

Health Services Reforms in Revolutionary Nicaragua

RICHARD M. GARFIELD, RN, MPH, AND EUGENIO TABOADA, MD

Abstract: Before the Nicaraguan revolution of 1979, access to health services was largely limited to the affluent sectors of the urban population and the minority of workers with social security coverage. Repeated attempts at reform by organized medicine were ineffective. Since the revolution, a tremendous expansion in health services has occurred. The national health system receives approximately one-third of its funds from the social security system. Steadily increasing equity in access is a result of the promotion of primary care, health campaigns involving up to 10 per cent of the general population as volunteers, the use of paramedical aides, and

foreign assistance. Private practice nevertheless remains strong. In the coming years, several complex issues must be examined, including: a balance in the number of nurses and doctors trained, the role of private practice, and the relationship of the Ministry of Health to the social security system. Further progress in health reforms may be delayed by the defensive war which Nicaragua is fighting on its northern and southern borders. Despite emergent health problems in the war zones, most of the innovative aspects of the health system remain intact as of this writing. (*Am J Public Health* 1984; 74:1138-1144.)

Latin American Background

Three systems for the provision of health care have traditionally existed in Latin America: church-related charity institutions, government-sponsored systems generally favoring urban areas, and social security systems which staff and operate their own medical facilities for industrial workers.¹ Over the years, the importance of charity institutions has declined while government responsibility for the provision and coordination of health services has increased. In Chile² and Costa Rica,³ much of the social security health services and the Ministry of Health services joined forces in the 1960s. Other Latin American countries such as Mexico⁴ and Brazil have greatly expanded public support for social security health systems. Nonetheless, many population groups have continued to lack access to health services. More aggressive attempts at health sector integration in Chile (1971-73)⁵ and Cuba (after 1959)⁶ met with considerable opposition from physicians which included strikes, slowdowns, and emigration.

In most Latin American countries, excessive attention has been given to the training of physicians with relative neglect of training for other health workers, especially nurses. For Central America and Mexico as a whole in 1972, there were 36 trained nurses per 100 doctors.⁷ By 1979, this had improved to 88 nurses per 100 doctors. Life expectancy at birth in these countries^a varied from 55 to 70 years. In 1976, per capita health expenditures varied from \$7 to \$12, consuming from 4.1 per cent to 14.7 per cent of government budgets.⁸

a) Data from the Pan American Health Organization (PAHO) include Mexico, Honduras, El Salvador, Nicaragua, Costa Rica, Guatemala, Belize and Panama; data from the World Bank include only the first five countries listed.

Address reprint requests to Richard M. Garfield, RN, MPH, Division of Epidemiology, Columbia University, School of Public Health, 600 West 168 Street, New York, NY 10032. Dr. Taboada is a resident, Department of Pathology, Albert Einstein College of Medicine, Bronx, NY. This paper, submitted to the *Journal* October 28, 1983, was revised and accepted for publication May 8, 1984.

Editor's Note: See also related editorial p 1083 this issue.

© 1984 American Journal of Public Health 0090-0036/84 \$1.50

Nicaragua Before 1979

Nicaragua, with its population of about 3 million, is one of the poorest countries in Latin America. Per capita income is about \$800; until 1980 a majority of the population was illiterate and lived by subsistence farming.^b Most of the country's foreign exchange is generated through export of cotton, coffee, and sugar. About 25 per cent of the population lives in the capital city of Managua.

During the decade preceding the Sandinista Revolution, four separate agencies and independent health ministry offices in each province ran the Nicaraguan health system. Because each agency and provincial office functioned independently in administration and funding, little coordination was possible; norms, administrative procedures, and salaries differed. Nicaragua prepared its first five-year national health plan in 1968 to guide training, health facilities development, and service delivery. An evaluation made by the US Agency for International Development (AID) in 1971 found that there had been "little implementation due to scarce financial resources, lack of trained personnel, and insufficient administrative support."⁹ The diverse and uncoordinated nature of the health system caused or contributed to these problems.

Efforts were again initiated in the 1970s to reform the health system. Integration of 23 agencies into a single national health service was proposed by AID and backed by large-scale funding. Vested interests resisted such a change, however. In addition, many of those favoring reform feared that preventive services would be further eclipsed if administered together with the more powerful curative system. Even the more modest proposal to coordinate services in Managua was not implemented.

Despite having favorable amounts of funding, beds, and physicians compared to the other Central American countries except Costa Rica,⁸ the Nicaraguan health system functioned poorly. Nicaragua had the lowest life expectancy at birth and one of the highest levels of infant mortality in the region.⁸

b) Despite the country's poverty, dictator Anastasio Somoza was considered one of the richest men in the world.

Access to Care

The Nicaraguan Social Security Institute (INSS) was organized in 1957. Twenty years later, it served only 16 per cent of the economically active population and 8.4 per cent of the country's total population.¹⁰ Nevertheless, in 1974, the INSS controlled 39 per cent of the planned and 50.4 per cent of the actual monies spent in the health sector.⁹ At the time of the revolution, the INSS covered 67 per cent of the salaried population in Managua and 13.5 per cent of those in the rest of the country.¹¹

By contrast, the Ministry of Health, although it had sole responsibility for rural health care, controlled only 16 per cent of health sector expenditures; nearly 75 per cent of its expenditures were disbursed in the capital city. Other local health agencies, charitable and private insurance groups controlled the remaining 34 per cent of actual health expenditures.

Per capita health expenditures during 1976–78 were more than 10 times greater for the insured than for the non-insured population.⁹ INSS subscribers in 1977 had more than twice as many hospitalizations, institutionalized births, laboratory examinations, and operations; more than five times as many x-rays; and more than eight times as many outpatient visits and prescriptions per capita than the rest of the population.^{12–15} While an estimated 28 per cent of the population had some access to medical care, a majority of the country's health resources went to 10 per cent of the population.^{16,17} Moreover, all of the INSS and much of the Ministry of Health budget was devoted to curative care. Of the approximately \$13 per capita spent in Nicaragua in 1972 by the health sector, only about \$3.15 went for preventive care (most of which was for malaria control).¹⁸ Organizational and financial splintering meant that insured workers received much more, and rural residents much less, than an equitable portion of the existing health resources.¹⁹

Health Personnel

Nicaragua, in 1977, had 43 professional nurses per 100 doctors. While the ratio of nurses to doctors improved in Central America as a whole during the 1970s, it decreased slightly in Nicaragua, so that in 1980 there were 42 nurses per 100 doctors.¹⁰ There were few other health workers, except for auxiliary nurses who received six months of in-service training. Only 1.4 per cent of the Ministry of Health budget in 1972 went to train and supervise nursing and other allied health workers.¹⁸

Regional imbalances were also serious. In 1972, although only 25 per cent of the population lived in the capital city, half of all doctors and more than two-thirds of the professional nurses worked there.¹⁸ It is estimated that at the time of the revolution 60 per cent of all human and material health resources were in Managua, and 80 per cent of the rural health manpower consisted of folk healers.⁹

The Somoza dictatorship considered students, especially in the health professions, a potentially subversive group and tried to limit their numbers. Expanded training of health professionals was further discouraged by the belief that this would lead to a surplus of employable workers in the capital without alleviating shortages in other parts of the country. The largest graduating class in the medical school before the revolution consisted of 73 students.

Most medical graduates avoided the one-year social service requirement^c through bribery and planned to estab-

lish practices in the major cities. Those planning to settle in smaller cities and towns used the social service year to establish private practices. The competitive nature of private medical practice deterred doctors from organizing themselves to reform the health system. Medical organizations were supposedly responsible for control over the quality of health services, but the "weak position of these societies in relation to the governing agencies made actual quality control by these organizations non-existent."¹⁸

Post-Revolutionary Developments

Following the 1979 Sandinista revolution, the establishment of the Unified National Health System, including the INSS, under the direction of the Ministry of Health (MINSA) to manage services throughout the country was, on August 8th, one of the first acts of the new government.²⁰

Professional Initiative

Doctors strengthened the scientific and political activities of their organizations following the revolution. The medical societies, organized much like county medical societies in the US, influenced health policy mainly through the officially recognized association of doctors, *Federacion de Sociedades Medicas de Nicaragua (FESOMENIC)*.²¹ The FESOMENIC is a leader of the Federation of Professional Organizations, (CONAPRO), and influences general governmental policy via its representation with voting power on the legislative Council of State of the National Reconstruction Government. This legislative power may disappear after November 1984, when the Council of State is to be replaced by an elected 90-member National Assembly.

The conservative nature of the FESOMENIC asserted itself in 1980 when the Council of State began to discuss a law to regulate professional activities.²² A one day walk-out was organized by physicians in protest against what they saw as government interference in areas of professional privilege. The heavily political character of the doctors' opposition, including threats of mass emigration to Miami, had a chilling effect on deliberations. Discussion of the legislation was tabled for months, doctors were brought into the writing of the law, and the terminology of the law was made less specific. Yet the precedent set by the action was important. For the first time, this highly conservative medical body was pressured to accept in principle the right of the government to regulate medical practice. At present, a rate-setting commission has been formed in what is the most significant subsequent effort at regulation.

By July 1981, tensions between the progressive and conservative camps of CONAPRO led to a formal split. During the eight-month dispute over which group was the legitimate representative of the professional organizations, CONAPRO progressives were able to maintain recognition²³ and the conservatives eventually voted to rejoin the official organization.

Health Personnel

During the 1970s, about 65 per cent of the doctors in the country were paid for some public service; for most of them, this constituted only a few hours a day, and many physicians were absent during much of their scheduled work time. A study in one of the main INSS clinics in Managua showed that at the time of the revolution only 50 per cent of the contracted hours in general medicine, pediatrics, pharmacy, and medical records had been completed.^d Some doctors

c) Placement in rural areas of government service, a post-graduation requirement in many Latin American countries.

d) Unpublished study, Oficina de Informatica e Estadistica, MINSA 1980.

worked less than eight hours a day, yet were paid for as many as 20 hours a day of work. In fact, the total number of reimbursed medical hours surpassed the physical limits of the INSS clinics.

Since the revolution, doctors have been pressured to fulfill their contracted time and increase their scheduled public practice to at least six hours a day. Salaries for public service at each professional level have been standardized and a maximum salary level has been established. The one-year social service requirement for medical graduates has been increased to two years. Its uniform implementation has greatly increased the number of doctors in rural areas.

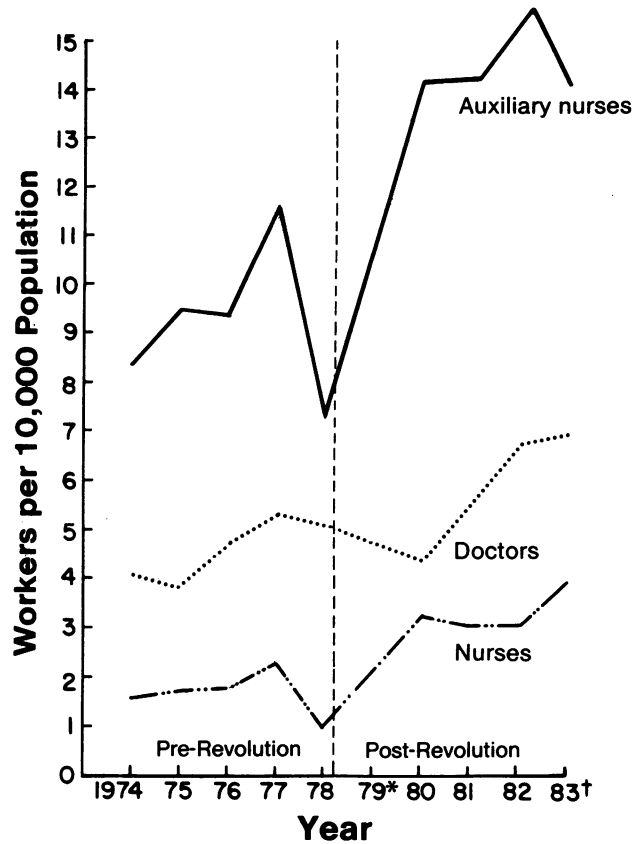
Well over half of the physicians still have private practices. Private practice is absent only in outlying areas, where foreign volunteers and recent Nicaraguan graduates providing social service have brought modern medicine for the first time. Following two years of social service, doctors are guaranteed the right to go into private practice. Even some MINSA personnel maintain private practices.^{e,24} Although many hope that private practice will diminish, no legal mechanisms exist to encourage this. Many discussions at the medical school today revolve around preferences for private or public practice, with those advocating one side or the other attempting to win the hearts and minds of the next generation of physicians.

Prior to 1979, each of the four major hospitals in the capital city of Managua functioned as the personal domain of its medical director, a Somoza appointee. Longstanding feuds and fears of a progressive influence from medical students at the country's one medical school meant that students had only limited access to these hospitals for clinical rotations. By 1981, with the opening of a second medical school and the firing of Somocista hospital directors, routine student rotations in Managua were begun.²⁵

All health career training programs have been greatly expanded and new ones added since the revolution. About three times as many nursing aides (600, in courses increased to one year in duration) and six times as many professional nurses (380) are being trained. Nine allied health careers for about 300 students have been developed. There are more than 10 times as many medical students now (900); 146 physicians are in 16 new residency training programs.^{26,27} In the next few years, almost twice as many doctors as nurses will be graduated. Although MINSA's policy is to establish a more appropriate physician to nurse ratio, the imbalance inherited from the past will continue for the present period (see Figure 1).^{f,10,25-30}

One of the earliest MINSA programs trained independent volunteer paramedical health aides called "Brigadistas".³¹ Brigadistas, selected primarily from the Sandinista Youth Organization, received several months of training and were supposed to be sent to isolated rural areas. They were to serve for two years, after which they would be eligible for professional training. Pressure from doctors who feared losing power led to a deemphasis of this program and an expanded enrollment in medical schools. In fact, many of these volunteers went on to become health educators, medical students, or health brigadistas in the revised volunteer program described below.

Although some emigration occurred in 1980, doctors have not left Nicaragua in large numbers. Any deleterious



*Data not available for 1979

†unpublished data from MINSA

FIGURE 1—Health Workers per 10,000 Population, Nicaragua, 1974-83
SOURCES: References 10, 26-30

effects of the trickling exodus of doctors have been offset by foreign health workers, numbering about 800 at present.³² Most of these "internacionalistas" come from Western Europe and Latin America, especially Mexico and Cuba; there are also some physicians from the US. Many of these doctors provide services to populations never reached by the departing physicians, especially in rural areas. The absence of emigrated physicians is felt most acutely in anesthesiology, ophthalmology, and internal medicine subspecialties.

Financing of Health Services

Government funds directly related to the provision of health care jumped from 200 million cordobas⁸ in 1978 to 1,050 million cordobas in 1981³¹ and reached an estimated 1,593 million cordobas in 1983.^h Despite inflation, a general rise in government spending, and the national austerity program, the proportion of the government budget devoted to health rose from 7.5 per cent in 1977 to 12 per cent of all public spending in 1981^{h,12,26,33-35} (see Figure 2). While health funding continued to rise in 1984, the escalating war

g) The official rate of currency exchange was 7 cordobas to \$1 (US) until 1978, when it changed to 10 cordobas to \$1. The current rate of exchange in banks is 28 cordobas to \$1. Because of the variability in the real value of Nicaraguan currency, values mentioned in this article should only be considered estimates.

h) Unpublished data from MINSA, Area de Finanzas, 1983.

e) This is found in many Latin American countries.

f) Unpublished Data from MINSA, DINEI, 1983.

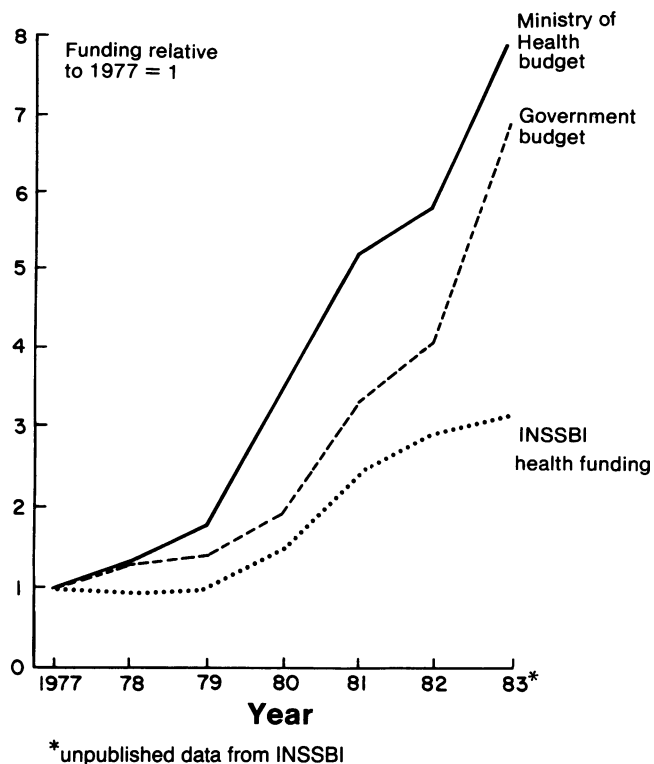


FIGURE 2—Funding for the Ministry of Health and Social Security, and the General Government Budget, Nicaragua, 1977–83
SOURCES: References 12, 25, 28, 33–35

increased the Nicaraguan military budget from 18 per cent in 1982 to 25 per cent in 1984, thus slowing health development.

About 30 per cent of all funds for health care since the revolution has come from the INSS.³³ In effect, the salaried sector subsidizes care for the much larger group of poor and unemployed in the sector served by government, through the transfer of funds to MINSAs. "This represents the principle of solidarity between different social sectors, which represents a positive mechanism for income redistribution."³² Before INSS makes its monthly contributions to MINSAs, it deducts for sickness, occupational hazards, maternity compensation benefits, reimbursement for emergency treatments in private clinics or hospitals, and administrative costs. These deductions amount to about 15 per cent of the total INSS contribution.

When they lost preferential access, salaried workers who had been covered by the INSS agitated for changes in the system. This agitation was only partially successful. The largest single group of workers covered by INSS were government workers.³⁶ Opposition to the integration of the INSS system into MINSAs was weakened by the fact that so many of its members depended on the government for their livelihood. A large educational campaign to encourage workers to "share the wealth" with those outside of the social security system may also have helped reduce potential opposition.

Health expenditures in 1983 passed 500 cordobas per capita. A large but decreasing proportion of the health budget (53 per cent in 1981, 47 per cent in 1982, and 43 per cent in 1983) was devoted to hospital care.^{f,10,26} During these same years, malaria control,³⁷ health education, and rural sanitation increased their respective shares of the health

budget. Thus, unification of the health system after 1979 has not resulted in a deemphasis of preventive activities as was feared when the policies of the Somoza dictatorship were dominant. This may reflect decreased corruption, the assistance of international organizations, improved administration, community participation in the development and execution of health policy, and a political commitment to care for underserved population sectors.

Social Security

The social security system is expanding rapidly. Since 1979, the percentage of the working population covered by social security has doubled, from 16 per cent to 32 per cent.^{13,15} Perhaps more importantly, most of the newly covered groups work in the formerly neglected agricultural sectors in outlying parts of the country. INSS coverage provides retirement insurance and workers' compensation among other non-medical benefits.

Where there had been separate hospitals and clinics for insured workers under the social security system, these facilities were opened to the entire population following the revolution. A general belief that former INSS centers provided better care led the general population to crowd these sites when they became available to the public in 1979, and a Ministry of Health study in 1980 found that their waiting times were much longer. Regionalization and the expansion of primary care resources have since reduced this problem. A nominal fee for filling prescriptions of non-INSS insureds has also been implemented in some areas.²⁴

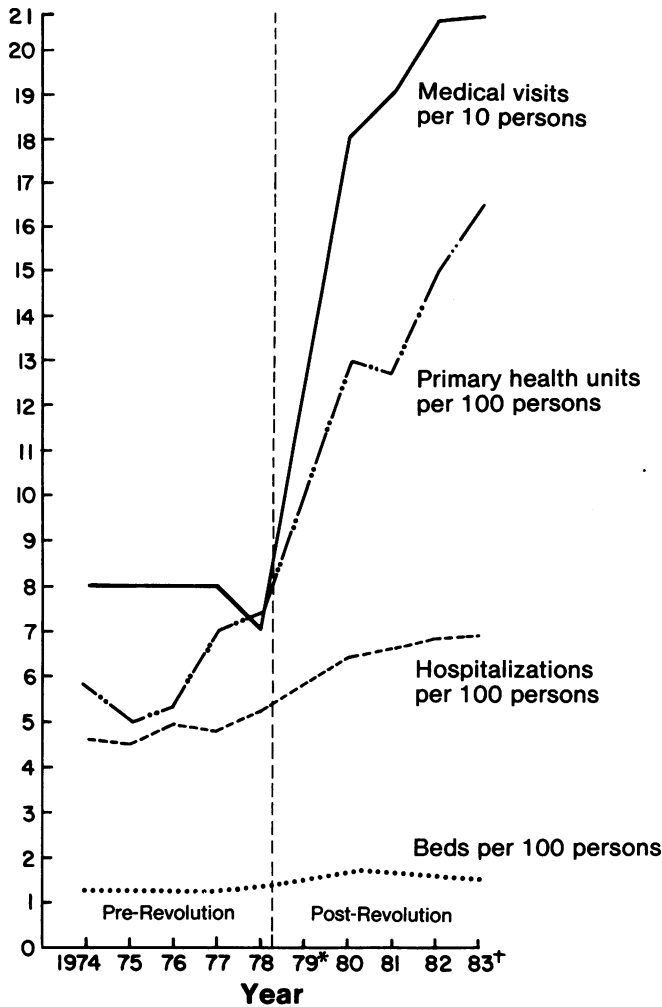
The integration of INSS and MINSAs services has permitted primary health units to take responsibility for occupational health at nearby work centers. In the afternoons, when patient demands on the health centers are lessened, work-site visits are made by the medical staff. This has been found to be an efficient system of coverage.

Although there are no data on this point, it is believed that many insured workers go to private physicians because of reduced waiting times or preferred treatment modalities. Thus, the goal of a single national health service is tempered by the reality of resource limitations, causing continued although greatly reduced differentials in access to health care between those who can afford private care and the rest of the population.

Availability of Services

In addition to increasing the number of people who qualify for INSS coverage, public programs for rural medicine, maternal and child health, and occupational medicine have been greatly expanded. It is estimated that more than 80 per cent of the population now has some regular access to medical care.³⁸ Since 1977, hospitalizations and surgical procedures have risen more than 50 per cent, outpatient medical visits per capita have nearly tripled, and the number of vaccinations administered has had more than a four-fold increase. There are two and a half times more primary care units, while the number of hospital beds has risen only slightly. Many of these and other indicators of service are illustrated in Figures 3 and 4. It is especially notable that the services most lacking before for the general population—outpatient care and prescription—have had the largest increase.

Community participation helps to explain the rapid growth in primary health care since 1980. Not included in Figure 3 are rapidly growing nurse-provided primary health programs established since the revolution. These provide:



*Data not available for primary health units in 1979

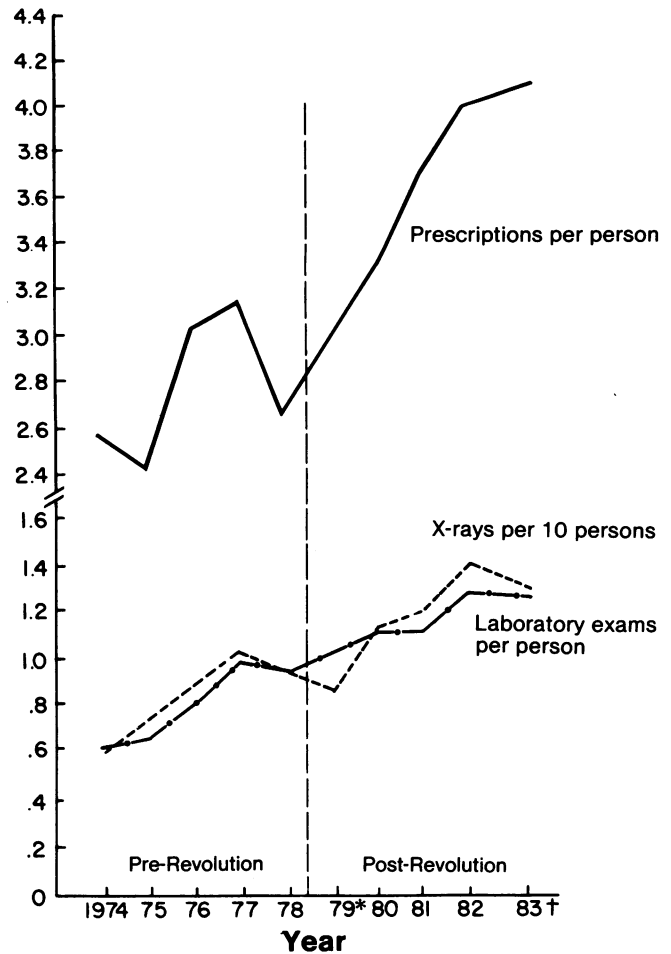
†unpublished data from MINSa

FIGURE 3—Health Facilities and Services per Capita, Nicaragua, 1974-83
SOURCES: References 10, 26-30

prenatal visits, puerperal check-ups, growth and development check-ups, and oral rehydration for infants with diarrhea. The shortage of trained nurses at this time limits more rapid growth of these services.

Equity has also improved. In 1980, there was a 4:1 ratio between areas with the highest and lowest rates of outpatient visits per capita. By 1982, this was reduced to a 3:1 spread. In the same period, the variation in hospitalization rates was reduced from 2.5:1 to 2:1. In 1980, the variation in doctors per capita between the best and worst served areas was 16:1, while for nurses it was 5:1. By 1982, these had been reduced to 3:1 and 2.5:1, respectively. In general, the greatest improvements in distribution of health resources have occurred in the availability of health workers and numbers of medical visits. The least improvement has occurred in the availability of hospital beds among the different regions of the country.

Nonetheless, cities (especially Managua) still take the largest share of health resources. Residents of Managua in 1982 had 55 per cent more medical consults per capita than people in the rest of the country.³⁹ The national average in



*Data not available for X-rays and prescriptions in 1979

†unpublished data from MINSa

FIGURE 4—Ancillary Medical Services, Nicaragua, 1974-83
SOURCES: References 10, 26-30

1982 was 2.06 consultations per capita; a region with a large indigenous population and economically important mines had the highest rate with more than three consults per capita, while several areas had between one and two consults per capita. Within five years, this situation could change considerably. About 800 beds, in five hospitals and 200 health centers, are currently under construction; most new construction is in rural and underserved areas.^f

Health Campaigns

During 1980, periodic health campaigns to mobilize large portions of the general population were planned. Immunization, malaria prophylaxis, and sanitation campaigns were launched in 1981. The campaigns included massive short-term training courses and a heavy dose of public health education. So successful were these campaigns that up to 10 per cent of the people in the country were mobilized as health volunteers.³⁷ The campaigns helped solidify the social role of mass organizations from which many of the volunteers came. They also promoted the formation of local, regional, and national community health councils which are now active throughout the country.

The structure of the health campaigns is currently being

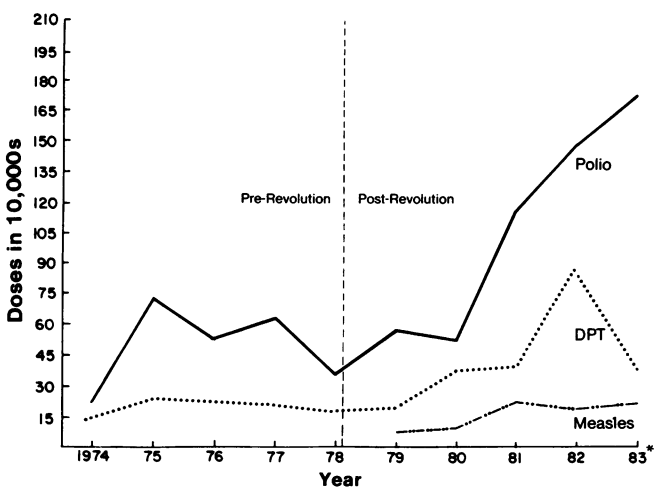
changed to promote permanent, ongoing activities. Activists are still volunteers, but receive more extensive training in maternal and child health, occupational health, first aid, or general health assistance. There are now 25,000 of these permanent "brigadistas," comprising about 1 per cent of the total population. This program appears more like the original Brigadista program, discussed earlier, and will be supplemented by mass participation in short-term campaigns.

Perhaps the most successful health campaigns have been those held four times a year to provide immunizations. Figure 5 shows a rapid and sustained increase in the number of vaccinations administered since 1979. Figure 6 shows the contributions the campaigns have made to total immunizations. The 1983 immunization campaign concentrated on measles, leaving tetanus toxoid vaccinations for a special campaign among pregnant women. Reported cases of measles, pertussis, and diphtheria have decreased sharply and no polio cases have been reported since 1981.

Developments in health services, prevention activities, and education may be related to rapid improvements in the population's health status since 1979. It is estimated that, between 1978 and 1983, infant mortality decreased from 121 to 80.2 per 1,000 live births, life expectancy at birth rose from 52 to 59 years. The number of reported malaria cases has decreased by 50 per cent, polio cases have not been reported for two years, no measles cases were reported in the first half of 1984, and most other immunization preventable diseases are considerably reduced. Diarrhea has fallen from the first to the fourth most common cause of hospital mortality.

Effects of War

The war along Nicaragua's borders adversely affects the development of primary health services. At the time of this writing, 16 health workers (including one French and one German physician) have been killed, 27 others have been seriously wounded, and 30 have been kidnapped and tortured along the country's northern border. In addition, three health educators, seven medical students, and at least 40 health volunteers have been killed by the contras. At least two hospitals and 19 health centers and posts have been destroyed.⁴⁰ The Nicaraguan response has been to remove



*unpublished data from MINSAs
FIGURE 5—Doses of Vaccine against Polio, DPT, and Measles Provided, Nicaragua, 1974–83
 SOURCES: References 10, 27, 28, 30

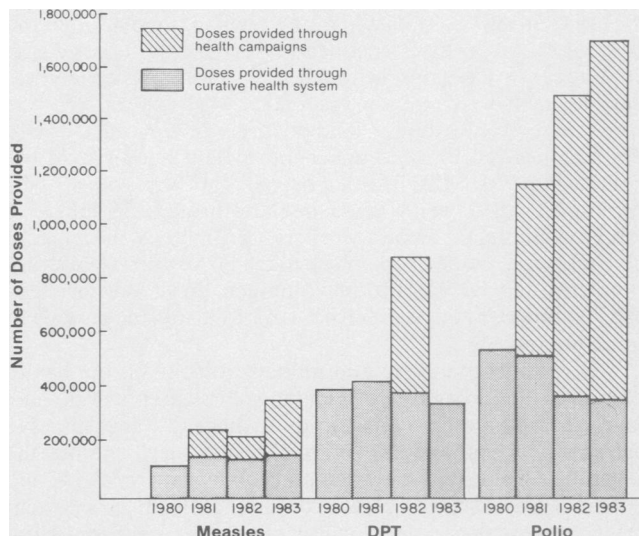


FIGURE 6—Doses Provided of Vaccines against Polio, DPT, and Measles, by Source, Nicaragua, 1980–83
 SOURCES: References 10, 27, 30

foreign health workers from border areas, organize mobile health teams to make up for the closed medical centers, and further promote community participation. In at least some fields, this strategy has been successful. Immunization coverage, for example, was higher in a war zone than in neighboring areas, due to the methods used to reach the population. Rather than one volunteer per community, a large group of brigadistas entered the war zone on unannounced days to reach all houses quickly. Immunization rates of 95 per cent among children under 5 years old in the war zone helped to protect the country from a polio epidemic occurring in neighboring Honduras during the summer of 1984.

Nevertheless, the destruction of infrastructure and the increasing danger of travel in the war zones is taking a toll on the population's health. Some areas report decreases in the number of hospitalizations and visits to physicians due to the war, in spite of continued increases in the provision of health services in the country as a whole.⁴¹ In hospitals near the fighting, up to 25 per cent of the patients have war-related injuries, lessening the number of beds available for routine care. Construction of more than half of the health posts planned for 1983 was abandoned because of the war. Oral rehydration and nutrition programs for children and the supervision of births are decreasing in some war zones as a result of the attacks. The contras' strategy seems to be to terrorize the dispersed rural population and limit its integration into the social programs of the revolutionary government. Among other effects, this has caused the destruction or closing of 153 rural schools and 125 social service centers, the deaths of 158 adult education teachers and students, halting of construction of 2,000 homes, and the paralysis of some rural sanitation, water, and road improvement projects.

As of this writing, about 1,000 peasants have been killed and more than 100,000 made refugees within Nicaragua by "contra" troop attacks. In 1983, in the country as a whole, MINSAs provided about 79 per cent of all medical visits, the army provided 6 per cent, and physicians in private practice provided about 15 per cent. With MINSAs unable to provide

for the growing health needs of the civilian population in the war zones, the army is significantly expanding its provision of services to civilians in those areas. Refugee concentrations have led to malaria epidemics.¹ Outside of the war zones, some health centers and posts are understaffed due to the mobilization of Nicaraguan physicians to serve in the militia or at MINSA health posts in the war zones. This personnel gap is being filled in part through an influx of foreign volunteers. Health workers on long-term assignment in Nicaragua come from more than 30 countries and are supplemented by short-term volunteers from Western Europe and the United States who work in teams for periods of three months.⁴²

Given the economic and military attacks on the health system, maintaining the formidable achievements of the last four years may be considered a success. The massive increase in access and utilization of health services since the revolution will lead to new demands on private medicine and public sector curative care. Continuing efforts to reorient private medical practice toward preventive care and rural medicine may provide important examples for other developing countries in coming years.

REFERENCES

1. Roemer M: Medical Care in Latin America. Washington, DC: Pan American Union, 1963.
2. Waitzkin H, Modell H: Medicine, socialism, and totalitarianism: lessons from Chile. *N Engl J Med* 1974; 4:171-177.
3. Casas A, Vargas H: The health system in Costa Rica: toward a national health service. *J Public Health Pol* 1980; 1:177-186.
4. Lopez Acuna D: Health services in Mexico. *J Public Health Pol* 1980; 1:83-95.
5. Belmar R, Sidel VW: An international perspective on strikes and strike threats by physicians: the case of Chile. *Int J Health Serv* 1975; 1:1-9.
6. Danielson R: Cuban Medicine. New Brunswick: Transaction Press, 1980.
7. Pan American Health Organization: Health Conditions in the Americas 1977-1980. Scientific Pub. No. 427. Washington, DC: PAHO, 1982.
8. World Bank: Health: Sector Policy Paper. 1980.
9. US Agency for International Development: Health Sector Assessment for Nicaragua: Managua. Washington, DC: AID, 1976.
10. MINSA: Informe 1980. Managua, 1981.
11. MINSA: El Sistema Nacional Unico de Salud: Tres Años de Revolucion. Managua; 1982.
12. Instituto Nicaraguense de Seguridad Social y Bienesta, Un Año y Medio de Revolucion en el INSS; Managua, Diciembre de 1980.
13. INSS: Anuario Estadistico 1979; Managua, 1980.
14. INSS: Anuario Estadistico 1981; Managua, 1982.
15. INSS: Anuario Estadistico 1982; Managua, 1983.
16. Halperin D, Garfield R: Developments in health care in Nicaragua. *N Engl J Med* 1982; 307:388-392.
17. Garfield RM, Halperin DC: Health care in Nicaragua. *N Engl J Med* 1983; 309:193.
18. Holland B, Davis J, Gangloff -: Syncrisis: The Dynamics of Health, #9: Nicaragua. DHEW Pub. No. 74-50007. Washington, DC: Govt Printing Office, 1972.
19. Donahue JM: The politics of health care in Nicaragua before and after the revolution of 1979. *Hum Organiz* 1983; 42:262-274.
20. MINSA: Decreto por el Gobierno de Reconstruccion Nacional. Boletin Informativo, Managua 1979; 1:5-7.
21. Barricada: Medicos por Unidad Gremial. Managua Oct. 6, 1980; 5.
22. La Prensa: Proyecto Reguladora Preocupa a Medicos. Managua, Aug. 18, 1980; 5.
23. La Prensa: Sindicato Medico Buscando Unidad. Managua, April 19, 1981; 13.
24. La Prensa: Fundan una Nueva Clinica en Managua. Managua, June 10, 1982; 1.
25. El Nuevo Diario: Aprueban Escuela de Medicine para Managua. Managua, Oct. 30, 1980; 6.
26. MINSA: Plan de Salud 1982. Division de Planificacion. Managua 1982.
27. MINSA: Plan de Salud 1983, DIPLAN, Managua, 1983.
28. MINSA: Boletin Estadistico #3, Series Historicas, 1974-1978. Division de Planificacion, Managua, Junio de 1981.
29. MINSA: Actividades de Salud en el Primer Año de la Revolucion Sandinista, Boletin Estadistico #2, Oficina de Informacion y Estadistica, Managua, Noviembre 1980.
30. MINSA: Informe 1981, Managua, 1982.
31. Amador C: Informe de la Situacion de Salud de Nicaragua. MINSA, Managua, 1980.
32. Barricada: 768 Medicos Internacionalistas en Nicaragua. Managua, March 22, 1981; 1.
33. Instituto Nicaraguense de Seguridad Social y Bienestar: Cuatro años de Revolucion en el INSSBI; Managua, 1983; 5-47.
34. Ministerio de Hacienda y Credito Publico; Presupuesto General de Ingresos y Egresos de la Republica. Nicaragua, 1977.
35. El Nuevo Diario: Managua, Aug. 30, 1983; 20.
36. De Kayzer B, Ulate J: Education, Participacion en Salud e Ideologia; Nicaragua Pasado y Presente. Revista Centroamericana de Ciencias de la Salud 1980; 6:143-157.
37. Garfield RM, Vermund S: Changes in malaria incidence after a mass drug administration in Nicaragua. *Lancet* 1983; 2:500-503; Garfield RM, Vermund S: Malaria in Nicaragua: an update. *Lancet* 1984; 1:1125.
38. Barricada International: Managua, Dec. 19, 1983; 1.
39. Barricada: Se Inicia Jornada Cientifica de Salud. Managua, Sept. 24, 1982; 5.
40. MINSA: Repercusion de la Agresion en la Situacion de Salud del Pais. Nuevo Diario, August 13, 1983; 12-13.
41. Lezama MA: Agresion Prejudico Programas de Salud. Barricada, Managua, Dec. 29, 1983; 5.
42. Links: Central America Health Rights Network: Health Brigades to Nicaragua. New York, April 1984; Vol. 1, No. 2, p 5.

ACKNOWLEDGMENTS

The authors wish to gratefully acknowledge the assistance of the Ministry of Health in the collection of information, including Dr. Ivan Tercero, Vice-Minister of Health for Medical Attention, Dr. Carlos Lopez, and Enrique Morales, Director of the Division of Statistics and Information. We would also like to thank Dr. Sophia Perez and Dr. Sten Vermund for their assistance. Dr. Taboada, who worked in the Nicaraguan Ministry of Health from March 1980 until May 1981, is a graduate of the Nicaraguan National University Medical School and did internship, residency, and social service in that country. Mr. Garfield worked in the Nicaraguan Ministry of Health from April 1981 to December 1981 and from June to November of 1983. He is supported by a fellowship from the InterAmerican Foundation, with additional support from the Health Research Training Program of the New York City Department of Health.

¹Unpublished data from Area de Control y Erradicacion de la Malaria, MINSA, 1983.