2. Levy S, Rachmilewitz EA, Izak G, *et al:* A therapeutic trial in anemia of pregnancy. Israel J Med Sci 1968; 4:218–222.
3. Levy S, Rachmilewitz M, Grossowicz N, *et al:* Nutritional survey in an iron and folate deficient population. Am J Clin Nutr 1975; 28:1454–1457.
4. Izak G, Levy S, Rachmilewitz M, *et al:* The effect of iron and folic acid therapy on combined iron and folate deficiency anemia: The results of a clinical trial. Scand J Haemat 1973; 11:236–240.
5. Izak G, Rachmilewitz M, Levy S, *et al:* Anemia in pregnancy and infancy in Kiryat Shemona, its causes and possible prevention. Harefuah 1971; 80:67–71.
6. Kark SL, Peritz E, Shilho A, *et al:* Epidemiological analysis of the hemoglobin picture in parturient women of Jerusalem. Am J Public Health 1964; 54:947–960.
7. World Health Organization: Tech. Rep. Series, No. 503, Geneva:WHO, 1972.
8. Statistical Abstract of Israel, Central Bureau of Statistics: Jerusalem, Israel, No. 25, 1974.
9. Sood SK, Ramachandran K, Mathur M, *et al:* WHO sponsored collaborative studies on nutritional anemia in India. Quart J Med 1975; 44:241–258.
10. Gitlin M, Bialik D, Flug D *et al:* A community program for the prevention, treatment, and evaluation of anemia in pregnancy. Harefuah 1968; 5:360–363.
11. Epstein LM, Bailik O, Abramson JH, *et al:* Changing hemoglobin picture among parturients in Jerusalem. Israel J Med Sci 1970; 6:267–272.
12. Pumpianski R, Cochavy Z: A contribution to the problem of anemia of pregnancy. Harfuah 1964; 67:128–131.

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Evaluation of Rural Primary Health Care Services in Iran: Report on Vital Statistics in West Azarbaijan

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Abstract: Iranian indigenous front-line health workers (FLHW) were locally trained to deliver environmental and primary health care services to mothers and children. After two years, there was a significant decline in crude birth and death rates and in infant and 1-5 year mortality rates in the test area as compared to a control area. One out of four encounters was referred to a health center physician, the remainder being handled by the FLHWs themselves. (*Am J Public Health* 1981;71:739–742.)

Introduction and Background

A shortage of primary health services in rural areas, sometimes a problem in more affluent countries,[1] is a far more acute need in less developed countries.[2–5] Many countries are therefore attempting to develop a rural primary health care system.[6–9]

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A project was started in 1971 in the West Azarbaijan Province of Iran to test the effectiveness of a primary health delivery system using mainly local young people with primary education. The province, located in the northwest region of Iran, is an agricultural area with potential for cattle breeding, a population of 1.3 million, and a surface area of 43.6-0 Km^2; about 77 per cent of the population lives in the 3,300 villages of the province. This particular province was selected for this study because geographically, economically, and otherwise it was typical of the whole country; and its population was ethnically and culturally a homogeneous group.

Materials and Methods

In 1972, base-line data were assembled from three sources: 1) local health office statistics, 2) 22 governmental health units and 21 private clinics (one-half of both facilities), and 3) interviews with 4,016 patients. On the basis of the information obtained, a field laboratory was set up in October 1973. It consisted of the total rural population of Chongoranloo, i.e., 26,091 persons living in 69 villages. The area is near Rezayeh, the chief city of the province.

A program to train front line health workers (FLHWs) was developed, using a block system with a total of four months of formal training and 20 months of inservice field training, under the close supervision of instructors. The instructors were nurses, nurse aides, and sanitary technicians, while the supervisors and directors were physicians, who

TABLE 1—Utilization of Services by the Population

Group	Number of Individuals in the Group	Number of Individuals Who Utilized Services	Per Cent That Utilized Services	Total Number of Encounters	Average Number of Encounters per Year
Pregnant Women	762	662	86.9	2849	4.3
Women Eligible for Family Planning	3049	2143	70.3	22819	10.5
Children 1-5 Years	4602	4119	89.0	13152	3.2

held weekly teaching and refresher sessions with the instructors.

The FLHWs were of two types: the male worker or Behdashtyar (BY) who was concerned mainly with community health problems, environmental sanitation, and surveillance of selected communicable diseases, and the female worker or Behvarz (BV) who dealt primarily with personal and family health problems, maternal and child health, family planning, and general patient care (management of headaches, common cold, helminthiasis, simple conjunctivities, mild diarrhea, and the like, as well as first aid). The populations covered by each BV and BY were, 1,000-2,500 and 2,500-5,000, respectively; in time the entire population of 26,091 was covered.

A BV, stationed in a "Health House" visited six to eight other villages regularly; she was visited herself by the doctor and other staff from the health center of the area at least once a week. Each BY worked in conjunction with two BVs. The FLHWs kept a continuous record of vital statistics (starting in March 1976) and turned in monthly reports. This paper draws on the vital statistics of the test area, and compares them with those gathered in a comparable manner in the control area; the control and test areas were comparable climatically, geographically, economically, ethnically, and culturally.

To obtain data on vital events, during the week local volunteers (traditional midwives, teachers and religious leaders) gathered information on deaths and births,* and gave them to the BYs and BVs, who visited the village at least once a week and checked the accuracy of this information by selected home visiting. A second check was done by the BV supervisors.

For specific indications and following specific instructions, **BVs were allowed to give out: aspirin, oral penicillin, antidiarrheal syrup and tablets, anticough syrup, antacid tablets, analgesic ointment, eye drops and ointments, antihelminthic drugs (for ascariasis and teniasis), oral rehydration salt, contraceptive pills and devices, vitamins D and A tablets and pearls, B-Complex and vitamin C tablets, iron tablets, ointment for dermatitis (without cortisone). They were also instructed in the use of first aid kits.

In referring cases to the Health House, the BVs also followed specific indications,** e.g., if a child with diarrhea had oral rehydration treatment but did not recover after three days.

Results and Discussion

Table 1 shows the utilization of BV services by different groups as well as the average number of encounters per year. Vital data from the test and control areas over a period of two years (March 1976 through February 1978)*** are compared in Tables 2 and 3; the control population increased from 5,689 to 7,427 because more villages came to be included in the control area.

Table 1 shows that significant proportions of the target population utilized the services offered and did so rather heavily. Other analyses of the data reported by BVs revealed that, during 1976-78, only 20.6 per cent of the 73,811 encounters were referred to a doctor, while the rest were treated by the BVs themselves.

Table 2 shows that the crude birth rate was significantly lower in the test area in the first year. Why it did not decline further in the second year may be a reflection of the change in family planning coverage which increased from 5 per cent of the eligible women‡ in 1972 to 70.2 per cent in 1976-77. We

*The data collected on births were: date of birth, body weight, place of birth (home or hospital), sex, birth order, accoucheur, father's name and other family particulars, delivery expenses, whether the baby was born dead or alive. The data gathered on deaths were: date of death, cause, sex, age, place of death (home or hospital), family particulars (number of children), duration of disease before death (when appropriate), and signs of death.

**The BVs were given manuals to be used as a reference. They were instructed to keep the manuals always close at hand.

***Between October 1973 and March 1976, no data were collected, as the research team was busy training the staff and making other preparations for the project. However, since there were no changes in the health system (i.e., the services provided by the Ministry of Health and other agencies) during this period, it was assumed that the situation immediately before March 1976 would not have been appreciably different from that in 1972-73.

‡Married women aged 16-44 years with at least two children, constituting 10.6 per cent of the total population.

TABLE 2—Comparison of Vital Statistics in Rural Areas Covered and Not Covered by FLHWs, from March 1976 through February 1977

Criteria	Area Not Covered by FLHWs		Area Covered by FLHWs		p<
	Number	Per 1,000	Number	Per 1,000	
Population	5689		28285		
Births	197	34.6[1]	767	27.1[1]	0.01
Deaths (total)	49	8.6[1]	234	8.3[1]	N.S.
Infant deaths	24	121.8[2]	78*	101.7[2]	N.S.

1) Total population
2) Live births
*Causes: Prematurity 16, pneumopathy 11, cyanosis 7, malnutrition 7, gasteroenteritis 5, unspecified 25, other 7.

think the latter figure is the maximum feasible to obtain under existing conditions. The fertility rate (births per 1,000 women 15-44 years old) was 143.2 in the project area and 208.4 in the control area, which is an indication of the effectiveness of the family planning program. Parity changes or delayed marriage age of women cannot account for the lower fertility rate. In the control area, 10-20 per cent of eligible women reported they visited a family planning program, but this figure could not be verified.

In the second year, the total number, as well as the number of infant, and 1-5 year, deaths was significantly lower in the test area (Table 3). More data are reported for the second year because by the end of the first year the BVs had more experience and could gather more detailed and specific data while doing their routine work. The decrease in infant deaths may not seem very striking (79.9 per 1,000 vs 115.6 per 1,000); premature birth remains a major cause of death; poor nutrition, the heavy work of pregnant women, and inadequate delivery services (not included in the FLHWs' functions) are contributing factors.

The more drastic changes in the 1-5 year deaths, on the other hand, were due to a prompt and effective treatment of diarrhea by oral rehydration, immunizations, and health and nutrition education.

In the test area no deaths were recorded due to measles or tetanus; the former had been the cause of 11 per cent of deaths in the infected children, and the latter a common cause of newborn deaths, before the start of the project; no cases of smallpox, and very few cases of pertussis (with no deaths) were reported.

Family planning programs, environmental sanitation, early treatment of conditions other than diarrhea may also have affected early childhood mortality. Child nutrition practices were not entirely satisfactory, however. Although 71.7 per cent of mothers practiced breast feedings alone, solid food supplementation started late (at 8-12 months), and 27.8 per cent of the mothers used bottle-feeding as a supplement to breast-feeding at some time.

Nevertheless, on the basis of these results, we believe we can say that a primary health care delivery system utilizing locally trained FLHWs, systematically and regularly supervised, is one possible solution to the widespread problem of rural health service organization and management in developing countries.

TABLE 3—Comparison of Vital Statistics in Rural Areas Covered and Not Covered by FLHWs from March 1977 through February 1978

Criteria	Area Not Covered by FLHWs		Area Covered by FLHWs		p<
	Number	Per 1000	Number	Per 1000	
Population	7427		28573		
Births	294	39.6[1]	779	27.3[1]	0.01
Deaths (total)	94	12.7[1]	209	7.3[1]	0.001
Deaths 0-28 days	20	68.0[2]	35	44.9[2]	N.S.
Deaths 1-11 months	14	47.6[2]	27	34.6[2]	N.S.
Infant deaths	34	115.6[2]	62*	79.6[2]	0.01
Deaths 1-5 years	20	20.0[3]	18**	4.7[3]	0.01

1) Total population
2) Live births
3) Population 1-5 years
*Causes: unspecific 14, pneumopathy 11, prematurity 11, gasteroenteritis 8, malnutrition 8, cyanosis 5, other 5.
**Causes: gasteroenteritis 8, pneumopathy 4, accidents 2, heartdisease 1, other 3.

REFERENCES

1. Roemer MI: Primary care and physician extenders in affluent countries. Int Health Serv 1977; 7:545-55.
2. Gregor A and Dowling MAC: Teaching and learning. World Health, January 1978; pp.14-17.
3. Newell KW (ed): Health by the People. Geneva: WHO, 1975.
4. Anonymous: Meeting basic health needs in developing countries: Alternative approaches. WHO Chronicle 1975; 29:168-187.
5. Anderson A: Adapt-don't adapt. World Health July 1976; pp. 4-7.
6. Gonzales CL: Simplified medicine in the Venezuelan health services, IN: Health by the People. Geneva: WHO, 1975, pp. 169-190.
7. Horn JS: Community action pays off. World Health, December 1975, pp. 22-25.
8. Belmar R *et al*: Evaluation of Chile's health care system, 1973-

1976: A communique from health workers in Chile. Int Health Serv 1977; 7:531-540.
9. Nugroho G: A community development approach to raising health standards in Central Java, Indonesia, IN: Health by the People, Geneva: WHO, pp. 112-127.

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Evaluation of the Rhode Island Child Restraint Law

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Abstract: In Rhode Island, a law went into force July 1, 1980, requiring drivers to transport children who are in the front seats of vehicles in properly used child restraints. In the fourth month of the law, restraint use and travel in rear seats had increased moderately; the net result was an increase in proper restraint use in rear seats (11 to 23 per cent) and a decrease in unrestrained, front seat travel (41 to 26 per cent). (*Am J Public Health* 1981;71:742–743.)

In July 1980, Rhode Island, following the lead of Tennessee, became the second state in the nation to legally require child restraint use in motor vehicles.[1, 2] The Rhode Island law requires all drivers to transport children aged three or under who are in the front seats of vehicles in properly used child restraints. Failure to comply with the law is considered a moving violation that may result in a $15 fine and, in combination with additional moving violations received in a one-year period, can lead to driver's license suspension.

In Knoxville and Nashville, Tennessee, the use of child restraints anchored by seat belts was 8 per cent before the Tennessee law; usage rose to 16 per cent in the fourth month of the law, and to 29 per cent in its third year.[3, 4] In this paper, a study of the effects of the Rhode Island law in its fourth month is reported.

Methods

Observations of children traveling in automobiles were made in Rhode Island in the greater Providence area (Providence, Pawtucket, Cranston, Warwick) about one month before the law went into force (May–June 1980) and in the fourth month of the law (October 1980). Observations of child travel for comparison purposes were also made at these times in New Bedford and Worcester, Massachusetts, an adjacent state not having a child restraint law.

The same observational techniques used in evaluating the Tennessee law[3, 4] were used in Rhode Island. Observations were made at stop signs and stop lights at exits from 20 shopping centers in the greater Providence area, and 10 shopping centers each in New Bedford and Worcester. If automobiles stopping at stop signs and stop lights contained one or more children who were possibly less than four years old, information was obtained from drivers on age of the child, and observations on how the children were traveling were made and recorded.

The criteria for "proper use" used in this study were as follows:

- Rear-facing infant restraints had to be anchored by the vehicle seat belt;
- In forward-facing child restraints in which the vehicle seat belt fastens around both the restraint and the child, the seat belt had to be fastened;
- In forward-facing child restraints in which the vehicle seat belt anchors the restraint but does not fasten around the child, both the seat belt and the restraint's harness system had to be used.

Although these are minimum criteria, restraints used in these ways would limit the child's motion in a crash and provide protection.

Results

In Rhode Island there was a moderate shift of children from front seats to rear seats after the law went into force. The proportion of children traveling in rear seats increased more in Rhode Island (49 to 62 per cent) than in Massachusetts (53 to 56 per cent) ($\chi^2 = 11.09$, $p < 0.001$).

Figure 1 shows pre-law and post-law rates of proper use of child restraints in Rhode Island and Massachusetts, in front seats, rear seats, and for all seating positions. Overall, there were increases in proper child restraint use in both

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