Economic woes may harm health later

The economic recession of 1981 and 1982 is history, but its legacy of stress and financial hardship is likely to result in serious health problems among U.S. residents over the next decade, according to a report released last week by the congressional Joint Economic Committee.

"Three to five years after the height of unemployment, we will begin to witness an increase in illness and the number of deaths," says the study's author, M. Harvey Brenner of the Johns Hopkins School of Public Health in Baltimore. He predicts that heart attacks, cirrhosis of the liver, suicides and homicides will all claim more lives.

Using data extending from 1950 to 1980, the study shows that the mortality rate is at its highest several years after a recession. Brenner previously reported that long-term economic expansion is associated with improved health and longer life-spans, while spurts of economic growth and decline are linked to physical and mental pathology (SN: 3/18/78, p. 166).

Brenner's new study focuses on the recession of 1973 and 1974, since public health statistics are not yet available after 1980. On the basis of what happened during the 1970s, it is reasonable to assume that the latest recession will have an even greater impact, he says.

Brenner links the 14.3 percent rise in unemployment during the early 1970s to a 2.3 percent increase in deaths from all causes over the last part of the decade. According to the report, the recession also led to a 6 percent rise in arrests and mental hospital admissions, a 1.1 percent rise in reported assaults and a 1 percent increase in suicides.

Furthermore, a 3 percent decline in per capita income and jumps in business failures were associated with more deaths from heart disease, cirrhosis of the liver and suicide. Overall, says Brenner, the recession that began in 1973 contributed to an estimated 165,000 additional deaths over the rest of the decade from heart disease and stroke alone. Deaths from heart attacks peak at three years, and again at 10 years after recessions, according to the study.

The 1973-74 recession affected certain groups in different ways, explains Brenner. Poor young people, especially minorities, were more often killed by others or admitted to mental hospitals. The health of middle-income and old people was most harmed by business failures.

Increases in alcohol and cigarette consumption, fat consumption and the divorce rate aggravate recession-related health problems, as does the lack of medical insurance due to unemployment, says Brenner.

Although the study does not show that economic conditions directly cause physical and mental disorders, the data support the notion that "economic decisions, whether they lead to recession or growth, always have health implications," Brenner told SCIENCE NEWS.

The 1981-82 recession may account for at least 400,000 early deaths in the next decade, he adds, even though the economy has improved. An added risk factor is the structural change taking place in employment. "There has been a large-scale movement out of the industrial labor force," he says. "Many of these workers have had to make a transition to lower-paying, lower-status jobs in the service sector." —*B. Bower*

Pulsar with very hard gamma rays

There are not many gamma ray pulsars known. Pulsars, stars that emit regularly pulsed radiation, are usually grouped into two classes, the radio and the X-ray. Few pulse in both regions of the electromagnetic spectrum, and fewer still add visible light or gamma ray pulses. Now, according to a report in the June 21 NATURE, Hercules X-1, a well known X-ray pulsar, has become the first of that species to be recorded pulsing in very high energy gamma rays.

A group from the University of Durham in England observed Hercules X-1 on April 17, 1983, using four telescopes of the Dugway very high energy gamma ray facility at the Dugway Proving Ground in Utah. They recorded a three-minute outburst of gamma ray pulsations with a period of 1.24 seconds. The energy of the gamma rays is a trillion (10^{12}) electron-volts or greater; truly very hard radiation. In wave terms this translates to a wavelength less than about 10^{-16} centimeters, about the breadth of an atomic nucleus.

The period of 1.24 seconds is the same as that of the object's X-ray pulsations. Hercules X-1, like all but two or three X-ray pulsars is a binary star system with a complicated set of periodic motions. It has a binary orbital period of 1.7 days, and its X-ray pulses undergo an amplitude modulation over a period of 35 days, which is characterized by a sudden turn-on of X-ray pulses followed by a gradual decline in intensity over 11 days. The outburst of gamma ray pulses occurred 35 days before an observed X-ray turn-on, so the observers suggest that the mechanism producing the gamma rays may also be connected with X-ray turn-on, but they do not speculate as to what it is. Theorists will very likely do so soon. The only other X-ray binary pulsar known to emit gamma rays of this energy range is Cygnus X-3, but its gamma rays are not pulsed.

The Durham group included J. C. Dowthwaite, A. B. Harrison, I. W. Kirkman, H. J. Macrae, K. J. Orford, K. E. Turner and M. Walmsley. —*D. E. Thomsen*

Platinum enrichment in cosmic spheres

For millions of years, innumerable particles of extraterrestrial dust have showered the earth's surface after surviving fiery journeys through the atmosphere. Many of these "cosmic spheres," recovered from deep-sea sediments, turn out to contain microscopic nuggets of platinum and related metals. The first appearance in the geological record of nugget-containing spheres, an astronomer now suggests, may provide a marker indicating when the proportion of oxygen in the atmosphere was half its present level.

Originally discovered more than a century ago, these magnetic spheres, up to a millimeter in diameter, were thought to consist of a layer of iron oxide around an iron and nickel core. While studying extraterrestrial particles to learn more about comets, astronomer Donald E. Brownlee of the University of Washington in Seattle noticed that many of these iron spheres contained not an iron-nickel core but a single micrometer-sized nugget made up of a mixture of the platinum group elements — osmium, iridium, ruthenium and platinum.

The iron cosmic spheres probably started out as small chunks of material similar to carbonaceous chondrites, says Brownlee. These carbon-rich, stony particles melt when they enter the earth's atmosphere at high speed. The carbon chemically reduces any iron present to its metal state, and because the metal fraction is twice as dense as the remaining silicate material, the particle separates into a metal bead and a stony bead.

This molten iron bead, which also contains about 7 percent nickel and up to 10 parts per million of the platinum group elements, reacts with oxygen very rapidly. The iron oxidizes first, then nickel. Finally, all that's left unreacted is a small nugget of the platinum metals. "It's a really neat process," says Brownlee. "It concentrates all the platinum group elements by about a factor of 100,000 in a few seconds."

Because the process occurs only while the sphere is molten, a platinum nugget will form if the particle's initial entry speed is high enough and if the proportion of oxygen in the atmosphere is more than 10 percent. "Anytime in the earth's history when the oxygen abundance was less than half of what it is now, [an iron sphere] would not collide with enough oxygen to completely oxidize it, and you wouldn't find platinum nuggets," says Brownlee.

The problem is to find sphere-containing sediments that date back at least 400 million years. The samples used in the initial study, as reported in the June 21 NATURE, were from the surface of the ocean floor and were less than 100,000 years old. Brownlee says, "We're going to try to get some old spheres." —*I. Peterson*