

TRAINING FOR THE HEALTH SECTOR

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OCCUPATIONAL RISKS AND CHILDREN'S HEALTH

**Children's Health and the Environment
Global Occupational Health Programme
WHO Training Package for the Health Sector
World Health Organization
www.who.int/ceh**

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<<NOTE TO USER: Please add details of the date, time, place and sponsorship of the meeting for which you are using this presentation in the space indicated.>>

<<NOTE TO USER: This is a large set of slides from which the presenter should select the most relevant ones to use in a specific presentation. These slides cover many facets of the problem. Present only those slides that apply most directly to the local situation in the region. It is very useful if you present regional/local examples of child labour and solutions and discuss local actions.>>

LEARNING OBJECTIVES

After this presentation, trainees will be able:

- ❖ To understand how occupational risks can affect children's health
- ❖ To develop preventive strategies for managing occupational risks that can potentially affect children's health
- ❖ To provide advice to current and future parents about how to avoid and deal with occupational risks that can affect their children

After this presentation, you will be able to:

- Explain how children's health can be harmed as a result of workplace exposures.
- Suggest several aspects of protecting children from occupational risks, namely:
 - parents' reproductive health
 - prenatal health
 - children's health
- Give advice to future and current parents on how to avoid work-related reproductive hazards and how protect their children from health risks arising from the workplace.
- Special emphasis will be put on the particular situation of child labour – as it requires different interventions.

EXPOSURE TO OCCUPATIONAL RISKS DURING THE PHASES OF CHILDREN'S DEVELOPMENT

- ❖ **Before birth** (before conception and during pregnancy) – parental exposures to mutagens and teratogens, neurotoxicants, psychological and mechanical risks
- ❖ **Infancy** – take-home exposure, home work
- ❖ **Childhood** – take-home exposure, home work, child labour
- ❖ **Adolescence** – home work, vocational training, apprenticeship, work

Most children do not work, however health risks from the workplace can affect their health and development in a number of ways.

Exposure of children to occupational risks can occur at any stage of their life: during reproductive age before conception; during early life before birth through parental exposure; in the situation of child labour (4 to 14 years old); or even when adolescents are early incorporated to the work force and exposed to the worse forms of child work (14 to 18 years old) .

The exposure of future mothers and fathers to certain risks at the workplace can have a serious impact on the health of their unborn child. Occupational exposures before birth can occur before conception and during the whole period of pregnancy.

During the period of infancy, children can be also exposed to different hazards related to work. Parents could bring toxic hazards home through contaminated working clothes or shoes (the so-called "take-home exposures"), or they may expose their children to environmental hazards when they work at home. Activities such as work on home-made handcrafts or car mechanicals or those performed by the family in the rural areas (growing vegetables or taking care of animals) are usually undertaken with the participation of the whole family.

The most direct form of occupational exposure for children is child labour. Child labour which can damage health is prohibited by a special ILO international convention (see upcoming slides on child labour).

In many countries, adolescents from 14 years of age and on can be formally incorporated to the work force. They can still be exposed to risks at the workplace which can harm their health and development with life-long consequences, if they are not trained adequately or if they are working under the worse forms of child labour conditions.

Adolescents start learning working skills and preparing for their future working life at technical schools, universities and during apprenticeships. The educational institutions and trainers have the responsibility to be informed about the special hazards that threaten the health of young girls and boys and educate them to assure their healthy development and their becoming healthy and productive adults. Therefore it is important that together with the work skills that the adolescents are taught, they also learn about safety measures to adequately protect themselves from occupational risks.

There are strict limitations on the work adolescents are allowed to perform: the weight they can hold; the working hours and resting time they are entitled to; have to be respected and are different from those of adults. Adolescents should not be exposed to situations where attention has to be held for a long time; they can not drive heavy machines (e.g. tractors); nor be in contact with big animals (e.g. horses, cows). There is "tolerance zero" for adolescents to work in contact with dangerous chemicals.

We will now explore how occupational risks can affect the health of children during the different stages of their life.

GENDER AND EXPOSURE TO OCCUPATIONAL RISKS

- ❖ **Girls** may start to be active in family tasks since very early in life and may undertake activities that demand the physiological and physical skills of an adult
- ❖ In rural areas, young girls and adolescents have a double role:
 - They often help with the home activities (e.g. cleaning, cooking, washing, caring for smaller children and others)
 - They may also work in the family farm, growing vegetables and raising small animals
- ❖ During reproductive age, women may be exposed to hazards that can affect the outcomes of pregnancy and the health of their offspring

<<READ SLIDE>>

GENDER AND EXPOSURE TO OCCUPATIONAL RISKS

- ❖ **Boys** may be exposed to occupational risks since early in life, while helping the father during the weekends or while working as apprentices
- ❖ Boys may be involved in hazardous work, such as repairing cars, recycling batteries, applying pesticides or scavenging
- ❖ Young men may
 - ❖ be exposed to toxic chemicals that can affect the quality of their sperm
 - ❖ bring home workplace toxicants and expose their family members (e.g. pregnant wife, small children)

<<READ SLIDE>>

OCCUPATIONAL EXPOSURE BEFORE CONCEPTION

Future fathers

Decreased sperm count

estrogens, heat stress, lead, ionizing radiation, carbon disulfide, dibromochloropropane, pesticides

Decreased sexual drive

chloroprene, stress

Changes in genetic material (birth defects)

mutagens – carbon dioxide, ethylene dichloride, vinyl chloride, ionizing radiation, pesticides

Future mothers

Menstrual disorders

ionizing radiation, shift work, pesticides

Reduced fertility or sterility

arsenic, benzene, carbon disulfide, carbon monoxide, epichlorohydrin, ethylene dibromide, lead, manganese, mercury, phosphorus, trichloroethylene, vinyl chloride, pesticides

Changes in genetic material (birth defects, miscarriages)

antimony, arsenic, cadmium, carbon disulfide, carbon dioxide, chlorinated hydrocarbons, ethylene compounds, lead, mercury, methyl-ethyl ketone, nitrous oxides, trichloroethylene, vinyl chloride, pesticides

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Future parents can be exposed at their workplaces to many occupational health risks that can affect their ability to have children or the health of their future children.

Both men and women can be affected by reproductive occupational health risks.

-Exposures to some chemicals or to stressful conditions can cause both male and female workers to experience a decrease in their desire or ability to have sex. For example, chemicals which have depressant effects, such as certain solvents, may suppress the libido (sex drive).

-Occupational exposures can also cause menstrual problems, which may prevent ovulation from taking place. Stress, working on shifts, or exposure to certain organic solvents can disrupt the normal menstrual cycle, which in turn can affect fertility.

-Another possible effect of exposure to certain occupational hazards is their ability to cause direct damage to the germ cells (sperm and eggs). Radiation and certain chemicals can cause decreased fertility or even sterility. Occupational risks can reduce the number of sperm to a level below the minimal necessary for fertilization.

-Certain occupational hazards can cause mutations in genetic material that can be passed on to future generations. Such hazards are called mutagens. Genetic mutations can result in birth defects, stillbirth or miscarriage, depending on the type of damage caused.

References:

- Male and Female Reproductive Hazards in the Workplace. *ILO (International Labour Organization)*. Available at actrav.itcilo.org/actrav-english/telearn/osh/rep/prod.htm
- Reproductive and Developmental Hazards: A Guide for Occupational Health Professionals. *US Navy Environmental Health Centre*, 2001, available at www-nehc.med.navy.mil/Downloads/Occmed/Reprodev2006.pdf

A significantly elevated risk of childhood leukaemia and non-Hodgkin's lymphoma was found among children of men and women who were occupationally exposed to ionizing radiation before conception.

References:

- Gardner MJ et al. Results of case-control study of leukemia and lymphoma among young people near Sellafield nuclear plant in West Cumbria. *BMJ*, 1990;300:423–9.
- Gardner MJ. Paternal occupations of children with leukaemia. *BMJ*, 1992;305:715.
- Perez-Saldivar ML et al. Father's occupational exposure to carcinogenic agents and childhood acute leukemia: a new method to assess exposure (a case-control study). *BMC Cancer*, 2008, 14;8:7.

EXAMPLE

Pesticide exposure before or during pregnancy associated with increased risk of:

- ❖ Infertility
- ❖ Genotoxicity
- ❖ Perinatal death
- ❖ Spontaneous abortion
- ❖ Premature birth
- ❖ Fetal growth retardation
- ❖ Low birth weight
- ❖ Congenital malformations
- ❖ Early childhood cancer



WHO

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Exposure of either **mother** or **father** to pesticides before conception, or exposure of the mother during pregnancy, has been associated with an increased risk of fetal death, spontaneous abortion and early childhood cancer.

There is increasing evidence that *in utero* exposure increases the risk of growth retardation: a small-for-gestational age baby, low birth weight, reduced length and small head circumference (see photo).

Significant increases in the risk of congenital anomalies have also been reported. These include: eye defects, limb reduction, urogenital defects, hypospadias, cryptorchidism, orofacial clefts, central nervous system defects and heart defects.

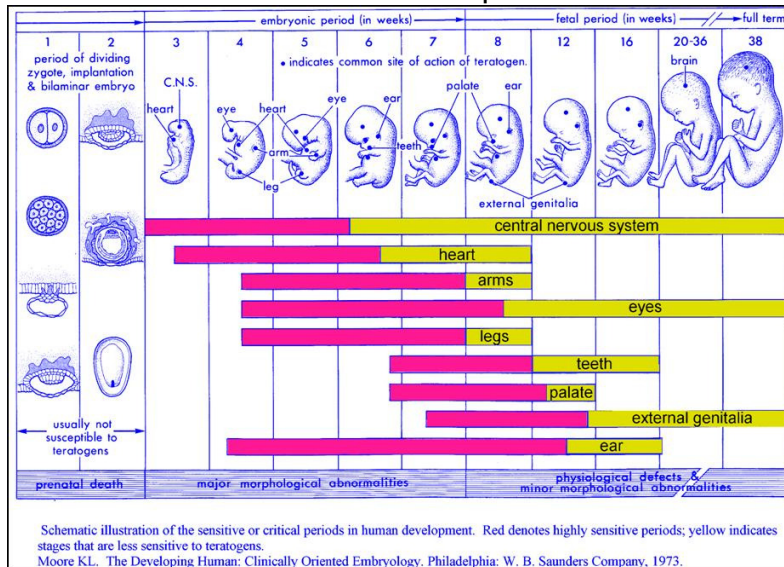
References:

- Bell. A case-control study of pesticides and fetal death due to congenital anomalies. *Epidemiology*, 2001, 12:148.
- Berkowitz. In utero pesticide exposure, maternal paraoxonase activity, and head circumference. *Environ Health Perspect*, 2004, 112:388.
- Garcia. Parental agricultural work and selected congenital malformations. *Am J Epidemiol* 1999, 149:64.
- Heeren. Agricultural chemical exposures and birth defects in the Eastern Cape Province, South Africa. A case - control study. *Environ Health*, 2003, 2:11.
- Kristensen. Gestational age, birth weight, perinatal death among births to Norwegian farmers, 1967-1991. *Am J Epidemiol*, 1997, 146:329.
- Nurminen. Maternal pesticide exposure and pregnancy outcome. *J Occup Environ Med*, 1995, 37:935.
- Perera. Effects of transplacental exposure to environmental pollutants on birth outcomes in a multiethnic population. *Environ Health Perspect*, 2003, 11:201.
- Rojas. Malformaciones Congenitas y exposicion a pesticidas. *Rev Med Chilena*, 2000, 128:399.
- Schreinemachers. Birth malformations and other adverse perinatal outcomes in four U.S. Wheat-producing states. *Environ Health Perspect*, 2003, 111 :1259.
- Weidner. Cryptorchidism and hypospadias in sons of gardeners and farmers. *Environ Health Perspect*, 1998, 106:793.
- Whyatt. Prenatal insecticide exposures birth weight and length among an urban minority cohort. *Environ Health Perspect*, 2004, 112:1125.

Occupational risks and children's health

DYNAMIC DEVELOPMENTAL PHYSIOLOGY

Windows of Development



Moore, Elsevier Inc, 1973

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Because important systems are still differentiating and growing, children have unique susceptibilities compared to adults — and critical time windows in those susceptibilities.

- Preconception
- Gestation
 - DES (diethylstilbestrol)
 - ionizing radiation
 - methylmercury, lead
- Postnatal
 - secondhand tobacco smoke
 - lead

There has been an explosion of knowledge about development in the past decade or so, and it is hard to remember that it was only about 50 years ago that the discovery was made that the fetus is vulnerable to exposures.

Now we know that other exposures during gestation can harm systems, and some are listed here. We also know that preconception exposure of either parent can cause harm to children, as well as postnatal exposures.

<<NOTES TO USER: It is important to point out the different responses to events shown on the bottom bar of the figure. Significant event during the embryonic phase will result in pregnancy loss (first 2 weeks) or major organ malformation. During the fetal stage, damage is more subtle and related to system dysfunction.>>

Picture:

•Moore. *The developing human*. Elsevier Inc., 1973. Used with copyright permission (2004) from Elsevier.

Occupational risks and children's health

OCCUPATIONAL EXPOSURE DURING PREGNANCY

Occupational hazards

Chemical risks

cancer drugs, ethylene-glycol ethers, CO, pesticides, solvents, carbon disulfide, lead, mercury

Physical agents

radiation (X-rays and gamma rays), noise

Biological agents

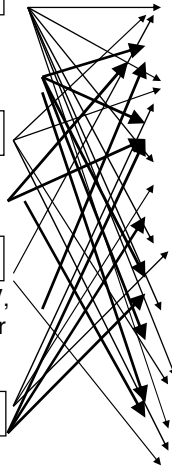
cytomegalovirus, hepatitis B virus, HIV, rubella, toxoplasmosis, varicella-zoster virus

Strenuous physical labour

prolonged standing, heavy lifting, twisting movements of the torso

Health effects

- Birth defects
- Low birth weight and premature birth
- Complications of pregnancy
- Miscarriage
- Developmental disorders
- Childhood cancer
- Genotoxicity



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Once fertilization has taken place, some harmful substances from the working environment can pass through the mother to the developing embryo or foetus. The foetus is at greatest risk during the first 14 to 60 days of the pregnancy when the major organs are being formed. However, depending on the type and amount of exposure, a foetus can be damaged at any time during pregnancy. For example, exposure to a particular hazard at one time in a pregnancy may result in organ damage and at another time in the pregnancy could cause death of the foetus and miscarriage.

Occupational hazards that prevent the normal development of a foetus are called teratogens. Teratogenic substances can pass from the blood of the mother to the blood of the foetus, across the placenta.

There are a number of chemicals, biological agents (such as bacteria and viruses), and physical agents (such as radiation) used in a variety of workplaces that are known to cause birth defects. Birth defects can include a wide range of physical abnormalities, such as bone or organ deformities, or behavioural and learning problems, such as a mental retardation. Exposures to some chemicals during pregnancy can lead to the development of cancer later in the life of the child. Such chemicals are called transgenerational carcinogens.

Exposure to occupational hazards during the second and the third trimester of a pregnancy can lead to slow foetal growth and result in low birth weight. Low birth weight is a serious risk factor for the health of the child and is one of the leading causes of under-five mortality rate in industrialized countries.

Work-related factors that cause stress, such as repetitive work, lack of breaks and constant demands on pregnant workers can be directly related to premature birth.

<<NOTES TO USER: please, note that there are individual modules on many of these agents.>>

References:

- Drozdowsky. Workplace hazards to reproduction and development: a resource for workers, employers, health care providers, and health & safety personnel. *Washington State Department of Labour and Industries*. Olympia, 1999.
- NIOSH. The effects of workplace hazards on female reproductive health. *DHHS* (NIOSH Publication No. 99-104). Cincinnati, 1999.
- Restrepo. Prevalence of adverse reproductive outcomes in a population occupationally exposed to pesticides in Colombia. *Scand J Work Environ Health*, 1990, 16(4):232.

ABSTRACT: A prevalence survey of adverse reproductive outcomes was carried out in a population of 8867 persons (2951 men and 5916 women) who had been working in the floriculture industry in the Bogota area of Colombia for at least six months. These workers were exposed to 127 different types of pesticides. The prevalence rates for abortion, prematurity, stillbirths, and malformations were estimated for pregnancies occurring among the female workers and the wives of the male workers before and after they started working in floriculture, and these rates were related to various degrees of exposure. A moderate increase in the prevalence of abortion, prematurity, and congenital malformations was detected for pregnancies occurring after the start of work in floriculture.

Recent studies have supported an increased risk of childhood cancer especially for all lymphomas, in offspring of parents working as pesticide applicators, particularly if chemically-resistant gloves were not used. A national case-controlled study in Australia showed an excess of cases of mothers whose offspring developed Ewing's sarcoma if the mother worked on a farm at conception or during pregnancy, and the risk doubled if she handled pesticides.

References:

- Flower KB et al. Cancer risk and parental pesticide application in children of agricultural health study participants. *Environ Health Perspect*, 2004, 112(5):631-5.
- Julvez J et al. Neurodevelopmental toxicity risks due to occupational exposure to industrial chemicals during pregnancy. *Ind Health*, 2009, 47(5):459-68.
- Shim YK et al. Parental exposure to pesticides and childhood brain cancer: U.S. Atlantic coast childhood brain cancer study. *Environ Health Perspect*. 2009,117(6):1002-6. Epub 2009 Feb 13.
- Valery PC et al. Farm exposures, parental occupation, and risk of Ewing's sarcoma in Australia: a national case-control study. *Cancer Causes Control*, 2002, 13:263-70.

THE ROLE OF HEALTH CARE PROVIDERS

- ❖ Answering workers' questions
 - Identifying hazards
 - Estimating patients' exposure
 - Getting professional help, *e.g.* from occupational health experts
- ❖ Planning the pregnancy
 - Potential reproductive hazards
 - Planned conception
 - Preventing exposure
- ❖ Evaluating risks for mothers and fathers
 - High concern
 - Moderate concern
 - Low concern
 - No concern
- ❖ Make recommendations to employer and workers

•Health care providers are frequently asked whether certain workplace risks pose a threat to the ability of men and women to have a healthy child. While the assessment of workplace risks is the primary responsibility of the employer, health care providers are responsible for advising patients and answering their health-related questions.

When faced with concerns about the health effects of the workplace, the health care provider can consult an expert in occupational health. Such experts usually work in the occupational health services of the industries, or in the district public health centres.

Health care providers can also consult some of the manuals on occupational health developed for primary health care workers. For example the WHO Regional Office for the Eastern Mediterranean has developed a manual to assist health providers in the primary health care settings in addressing the occupational health concerns of their patients and helping them to solve their problems.

•Planning pregnancy is often associated with considering many aspects, for example finances, age of other children, living arrangements etc. It is very important to also consider work issues when planning to have a child because exposure to harmful substances is often preventable. For example, men who want to be fathers should find out whether they are exposed to certain substances at their workplace that may affect their ability to have children or the health of their future child. Because sperm cells renovate every three months, it is usually enough to discontinue the exposure to reproductive hazards several months before the planned conception. However, this is not the case for future mothers. Women are born with the whole number of eggs which they will produce throughout their life and the damage to these eggs may be irreversible. However, most hazardous exposures before conception and during pregnancy can be avoided.

•In evaluating patient risks it is important for the health care provider to consider both work-related and non work-related risks, for example age, lifestyle factors, and personal or family history of adverse outcomes.

It is important to ask questions to evaluate historical and current occupational exposures. The health care provider can determine if there are any specific medical conditions or complications of pregnancy that might make a working pregnant mother unusually susceptible to any occupational health hazard. For instance, a patient with placenta previa or with threatened abortion should be advised to avoid lifting weights and prolonged standing. Also, a foetus that is already smaller for its gestational age would be at greater risk of further compromise by maternal exposure to developmental hazards.

Situations of high concern include overexposure or substantial exposure to a known or probable human reproductive toxicant (for which there is human evidence).

A moderate concern situation would be an on-going, frequent exposure to a probable or possible human reproductive toxicant (for which there is animal evidence).

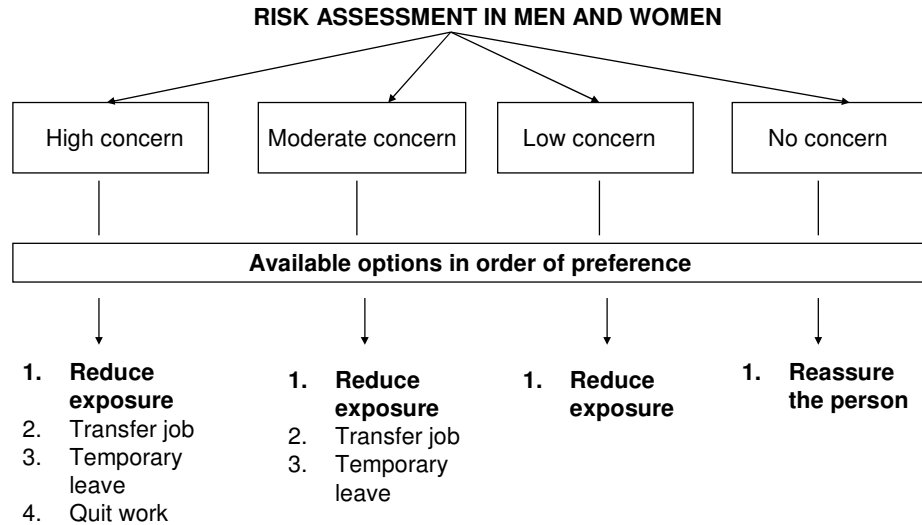
Situations of low concern are usually infrequent, transient, low-level exposures to a possible reproductive toxicant.

Finally, situations with extremely low exposures to a substance unlikely to be harmful to human reproductions are of no concern.

Reference:

•Drozdowsky. Workplace hazards to reproduction and development: a resource for workers, employers, health care providers, and health & safety personnel. *Washington State Department of Labor and Industries, Olympia, 1999.*

DETERMINING INTERVENTIONS



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Workplace practices may need to be modified or eliminated to control reproductive or development risk. Based on the results of the risk assessment the health care provider can advise the patient on the level of risk. Several options are available to protect workers who are considered to be at risk. In order of preference these are:

- 1) Reducing the level of exposure
- 2) Temporary transfer to a job assignment with reduced exposure to hazardous agents
- 3) Compensated and uncompensated leave
- 4) Quitting work

Reducing the level of exposure is always the preferred alternative to any situation. This approach does not single out reproductive hazards that may affect an individual worker or one sex more than the other and thus avoids discrimination. Moreover, the European Union's law on health and safety at work stipulates that risk shall be avoided and that work shall be adapted to the individual.

Exposure to hazardous substances can be reduced through their replacement with less hazardous or non-hazardous substances, through ventilation, using safe work practices and finally through use of personal protective equipment. However, the use of personal protective equipment should be advised only as a last measure to control exposure. Moreover, such equipment, for example gas masks, may not be appropriate for pregnant women who have short breath. Measures to reduce exposure are usually developed by specialized occupational health services and/or by safety engineers in the enterprises. However, the health care provider should notify the employer and the respective occupational health service that the individual worker is being considered at high risk of reproductive health effects.

Temporary transfer or compensated and uncompensated leave depend on the legal practice in each country. In many industrialized countries these options are available upon advice from healthcare providers.

Finally, whether a worker decides to quit work is a personal option. It is important that a worker be aware of the other options available and of the consequences of his or her decision.

References:

- Drozdowsky. Workplace hazards to reproduction and development: a resource for workers, employers, health care providers, and health & safety personnel. *Washington State Department of Labor and Industries*. Olympia, 1999
- Gender equality, work and health: A review of the evidence. Messing. *WHO*. Geneva, 2005 (www.who.int/gender/documents/Genderworkhealth.pdf)

OCCUPATIONAL EXPOSURE DURING INFANCY

- ❖ Exposure through breast-milk
Polychlorinated biphenyls (PCBs), polybrominated biphenyls (PBBs), DDT, organic solvents, lindane, methylene chloride, phthalates, perchloroethylene, mercury and lead
- ❖ Take-home exposure
Industrial chemicals, pesticides, fibres, metal dust or biological agents brought home from a worksite by a parent (lead, cadmium, mercury, fiberglass, asbestos, bacteria)
- ❖ In-home exposure (hazards associated with work conducted by parents in a home setting)
Kitchen-table assembly of radar detectors (lead), backyard work on car batteries (lead, cadmium), home manufacture of methamphetamines (volatile solvents, corrosive materials) and accidental poisoning from chemicals stored at home (pesticides)

The most common work-related exposure during the first five years of the child would be indirect exposure to occupational health hazards due to the job performed by the father and mother and by the fact that he/she is growing up in a workplace (e.g. cottage industries) or is being taken to the fields.

For the child that is being breastfed, some toxic chemicals concentrate in fat tissue once they are absorbed into the body. Since breast milk is rich in fats, a breast feeding infant can be exposed to these toxic chemicals. However, because breastfeeding has many benefits, a woman who is exposed to reproductive hazards at work should consult with her healthcare provider before deciding whether to stop breastfeeding. It is rarely necessary to stop.

Children and/ or other family members can be exposed to workplace chemicals if they are brought home on skin or working clothes. If laundry facilities are not provided at the enterprise, workers may bring their working clothes to wash at home. Such clothes can be contaminated with chemicals from the workplace and when washed together with the children's clothes can expose children in the family to industrial and agrochemicals. Examples of such take-home exposures are lead, cadmium, mercury, fiberglass, asbestos, pesticides, bacteria, and others.

Parents who work at home can create many risks for their children. For example, kitchen-table assembly of radar detectors is associated with dipping wires in lead. Backyard work on cars and recycling of batteries can expose children in the family to a risk of lead poisoning. Clandestine home manufacture of methamphetamine, an illicit drug, can expose children to carcinogens, neurotoxins, solvents and corrosive materials. Therefore it is very important to have a medical evaluation of children who are being removed from such homes and placed in foster care.

References:

- American Academy of Pediatrics Committee on Environmental Health. Workplaces. In: Etzel, RA. ed. *Pediatric Environmental Health*. 2nd ed. *Elk Grove Village. American Academy of Pediatrics*; 2003.
- Drozdowsky. Workplace hazards to reproduction and development: a resource for workers, employers, health care providers, and health & safety personnel. *Washington State Department of Labor and Industries*. Olympia, 1999.

CHILD LABOUR

❖ Hazardous work

Any work which is likely to jeopardize children's physical, mental or moral health, safety or morals should not be done by anyone under the age of 18.

❖ Basic Minimum Age

The minimum age for work should not be below the age for finishing compulsory schooling, which is generally 15.

❖ Light work

Children between the ages of 13 and 15 years old may do light work, as long as it does not threaten their health and safety, or hinder their education or vocational orientation and training.



WHO

International standards:

1. ILO Convention No. 138 on the Minimum Age for Admission to Employment and Work
2. ILO Convention No. 182 on the Worst Forms of Child Labour, 1999

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<< NOTE TO USER: ADD LOCAL INFORMATION IF AVAILABLE >>

References:

- ILO (International Labour Organization). Convention Concerning the Prohibition and Immediate Action for the Elimination of the Worst form of Child Labour. No. 182. *ILO*, 1999
- ILO Convention on Minimum Age. N° 138. *ILO*, 1973.
- ILO Declaration on Fundamental Principles and Rights at Work and its Follow-up. *ILO*, 1998.
- International Programme on the Elimination of Child Labour (IPEC). ILO. (www.ilo.org/ipecc/lang--en/index.htm)
- IPEC's strategy to eliminate child labour. ILO (www.ilo.org/public/english/region/asro/bangkok/child/trafficking/downloads/ipeccchildlabour.pdf)
- WHO Regional Office for Europe. Report from WHO Consultation on Occupational Health Risks for Children, Fiuggi, Italy, 19-20 February 2004. *WHO*, 2004

Picture:

- WHO

Occupational risks and children's health



SEARO

14

This is a reminder to us from a child from South East Asia who has drawn child labor in various forms.

WORSE FORMS OF CHILD LABOUR:

- ❖ Slavery, trafficking of children, forced labour, child soldiers
- ❖ Child prostitution, use of children in pornography
- ❖ Involving children in illicit activities, such as the production and trafficking of illicit drugs
- ❖ **Hazardous child labour** – work that, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety and morals of children

All these forms of child labour are prohibited by international law
(International Labour Organization Convention No. 182 ratified by 160 countries)

Some legal facts about child labour:

The ILO Convention No. 182 from 1999, Concerning the Prohibition and Immediate Action for the Elimination of the Worst form of Child Labour, calls on ratifying states to take immediate and effective measures to prohibit and eliminate all worst forms of child labour (under the age of 18).

<<READ SLIDE>>

The ILO emphasizes that no country is immune to the problem of child labour.

Hazardous work under the age of 18 is the most widespread form (62%) of the worst forms of child labour. It is difficult to estimate the magnitude of this problem in the European Region, for instance, as a whole since the data are very scarce. However some figures suggest that it may be a problem across the Region. For example, of the 1.6 million children in Turkey who are economically active, 310,400 (19.4%) have experienced work accidents and other health problems related to work. In Ukraine 147,000 (42%) of the 350,000 economically active children work in hazardous conditions with heavy physical load, excessive concentration, eye strain, dust, fumes and noise. In Portugal between 43,000 and 82,000 children (4-7% of all children 5-14 years of age) are working and 2% of these suffered accidents or sickness related to their work. In Italy alone, about 17,000 work accidents are being registered annually where the victim is under 17 years of age

References:

- ILO Convention Concerning the Prohibition and Immediate Action for the Elimination of the Worst form of Child Labour. No. 182. *ILO*, 1999
- WHO Regional Office for Europe. Report from WHO Consultation on Occupational Health Risks for Children, Fuggi, Italy, 19-20 February 2004. *WHO*, 2004

HAZARDOUS CHILD LABOUR (BELOW 18 YEARS OF AGE)

Most often in rural and informal sectors;

Varies according to countries:

- ❖ Agricultural production, farms
- ❖ Small and medium size factories, enterprises
- ❖ Cottage industries, family trade and business
- ❖ Services (domestic help, construction)
- ❖ Scavenging for recycling trade

While older children are in the fields or construction sites, the younger ones (even babies!) may play alongside...

The vast majority of working children are in the agricultural sector.

A substantial number of children work in industry, services, small and medium size enterprises and the family business. The highest proportion of working children in the 5-15 age group work in the informal sector.

For example:

- Children involved in the matches and fireworks industry can be required to mix hot chemicals, make matchsticks and boxes and deal with powder. They are not only exposed to hazardous chemicals but also to the possibility of fire and explosions that might lead to intoxications, burns, injuries and death.
- Button-making requires them to autoclave, saw, press and punch bones, metal and plastic and pulverize, mix and mould different materials. They are exposed to unguarded machinery, dust, chemicals, noise, vibrations and a risk of fire or explosion. The health consequences can be varied: repetitive strain injuries, ocular fatigue, chemical poisoning and hearing impairments.
- Dock work involves, among others, trimming and stocking, which exposes children to heavy loads, heights, arduous work, heat and long hours of work. They can be injured from falls, burns, respiratory diseases, fatigue, physical stress and strain, thermal stress and musculoskeletal disorders.
- Many children assist their families in the market sector, by selling wood at a small stall or while walking through the surrounding streets.
- Children also may help parents with spraying and applying pesticides (to fields or cattle).

References:

- Forastieri. Children at work: health and safety risks. *International Labour Office*. Geneva, 2002.
- Kaminsky DC. In J Pronczuk Garbino. Children Health and the Environment. *WHO*, 2005.

HIGH-RISK SECTORS AND ACTIVITIES INVOLVING HAZARDOUS CHILD LABOUR

- Agriculture
- Metal work
- Toy-making
- Button-making
- Meat-processing
- Shoes factories
- Deep-sea fishing
- Dock work
- Auto repair
- Mining
- Brick-making
- Carpet-weaving
- Textile workshops
- Tanneries and footwear
- Matches and fireworks
- Paint shops
- Entertainment

<<READ HIGH RISK SECTORS FROM THE SLIDE>> ADD EXAMPLES OF YOUR REGION

The highest proportion of working children in the 5-15 age group work in the informal sector. For example:

-Children involved in the matches and fireworks industry can be required to mix hot chemicals, make matchsticks and boxes and deal with powder. They are exposed to hazardous chemicals and to the possibility of fire and explosions.

-Button-making requires them to autoclave, saw, press and punch bones, metal and plastic and pulverize, mix and mould different materials. They are exposed to unguarded machinery, dust, chemicals, noise, vibrations and a risk of fire or explosion.

-Dock work involves, among others, trimming and stocking, which exposes children to heavy loads, heights, arduous work, heat and long hours of work.

-Many children assist their families in the market sector, by selling wood at a small stall or while walking through the surrounding streets.

-Children help parents with spraying pesticides in agricultural activities or handling big animal or driving heavy machines.

Children are more vulnerable to occupational hazards than adults

Working children are more likely to be exposed and suffer damage from occupational hazards because of their immaturity, lack of neurological and physiological skills and less strength as well as biological differences with adults and lack of social power.

Children:

- ❖ may misjudge, ignore or take a risk that they can not manage.
- ❖ may be exposed, because of their smaller height, to vapours and gases heavier than air, particularly in cases of leakage and accidents.
- ❖ do not fit in personal protective equipment (gas masks, earplugs, gloves, goggles and others) designed for adults.

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Working children may be exposed to the same hazards as working adults but are more likely to suffer damage because of their immaturity, lack of neuro-developmental skills and strength as well as biological and psychological differences.

For example, children have difficulties in judging the risks to which they are exposed and they may be more likely to take risks or to ignore them. Also, the smaller height of children makes them more vulnerable to exposure to vapours and gases which are heavier than air, particularly in cases of leakage and accidents.

Personal protective equipment, gas masks, earplugs, gloves, goggles etc. are developed for adults. They do not protect children.

The major hazards which can affect the health of working children are following:

<<READ SLIDE>>

Reference:

•ILO Eliminating hazardous child labour step by step”, International Programme for Elimination of Child Labour. ILO. Geneva. Available at:
www.ilo.org/public/english/standards/ipecc/publ/hazard/hazardous_work.pdf

HAZARDS FOR WORKING CHILDREN (1)

❖ Mechanical

- Risk of falling, being struck by objects, being caught in or between objects and being cut or burned

❖ Biological

- Dangerous animals and insects, poisonous or sharp plants and exposure to bacteria, viruses, parasites

❖ Chemical

- Dangerous gases, liquids, dust, agrochemicals, solvents, explosives and flammable or corrosive materials



Pronczuk J.

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Working children can be exposed to the same hazards as working adults. However, in some cases children are more likely to be exposed to certain hazards than adults because of their physical and psychological differences.

For example, children have difficulties in judging the risks to which they are exposed and they may be more likely to take risks or to ignore them. Also the smaller height of children makes them more vulnerable to exposure to vapours and gases which are heavier than air, particularly in cases of leakage and accidents.

Personal protective equipment: gas masks, earplugs, gloves, goggles and others, are developed for adults. They do not protect children.

The major hazards which can affect the health of working children are the following:

<<READ SLIDE>>

References:

- Baig. Health and safety measures available for young labourers in the cottage industries of Karachi. *J Coll Physicians Surg Pak*. 2005, 15(1):7-10. **ABSTRACT: OBJECTIVE:** To determine the health problems faced by labourers, 18 years and under, working in the cottage industries of Karachi and know the safety measures available and utilized at these places. **DESIGN:** Cross-sectional study using two-stage cluster sampling. **PLACE AND DURATION:** From February 2002 to March 2003, 95 cottage industries from 10 different locations of five districts of Karachi were included. **SUBJECTS AND METHODS:** All workers, 18 years and below, present were interviewed. The environmental and safety gadgets present at the industry were inspected by the surveyors and the manager was interviewed for presence of health and safety benefits for the workers. **RESULTS:** A total of 280 workers were interviewed, 26 (9.3%) children were between 9-12 years, 82 (29.3%) were between 13-15 and 172 (61.4%) were between 16-18 years of age. Health benefit was given to only one 13-year-old worker in silk industry; appropriate gadgets were absent in 93 (97.8%) industries, present only in 2 industries (one silk and one loom). First Aid box was present in only one loom industry. Two hundred and forty workers (85.7%) were unaware of the materials they were using. One hundred and ninety-three (69%) children were working in improper light, 199(71%) workers experienced high level of noise, 232(83%) were working in high temperature and 155(55.3%) were working with improper ventilation. Health problems faced included joint pains (n=64, 22.85%), backache (n=85, 30.35%), vertigo (n=48, 17.14%), numbness of fingers (n=77, 27.5%) and fatigue experienced by 143 (51.07%) children. **CONCLUSION:** The children and adolescents employed in cottage industry are suffering from health problems due to lack of knowledge on their part, and improper ergonomics, environmental and safety conditions at the workplace. The cottage industry should be regulated and brought under labour law. The health sector non-governmental organizations should make concerted efforts for the rehabilitation of this workforce by creating awareness and providing opportunities for education and development of skills.
- International Programme on the Elimination of Child Labour (IPEC). ILO. (www.ilo.org/ipec/lang--en/index.htm)
- Tiwari RR et al. Respiratory morbidities among working children of gem polishing industries, India. *Toxicol Ind Health*. 2009, 25(1):81-4.

Picture:

- Courtesy of J. Pronczuk.

HAZARDS FOR WORKING CHILDREN (2)

❖ Ergonomic

- Poorly designed workplaces, lifting, carrying or moving heavy loads, driving or using machinery too heavy for their size, repetitive movements and awkward working postures

❖ Physical

- Extreme temperatures, noise,
- Vibration and radiations

❖ Psychosocial risks

- Stress, monotonous work, lack of control or choice, insecurity, harassment or abuse (sexual or violence), shift work, long working hours, night work or work in isolation, underground work and work at heights



Uruguay. Laborde A.

20

<<READ SLIDE>>

Some of these hazards have serious consequences for children's health. The health effects of other hazards are not so clear. Whether occupational hazards will affect a child's health depends on:

1. activity, duration and intensity of the exposure
2. workplace – not all workplaces in agriculture are hazardous for children's health
3. working conditions – long hours, working in shifts, night work
4. individual health status of the child – malnourishment, anaemia, infectious and parasitic diseases may aggravate the effects of occupational hazards.

References:

•Fassa. Child labor and musculoskeletal disorders: the Pelotas (Brazil) epidemiological survey. *Public Health Rep.* 2005, 120(6):665-73.

ABSTRACT: This article describes the prevalence of musculoskeletal pain in several anatomic sites in children and teens, and investigates, while adjusting for potential confounders, the association between musculoskeletal pain and back pain and the following: age, gender, sports practice, use of computer/video games/television, school attendance, intensity of involvement in household domestic activities, care of other children, care of sick/elderly family members, work activities, and workloads. We conducted a cross-sectional study interviewing 3,269 children aged 10-17 years in the low-income areas of Pelotas, Brazil. The prevalence of pain in the neck, knee, wrist or hands, and upper back exceeded 15%. Workers in manufacturing had a significantly increased risk for musculoskeletal pain (prevalence ratio [PR]=1.31) and for back pain (PR=1.69), while workers in domestic service had 17% more musculoskeletal pain and 23% more back pain than nonworkers. Awkward posture (PR=1.15) and heavy physical work (PR=1.07) were associated with musculoskeletal pain, while monotonous work (PR=1.34), awkward posture (PR=1.31), and noise (PR=1.25) were associated with back pain. CONCLUSIONS: Musculoskeletal pain is common among working children and teens. Knowledge of occupational risk factors can support actions to restructure work conditions to reduce or eliminate childhood exposure to hazardous conditions. Our results suggest that strategies to prevent musculoskeletal disorders in child workers should be developed.

•International Programme on the Elimination of Child Labour (IPEC). ILO. (www.ilo.org/ipec/lang--en/index.htm)

•Li P et al. Maternal occupational exposure to extremely low frequency magnetic fields and the risk of brain cancer in the offspring. *Cancer Causes Control*, 2009, 20(6):945-55. Epub 2009 Feb 18.

Picture:

•Courtesy of A. Laborde.

HEALTH EFFECTS OF HAZARDOUS CHILD LABOUR

❖ Injuries

- Cuts, fractures
 - ✓ falling from trees when picking fruit, or riding horses
 - ✓ vehicles and machinery.
 - ✓ construction work and mining.
 - ✓ animal attacks
- Burns and scalds
 - ✓ firewood used for cooking or open fires
- Animal bites
 - ✓ poisonous bites and stings, dogs, cattle, insects
- Drowning
 - ✓ in wells without protective barriers, fishing activities

❖ Osteo-articular

- Pain, strain, contracture



FAO

21

These hazards have acute and chronic effects

The acute effects are acute poisonings and injuries and develop immediately after the exposure, while the chronic effects need some time to develop.

<<READ SLIDE>>

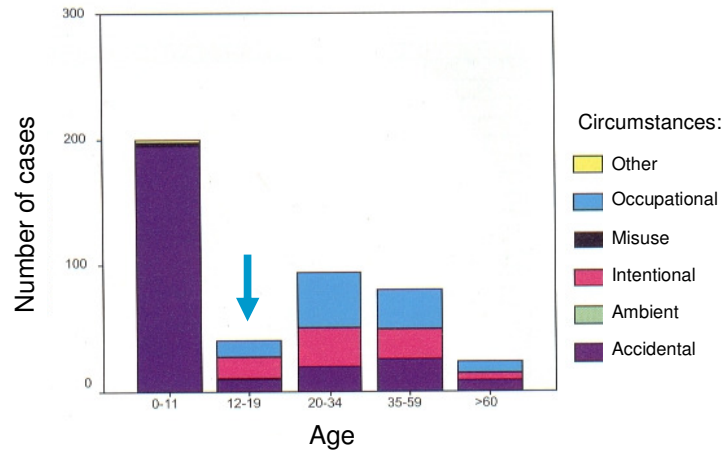
Reference:

•Forastieri. Children at work: health and safety risks. *International Labour Office (ILO)*. Geneva, 2002.

CHILDREN'S OCCUPATIONAL POISONING

Acute poisoning and/or chronic exposures

Cleaning solutions, volatile solvents and pesticides



Age and exposure distribution (N=439)

Adapted from Alonzo C et al. MSP / CIAT. Montevideo, Uruguay, 1998

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<<NOTE TO USER: ADD LOCAL INFORMATION IF AVAILABLE>>

Rural areas are recognized as some of the most important scenarios of child labour.

The magnitude of the situation is not completely known.

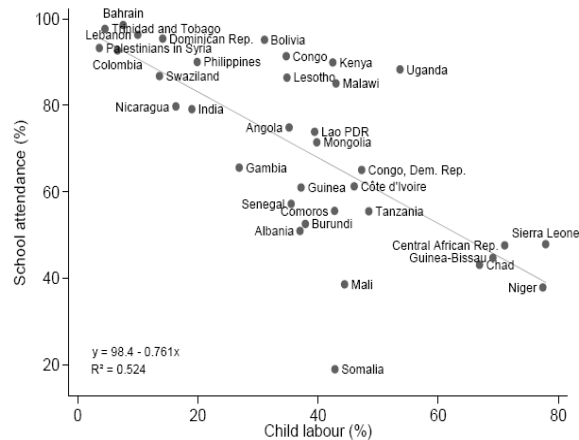
The amount of cases of occupational exposure to pesticides notified to Poison Control Centres or national vigilance systems points out that children are in a high risk.

Reference:

•Alonzo C. et al. Taller sobre Uso seguro de Plaguicidas en países del Mercosur y asociados. Registro Armonizado de casos y productos para Toxicovigilancia y Prevención de la Intoxicación por Plaguicidas. Estudio Epidemiológico de la Intoxicaciones Agudas por Plaguicidas en Uruguay. Fase Piloto del Proyecto PISQ/OMS sobre armonización del registro de datos y análisis de la exposición humana a Plaguicidas. PISQ /OMS/OIT/PNUMA. OPS/OMS. MSP. Montevideo, Uruguay, 13-15 diciembre, 1999, Page 12. (available at www.bvsops.org.uy/pdf/plaguicidas.pdf)

CHILD LABOUR AND SCHOOL ATTENDANCE

Less time in school, less opportunities to learn



Huebler F. UNICEF, 2007

Child labour and school attendance, 7-14 years.

23

Drawing on household survey data from 35 developing countries, a recent study has highlighted the trade-off between child labour and school attendance. 78 percent of all children between 7 and 14 years of age were attending school at the time of the surveys, while 25 percent of all children in this age group were in child labour. A regression analysis identified poverty as the most important determinant of low school attendance and high child labour rates. The education of the household head was also found to be an important factor in the decision between work and school for children, underscoring the intergenerational benefits of education. Many countries are still far from the Millennium Development Goal of universal primary education.

Reference:

- UNICEF. Huebler F. Child labour and school attendance: Evidence from MICS and DHS surveys. Seminar on child labour, education and youth employment. Understanding Children's Work Project. UNICEF. Universidad Carlos III de Madrid, Madrid, 11-12 September 2008.

CHILD LABOUR AND SCHOOL ATTENDANCE

Work often interferes with children's education.

- ❖ Recent studies in 35 countries highlights child labour and school attendance:
 - 78 % of all children between 7 - 14 years old were attending school at the time of the surveys
 - 25 % percent of all children in this age group were involved in child labour
- ❖ Poverty is the most important determinant of low school attendance and high child labour rates
- ❖ The level of education at home is an important factor in the decision between favouring work or school for children

24

Drawing on household survey data from 35 developing countries, a recent study has highlighted the trade-off between child labour and school attendance. 78 percent of all children between 7 and 14 years of age were attending school at the time of the surveys, while 25 percent of all children in this age group were in child labour. A regression analysis identified poverty as the most important determinant of low school attendance and high child labour rates. The education of the household head was also found to be an important factor in the decision between work and school for children, underscoring the intergenerational benefits of education. Many countries are still far from the Millennium Development Goal of universal primary education.

Reference:

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HEALTH EFFECTS LATER IN LIFE

"Child origins of adult disease"

Chronic exposures may lead to:

- Early hearing loss (noise)
- Contact dermatitis (corrosive or irritant substances, cold, heat and humidity)
- Infectious and parasitic diseases
- Respiratory diseases (cotton, nitrous fumes, phosphorus and dust: silica, coal and asbestos)
- Neurological effects (lead, mercury and carbon monoxide)
- Anaemia (lead, benzene, malnutrition)
- Cancer (exposure to carcinogens)
- Mental disorders (working in isolation, child abuse, harassment)

In some cases, the health effects of child labour can develop during adult life, as is the case of cancer.

<<READ SLIDE>>

Radiological evidence of silicosis was found in children that had worked as agate grinders. A higher prevalence of tuberculosis among those children was also reported.

Reference:

- Forastieri. Children at work: health and safety risks. *International Labour Office*. Geneva, 2002.
- Sayed HN. In: J Pronczuk Garbino .*Children health and the Environment*. WHO, 2005.

CHILD LABOUR THE ROLE OF HEALTH PROFESSIONALS (1)

How to make the diagnosis?

- ❖ Occupational history:
 - explore and register parents' workplaces or activities
 - ask specifically about children's occupations and responsibilities at home or work
 - explore about activities undertaken at technical schools or universities and during apprenticeships
 - talk with the child or adolescent on their working conditions their associated risks
- ❖ Biomonitoring: blood lead levels, pesticide exposure (biomarkers)
- ❖ End-organ effects of exposure: hepatic enzymes, audiometry
- ❖ Workplace risk assessment

In order to recognize the health effects of hazardous child labour it is necessary to take a thorough history (including occupational history) and to make a detailed physical examination. The effects of most occupational hazards are not easily detectable. Therefore purposefully ask questions about whether the child has been doing any kind of work, or whether the parents work, what they do, and where they carry out their work, can be important to determine whether occupational exposure may be an issue. Examples of potential job-related exposures in industrialized countries that can affect children are: (1) working with hazardous machines in agriculture; (2) scavenging in landfills; (3) using cleaning agents in nursing homes, restaurants, and schools; (4) applying pesticides in lawn care work, farm work, and when buildings are sprayed; (5) using isocyanates (pulmonary sensitizers) during auto body repair or roofing; (6) using benzene when pumping gas; (7) being exposed to lead from radiators in car repair or home renovation; (8) dealing with asbestos in auto brake repair, renovation/demolition of old buildings; (9) using solvents in T-shirt printing; (10) handling asthma-inducing wood dusts in shop and furniture making; (11) being exposed to welding fumes and to UV (eyes); (12) being exposed to tetanus and other biological hazards in farming (hypersensitivity pneumonitis), veterinary clinics, hospitals and nursing homes; (13) being exposed to noise in farming and factory work; (14) working in smoking areas of bars and restaurants – exposure to second-hand tobacco smoke.

In some cases, the hazardous substance can be measured in body fluids. A blood lead level is a very sensitive marker of recent and past exposure to lead. When the substance itself can not be measured, it might be possible to measure the effects of this substance on the end-organ, for example, to measure hepatocellular enzymes following solvent exposure. In cases of acute poisoning, it is important to save the original container for analysis if needed. In some cases, knowing the substance can be crucial for the therapy as there might be specific antidotes.

Reference:

•American Academy of Pediatrics Committee on Environmental Health. Workplaces. In Etzel, RA. ed. Pediatric Environmental Health. 2nd ed. Elk Grove Village. American Academy of Pediatrics, 2003.

CHILD LABOUR THE ROLE OF HEALTH PROFESSIONALS (2)

When child labour is detected, the health professional has to:

- ❖ **Communicate the situation to the authorities**
- ❖ **Talk with the parents and the adolescent/child about the sources of exposure and the dangers of child work.**
- ❖ **Treat of clinical symptoms**
 - Identify and eliminate the source of exposure
 - Implement symptomatic treatment
 - Administrate specific antidotes if required (Poison Control Centre)
 - Recommend rehabilitation (nutritional supplements, physiotherapy)

The best treatment is to eliminate the source of exposure. It should be borne in mind that the routes of exposure are different. There are dermal, oral, and inhalation exposures, and eliminating one route of exposure does not necessarily mean that the other possible routes are eliminated. For example, cleaning the air from exhaust gases may reduce exposure to lead through inhalation, but the soil may be still contaminated with lead, so children playing nearby can ingest lead from the contaminated dirt and from their hands.

Specific suggestions for medical treatment of the consequences of toxic exposures can be obtained from a poison control centre.

Reference:

•American Academy of Pediatrics Committee on Environmental Health. Workplaces. In Etzel, RA. ed. Pediatric Environmental Health. 2nd ed. *Elk Grove Village. American Academy of Pediatrics*, 2003.

Occupational risks and children's health

*Work is the source of subsistence.
It can be also a fulfilling joy for both adults and young people.
You can help this happen!*



WHO

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To end this presentation, I would like to remind you that work can and should have positive effects on physical, psychological and social well-being. It is possible to organize work in a way that will not harm our children and our future.

The experience from some countries and companies has shown that good health and safety measures at work lead to increased productivity, better health and quality of life. Good occupational health and safety also provides for long-term sustainability of companies and whole societies.

Occupational risks and children's health



SEARO

29

To end this presentation, a beautiful reminder to us from a child who has drawn a clean environment where children are happy and healthy.

INTERNATIONAL CONVENTIONS AND DECLARATIONS

- ❑ The 1948 Universal Declaration on the Rights of the Child recognized the right of children to education and freedom from exploitation.
- ❑ The International Labour Organization's Minimum Age Convention of 1973 (Convention 138) defines "child labour" as most work performed by children under the age of 15.
- ❑ The ILO Convention No. 182 from 1999 Concerning the Prohibition and Immediate Action for the Elimination of the Worst form of Child Labour calls on ratifying states to take immediate and effective measures to prohibit and eliminate all worst forms of child labour (under the age of 18).
- ❑ ILO Declaration on Fundamental Principles and Rights at Work and its Follow-up. ILO, 1998.
- ❑ WHO Regional Office for Europe. Report from WHO Consultation on Occupational Health Risks for Children, Fiuggi, Italy, 19-20 February 2004. WHO, 2004
- ❑ IPEC's strategy to eliminate child labour. ILO.
(www.ilo.org/public/english/region/asro/bangkok/child/trafficking/downloads/ipccchildlabour.pdf)
- ❑ International Programme on the Elimination of Child Labour (IPEC). ILO.
(www.ilo.org/ipec/lang--en/index.htm)
- ❑ The end of child labour: Within reach. Global Report under the Follow-up to the ILO Declaration on Fundamental Principles and Rights at Work. ILO, 2006

POINTS FOR DISCUSSION

<<NOTE TO USER: Add points for discussion according to the needs of your audience.>>

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