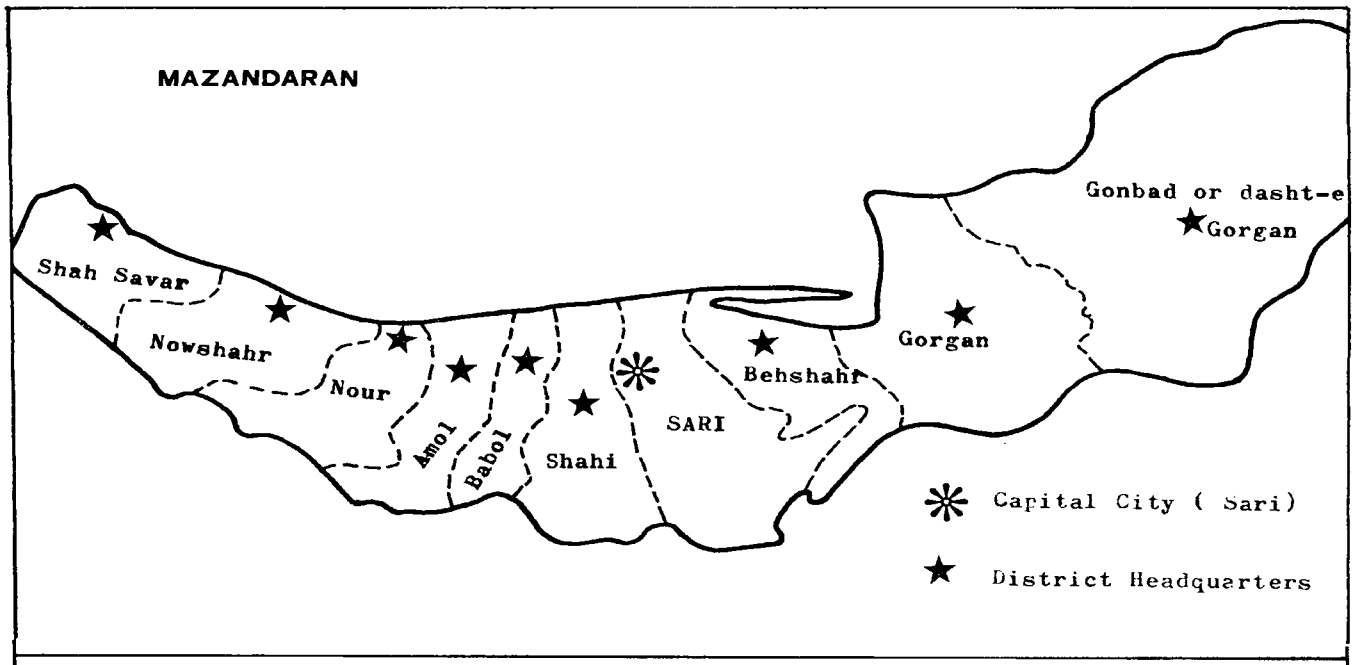
★ District Headquarters

LORESTAN



✳ Capital City (Khorramabad)

★ District Headquarters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Gonbad or dasht-e
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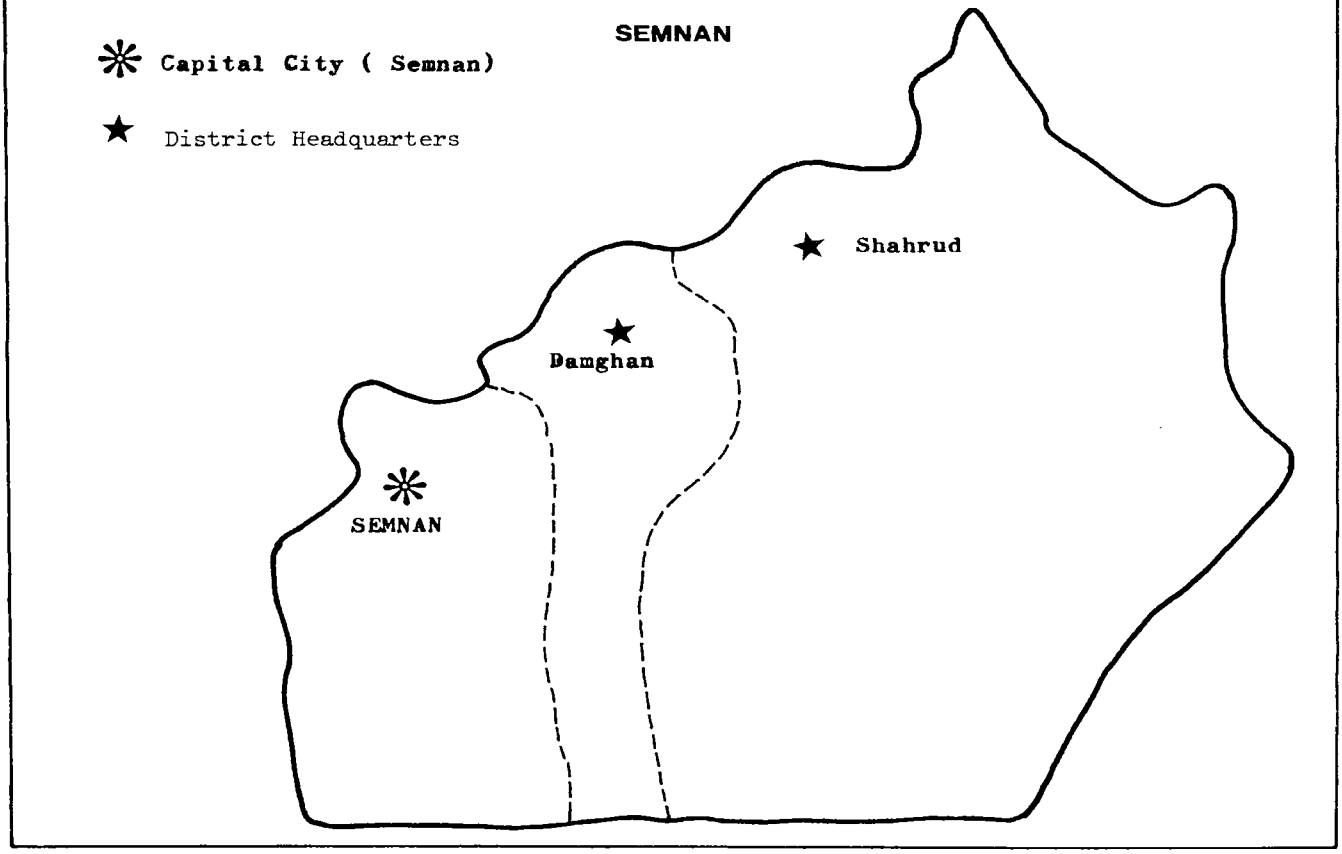
Gorgan
Capital City (Sari)
District Headquarters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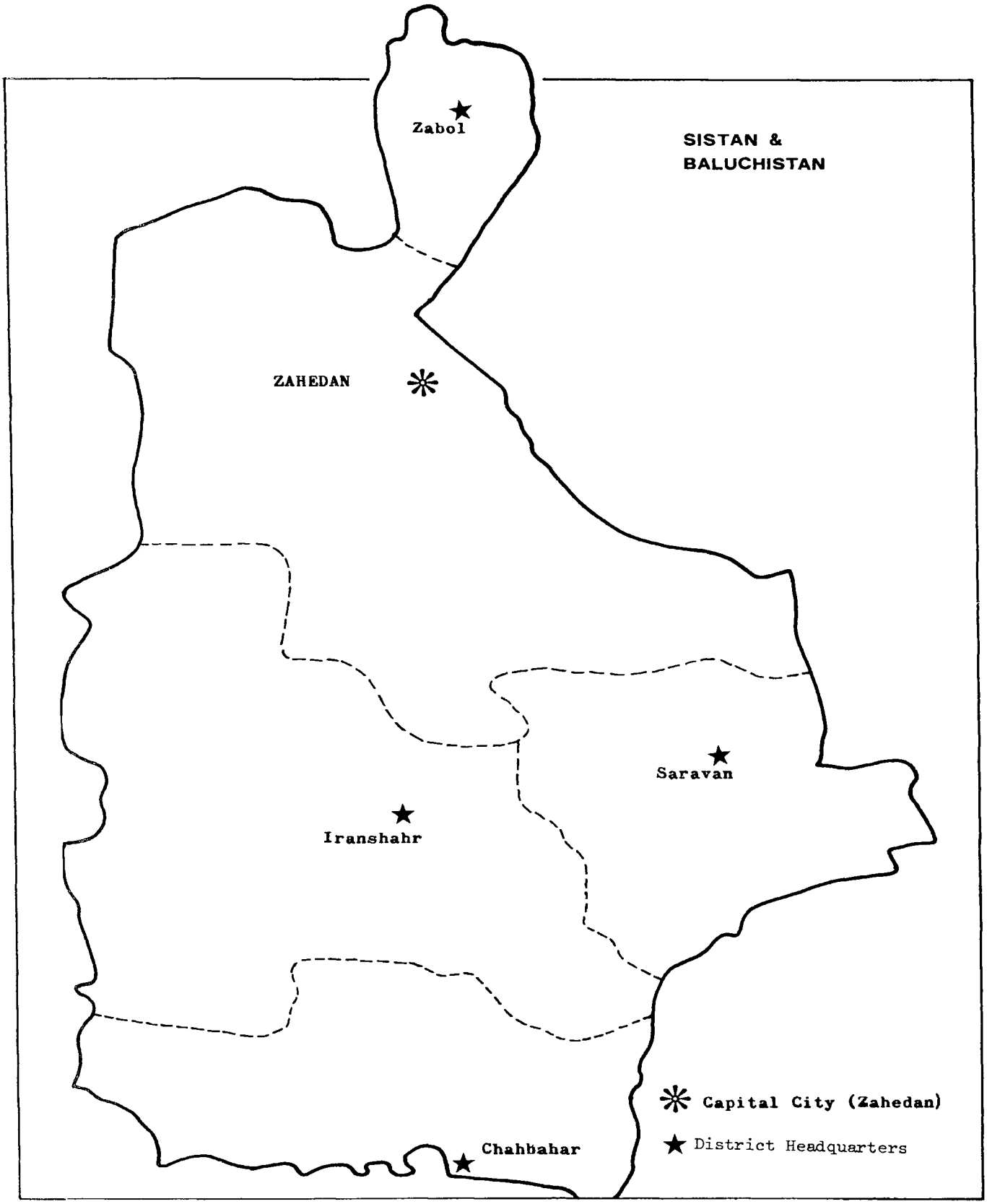
District Headquarters
Shahrud
Damghan
SEMNAN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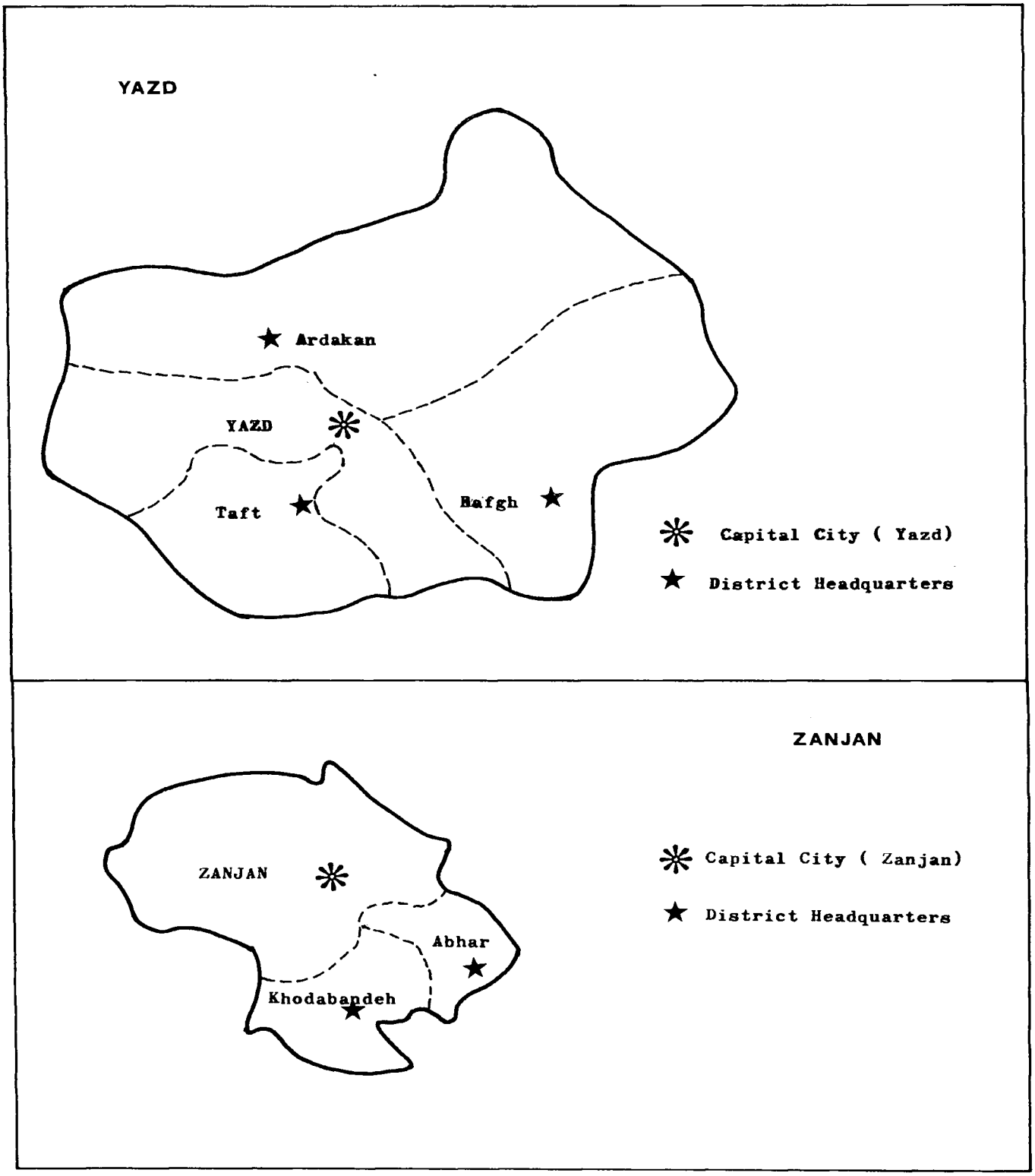
SISTAN &
BALUCHISTAN
ZAHEDAN
Saravan
Iranshahr
Chahbahar
Capital City (Zahedan)
District Headquarters


YAZD
Ardakan
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Taft
Bafgh
Capital City (Yazd)
District Headquarters
ZANJAN
ZANJAN
Abhar
Khodabandeh
Capital City (Zanjan)
District Headquarters

Annexe 2: PLAN OF OPERATION: SPECIAL PROGRAMME FOR CONFIRMATION OF SMALLPOX ERADICATION IN IRAN

1. Objectives

The objectives of this Plan of Operation are to confirm that smallpox has been eradicated in Iran and further to prepare the documentation necessary for presentation to an International Commission for Certification of Global Smallpox Eradication. Such a Commission is being appointed by the World Health Organization.

2. Timing

This plan will be put into effect for a period of 6 months in all provinces of Iran. It will start from 21 March 1978 (beginning of the Iranian New Year). Prior to the start of the plan, three months will be allocated for necessary administrative preparations, training of field workers and despatch of supplies.

3. Methodology

This plan includes four specific programmes:

3.1 Chickenpox Surveillance

The objective of this programme is to create a surveillance system network so that all chickenpox cases can be reported and some epidemiologically investigated.

a) Compulsory reporting of chickenpox cases

During the execution of this programme (6 months) reporting of all chickenpox cases is obligatory throughout the country.

i. Reporting of chickenpox cases will be weekly and by telegram. Each sub-province (shahrestan) will cable cases of chickenpox to the provincial communicable diseases control office, and in turn the cases will be reported weekly from the province to the central communicable diseases control office in Tehran.

ii. The cable will be according to the proforma attached and will include information such as the number of cases - number of cases without previous smallpox vaccination history - number of deaths.

iii. If no cases of chickenpox is reported, a nil report will still be sent.

b) Epidemiological form for chickenpox cases

An epidemiological form (form No. 1, attached) should be completed for each case of chickenpox, in duplicate - one copy to be kept at the provincial communicable diseases control office and one to be sent to the central headquarters, Tehran. These forms are meant for final analysis of all chickenpox cases by sex, age and previous vaccination history.

c) Epidemiological investigation of chickenpox outbreaks associated with at least one death

Such an investigation, because of its importance, should be carried out by the Chief of the provincial communicable diseases control himself. In all such cases a special epidemiological report will be prepared to eliminate all possibility of smallpox. A copy of this report will be sent to central headquarters.

d) Samples for laboratory examination

i. For this purpose, one or two field workers (bedashtyar - equivalent to sanitary inspector) with experience in smallpox eradication activities will be selected in each province.

ii. The particulars of such field workers will be sent to the central headquarters so that they can be invited to Tehran for 2 days for special briefing and training.

iii. These field workers will be engaged full-time on this operation for the period of 6 months and will have no other responsibility.

iv. Specimen kits will be handed over to these field workers.

v. It will not be necessary to take samples from all the cases but definitely samples should be taken from the following patients:

- cases which have no previous vaccination history and no visible vaccination scar (the verbal statement of the patient will not be taken into consideration but the presence of a vaccination scar will be the basis of this judgement).

- all chickenpox cases over 15 years of age, no matter whether or not they have a smallpox vaccination scar.

- one sample from each chickenpox outbreak associated with at least one death.

- all serious abnormal chickenpox cases, specifically those with lesions on the soles of the feet and palms of the hands, or if there is any disagreement regarding the differential diagnosis between chickenpox and smallpox.

e) Laboratory examination

i. Laboratory examination and diagnosis will be carried out in a WHO reference library so that the results can be internationally acceptable.

ii. Specimen kits in sufficient quantity will be provided by WHO to the Ministry of Health of Iran.

iii. Arrangements will be made so that all specimens from the provinces reach Tehran weekly.

iv. Central headquarters of communicable diseases control in Tehran will in turn collect and send all samples from the provinces on a weekly basis by air to WHO Geneva.

v. During transport from place to place (within the provinces and from the provinces to Tehran) specimens need not necessarily be refrigerated but certainly while in store in the provinces or at central headquarters, they should be kept in a refrigerator.

vi. The number of specimens, date of despatch, and name of carrier will be cabled to the destination before despatch.

vii. The methodology for taking samples is attached.

3.2 Special Investigation of Suspect Smallpox Cases

As normally a number of reports will be received from different sources (such as police, village heads, inspectors and other officials) indicating spread of smallpox-like disease, which after investigation prove to be false, a special format will be prepared to record all such information. The results of such activity will show the precision of the epidemiological investigation in all such cases, even though the reports were not true.

a) To carry on this programme, the provincial communicable diseases office will be responsible at the provincial level for any such investigation.

b) A special form (form No. 2) will be completed in duplicate (one to be filed at the provincial level and the other copy to be sent to the central headquarters, Tehran).

c) All forms will be filed and will always be available for final analysis.

d) The analysis of such suspected smallpox cases in all provinces will be the responsibility of central headquarters and the results will be sent back to each province.

e) All such reports from any place in the province should be communicated to provincial headquarters for recording on form No. 2

3.3 Special Facial Scar Surveys

This survey will be carried out to confirm the existence or nonexistence of smallpox during the last 5 years specifically in border areas and certain other parts of the country which, from the epidemiological point of view, are of special interest.

a) This programme will be carried out specifically by the central communicable disease control headquarters.

b) Between 1,000 and 1,500 villages in the sub-provinces mentioned in list No. 4 will be selected randomly at the central headquarters office.

c) Two teams from central headquarters, each consisting of 2 field workers (bedashtyar), with special training and experience, supported by one driver and one car, will be assigned to carry out this programme for 6 months.

d) These operational teams, after receiving the names of the villages which should be surveyed, will go to the provinces concerned and after introducing themselves to provincial officials will visit the villages.

e) For such a survey, the number of families in the village which should be examined is according to the following table:

Village population	No. of families to be examined
50	100% of resident families
50-100	50% " " "
100-500	25% " " "
over 500	20% " " "

f) Families to be examined will be selected on a random basis according to the instruction and training received.

g) In selected families, all (100%) of children under 5 years of age will be examined.

h) The children under 5 years of age will be examined in good daylight and if at least 5 pockmarks not less than 2mm in diameter are found, the child's particulars should be recorded on a special form (form No. 4). All forms will be sent to central headquarters.

i) After the survey is over in each sub-province, a special form (From No. 5) which shows the total number of villages investigated and also the number of families seen and the number of children examined will be completed and sent to central headquarters.

j) The children who, in the facial scar survey mentioned above, were found to have facial pockmarks, will be investigated by the epidemiologist from communicable diseases control headquarters and for each case a special epidemiological report will be prepared.

4. Preparation of the Final Report

After finilization of the programmes mentioned and analysis of the results, a special report will be prepared for presentation to the International Commission as evidence for confirmation of global eradication. The central headquarters communicable diseases control office will be responsible for preparation of such a report. This report, besides reflecting the results of the programmes mentioned (chickenpox surveillance, rumour register, facial scar survey) will include other general information such as:

1) General demographic information on the country - social and economic.

2) Health organization and manpower.

3) Educational institutions and health training facilities.

4) History of smallpox disease in the country and its epidemiology.

5) Vaccination against smallpox.

6) Reporting and recording of communicable diseases.

7) Laboratory examination.

8) Epidemiological investigation of suspected cases.

After preparation of the final report, the Ministry of Health of Iran, will invite, through WHO, two International Commission members to visit Iran so that by studying the report and special observations they can prepare the ground for certification of smallpox eradication in Iran.

Prepared December 1977.

EPIDEMIOLOGICAL INVESTIGATION FORM FOR CHICKENPOX CASES

Form No. 1	Sequential No.....

Personal Data

Name ..... Father's Name .....

Age ..... Sex .....

Full Address: Village ..... District .....

Province .....

Present Illness

Date of Onset of Rash .....

Type of Rash: Papulo-vesicular ☐ Pustule ☐ Scab ☐

Status of Patient: Recovering ☐ Ill in bed ☐ Dead ☐

Date .....

History

Year of earliest vaccination ..... vaccination scar:

Date of most recent vaccination ..... Yes No

Collection for Laboratory tests

Specimen collected: Yes ☐ No ☐

Date of Collection .....

Date of sending the Specimen .....

Epidemiological investigation:

Name and title of Investigator

Date of Investigation