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• *Editorial*

ADDRESSING THE THREAT OF OCCUPATIONAL REPRODUCTIVE TOXICITY IN RUSSIA

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Articles in recent issues of *Reproductive Toxicology* have demonstrated that toxic exposures can be transmitted paternally as well as maternally to cause teratogenic and other forms of adverse reproductive outcomes (1–4). Together with recent judicial rulings (5), these and similar reports are beginning to yield the scientifically defensible position that men as well as women should be provided appropriate protection from occupational hazards to minimize the potential for adverse reproductive outcomes.

It is in contrast to this position that in one of this issue's special articles, "Medical and Social Aspects of Work During Pregnancy," Nizyayeva (6) proposes a conceptual model for protecting the reproductive health of the Russian population. The foundation of the model centers around providing women of childbearing age, and especially pregnant working women, special consideration relating to protection from occupational hazards and availability of health care. What are the circumstances that may have led to the proposal of such preferential treatment for women?

Information is beginning to emerge describing the polluted environmental and hazardous occupational conditions in Russia (7,8). Ironically, these conditions have developed in the presence of stringent environmental contamination and occupational exposure limits (Table 1) derived from toxicologic research within the the former Soviet Union (9). The Research Institute of Occupational Health and Diseases within the USSR Academy of Medical Sciences[1] was established in 1923, soon after the Bolshevik Revolution. While the research from this and other institutes in the former Soviet Union still does not enjoy wide distribution, readers are encouraged to search the literature within their own fields to discover the issues that were pioneered by Soviet scientists (10).

Despite exposure limits typically more stringent than those in the USA[2], regulations were often not enforced, since industrial and military growth were promoted without always having the technologic or economic means of dealing with the associated hazards (8). While the shortcomings of these past policies are recognized by the current government, enforcement of regulations is still lacking (11).

What is the situation of the working woman in Russia? In 1918, the USSR became the first country in the world to constitutionally guarantee equal rights for men and women (12,13). For the next 70 years, work in the Soviet Union was viewed as a civic duty as well as a right (14). Exacerbated by massive deaths of Russian men (perhaps 30 million) during the World War I, the Russian Civil War, World War II, and political purges[3], women fre-

The purpose of this article is to provide a perspective of the Russian situation. The views expressed are those of the author and do not necessarily represent the views of NIOSH.

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[1]Currently known as the Scientific Research Institute for Occupational Medicine, Russian Academy of Medical Sciences, this institute was renamed after the dissolution of the USSR.

[2]In 1987, 75% of the USSR maximum allowable concentrations were more stringent than those for the USA. These stringent limits are attributed to use by Russian toxicologists of sensitive behavioral and neurophysiologic toxicity tests including EEG-conditioned reflex, EEG-photic driving, olfactory sensation, and eye-light sensitivity. Russian limits in occupational areas preclude exposures that would "cause any diseases or deviations from a normal state of health detectable . . . during the work itself or . . . in this and subsequent generations" (9).

[3]In the USSR, there were 20.7 million more women than men in 1959—8.5 million more women than men up to the age of 42 inclusive (15).

Table 1. Occupational exposure limits (OELs) for air contaminants in Russia and the USA (mg/m^3)

Substance	Russia	USA
Acetaldehyde	5	360
Acetone	200	2400
Benzyl chloride	0.5	5
1,3-Butadiene	100	2200
Cadmium[a]	0.05	0.2
Carbon monoxide	20	55
Chlorine	1	3
Cyclohexane	10	1050
Dimethyl sulfate	0.1	5
Hydrogen bromide	2	10
Lead[b]	0.007	0.05
Ozone	0.1	0.2
Uranium[c]	0.015	0.05
Xylene	50	430

Values are 8-hour time-weighted averages (9). Russia limits were approved by the USSR Ministry of Health in 1983; the USA values are the 1985 OSHA limits. While these OELs are not necessarily the most current, they serve as contemporaneous values to demonstrate the stringent Russian limits. For current occupational exposure limits in the USA, refer to the Code of Federal Regulations, Parts 29 and 30.
[a]dust and salts.
[b]inorganic, dust and fumes.
[c]soluble compounds.

quently were propelled into occupations traditionally reserved for men in other cultures. Consequently, more than 90% of able-bodied Soviet women were either actively employed or engaged in full-time study (14).

While women still compose 51% of the Russian work force, the current motivation for them to work is principally economic necessity[4] (16). Employment has become competitive, and women are deemed unreliable because they may become pregnant; employment announcements frequently specify "men only" (17). As a result, women are forced to accept work that may be hazardous to their health (6,16). Present laws that protect workers against discriminatory dismissals are currently inadequately enforced. Administering these laws is especially difficult given the current flux of jobs and because privatization has yielded new owners who may not assume responsibility for past female employees. Consequently, out of fear that they will lose their jobs, sick women do not seek medical attention, which requires certificates from their employer, and pregnant women do not apply for alternative work (16).

The largest segment of the Russian work force consists of women of reproductive age (16). In 1990, at least 3 million Soviet women who were employed in industry and services worked in conditions that did not meet occupational safety standards (8). Adverse effects on the reproductive health of female workers and the well-being of children have been reported for occupational hazards in Russia (7). Industries described include rubber, textile, and electronics industries; coke, petroleum, and copper refineries; other industries of chemical production; and agriculture. In 1990, women represented 20% of the heavy manual labor force, 25% of the construction workers, 34% of road-building crews, 20% of railroad workers who laid and repaired tracks, 13% of the ditch diggers, and 12% of the bricklayers (who may haul 40 tons of bricks per shift) (8).

Thus occupational hazards for pregnant Russian women include "forced work postures, thrusted work objects, and vibration" of intensity not often experienced by women in the USA (6,16). However, the experience gained by evaluating the reproductive health effects of these types of jobs on the female Russian workers may become relevant to American women as they continue moving into more physically demanding jobs.

Feshbach and Friendly (8) and Sivochalova (16) have described how the hazardous environmental and occupational exposures, inadequate diets, and poor health care have compromised the health status of the Russian people. As a result, 65 to 70% of pregnant Russian women are diagnosed with general illness; 92% of the women in the region of Chernobyl were found to suffer from gynecologic disorders after the nuclear power plant accident. As many as 80% of women working in machine-building plants and greenhouses suffer complications of pregnancy (16).

The national birth rate in Russia has now decreased below the national death rate (16). The reasons for this trend are complex. For instance, the voluntary reduction in birth rates experienced by many countries is being exaggerated in Russia by the current economic crisis (11), despite expensive and sparse contraception[5]. However, this trend also reflects a 36% increase in birth anomalies

[4]As of September 1993, the exchange rate for 1 USA dollar was about 1,000 rubles; 1 month's salary was about 16,000 rubles for a professor, 15 to 30,000 rubles for a physician, and 30 to 40,000 rubles for a factory worker; groceries cost 75 rubles for 1 kg of bread, 130 rubles for 1 L of milk, 1,300 rubles for 1 kg of meat, and 1,600 rubles for 2 L of cola; gasoline cost 120 to 250 rubles/L, although purchasing an automobile was virtually impossible; electricity cost 4 rubles/kilowatt hour compared to 5 cents/kilowatt hour in the USA; clothes in Russia cost more, even in absolute terms, than in the USA.

[5]Induced abortion and the intrauterine device are the principal means of reproductive contraception; condoms are sparse and of unreliable quality; use of the birth control pill increased from 1.3% of sexually active women in 1989 to 3.1% in 1992 (11).

(1987–1991), a 29% increase of spontaneous abortions (1989–1992), and a high rate of infertility (11). While the causes for these increasing rates of reproductive failure are frequently unknown, the collective stress from illness, pregnancy, and occupational exposures can compromise the well-being of the mother and the fetus; the stresses of work and pregnancy are capable of igniting subclinical illnesses in women (18). Consequently, lack of relatively modest expenditures to improve industrial conditions and health care are resulting in immense expenditures to combat human disease (6,16).

The perspective that emerges is a workplace environment that is hazardous to fecundity and reproductive outcome (6–8,11,16), a work force heavily reliant on women of childbearing age, a health care system that has permitted the population to become vulnerable to other environmental stressors, and an economy that cannot afford to find alternative work for every worker whose health may be affected by occupational exposures or to close or immediately clean up hazardous work sites.

By her proposal (6), Nizyayeva does not discount the threat that workplace exposures may be expressed as male-mediated adverse reproductive outcomes or as reduced reproductive potential in men or women. These topics are addressed briefly. Instead, the author recognizes the reality within her country and has attempted to address the priority threat.

Enactment of Nizyayeva's proposal without enforcement of worker protection laws, however, could yield unintended repercussions. Her proposal to protect the fetus could lead employers to further exclude women from the workplace, as did the fetal protection policies of some USA companies prior to the March 1991 Supreme Court ruling on UAW et al. versus Johnson Controls, Inc (5). Furthermore, Nizyayeva's proposal must be recognized as only an interim step toward protecting the Russian population against reproductive hazards in the workplace; it is not a substitute for providing generally safe and healthful workplaces for all workers.

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