Environmental Toxicants and Children's Health in Turkey

Ali Esat Karakaya*, Bayram Yilmaz**

**Gazi University, ,Faculty of Pharmacy, Department of Toxicology, Ankara-Turkey. ** Firat University, Medical School, Department of Physology, Elazig-Turkey.*

Turkey has an area of 779,452 square kilometers and its population reached 68.1 million in 2003. Thirty five percent of Turkey's population is under the age of eighteen and nine percent are under five. While life expectancy at birth is 70.4 years (1), under-five mortality rate was 41 per 1000 live births in 2002 (2). According to the World Bank, Turkey ranks as the world's 17th most industrialized nation. However, in terms of GNI per capita, with $ 6690 (PPP), Turkey ranked the 94th out of 208 countries in 2003. In terms of health and standard of living, the UNDP Human Development Index (HDI) is a much more informative indicator than the standard economic indicators. It measures average achievements in three basic aspects of human development: longevity, education and a decent standard of living. Among 177 countries, Turkey ranked the 88th in this HDI in 2002 (2). Three-fifths of the population of Turkey lives in urban centers while the rest live in relatively impoverished rural areas. Average annual urbanization growth rate was 4.8% between 1980 and 1995. Industrial cities have been the most attractive destinations for the rural migrants. Industrialization and urbanization yield important social benefits, improving access to public services such as education, health care and cultural facilities. But they also cause adverse environmental effects that require policy responses.

Rapid industrialization, high rate of urbanization as well as failure to take sufficient measures in terms of environmental protection due to economic and financial difficulties cause environmental problems in Turkey. Exposure to environmental toxicants may have significant implications for health. Recent studies indicate that gene-environment interactions are important are many diseases. Children are uniquely vulnerable to environmental toxicants. Risk assessment and management is a rational approach for the protection of human health against disease and injury caused by toxic chemicals in the environment. However, it is impossible to carry out realistic risk assessment studies in a country where reliable exposure data to environmental toxicants is unavailable. In Turkey, only several major urban air pollutants --sulfur dioxide ($S0_2$) nitrogen monoxide (NO), nitrogen dioxide (NO_2) and suspended particulate matter (PM_{10})-- are routinely monitored in some cities (3).

In terms of biomonitoring of environmental toxicants in children, data is available for only a few contaminants, in particular for lead. However, generally this data has been generated in episodic and sporadic rather than routine large-scale biomonitoring studies. Like all other countries, human exposure to lead can be attributed to four types of sources in Turkey: leaded gasoline, industrial emissions, waste disposal and processing of lead-containing substances, and use of lead-containing products. It is well documented that even low levels of lead exposure retards the mental and physical development of children. Leaded gasoline is the most important source of lead emissions in Turkey.

Turkey steadily reduced lead in gasoline between 1988 and 2002. The lead content in high octane leaded gasoline that contained 0.84 g/L in the pre-1988 period was reduced to 0.40g/L in 1988 and 0.1 g/L in 2002. However, in spite of these

reductions, total lead emission has increased considerably until 2002 because of substantial increases in the number of vehicles. For instance, lead emissions from vehicles more than doubled between 1990 and 1996, from 484 to 1,032 tons (4). During the last three years Turkey has been quite successful in phasing out leaded-gasoline usage: The market share of leaded gasoline has decreased precipitously and the use of unleaded gasoline (with low lead-content of 0.005 g/lt) has been rising steeply. But, because of its cumulative nature still lead is an important environmental health concern for children in Turkey.

In brief, other than episodic cases, the most important source of lead exposure in children in Turkey is leaded gasoline. This is also demonstrated by our research (5) that children from low-traffic-density suburban areas have mean deciduous teeth lead levels of about 1.69$\pm$ 0.25 μg/g, whereas children from high-traffic-density urban areas have much higher teeth lead levels (4.99$\pm$0.46 μg/g).

As mentioned above, exposure assessment data of environmental toxicants is very limited in Turkey. In order to assess health risk of environmental chemicals on children, large scale biomonitoring programs should be carried out using reliable biomarkers for selected toxicants, especially for lead, cadmium, arsenic and some genotoxic organic chemicals.

References:

1.UNICEF : Monitoring of the Situation of Children and Women
http://www.childinfo.org/index2.htm
2. United Nations Development Program: Human Development Report 2004.
http://hdr.undp.org/statistics/
3. Turkey State Institute of Statistics : Air Pollution Statistics
http://www.die.gov.tr/english/SONIST/CEVRE/e24012005.html
4. UN/ECE Task Force to Phase Out Leaded Petrol in Europe. Country Assessment Report.
Arhus, Denmark (1998).
5. Karakaya A. Ilko M., Ulusu T., Akal N., Isimer A., Karakaya A.E.: Lead Levels in Deciduous teeth of children from Urban and Suburban Regions in Ankara (Turkey).
Bull Environ Contam Toxicol. 56 :16-20 (1996).

*alikarakaya@tr.net