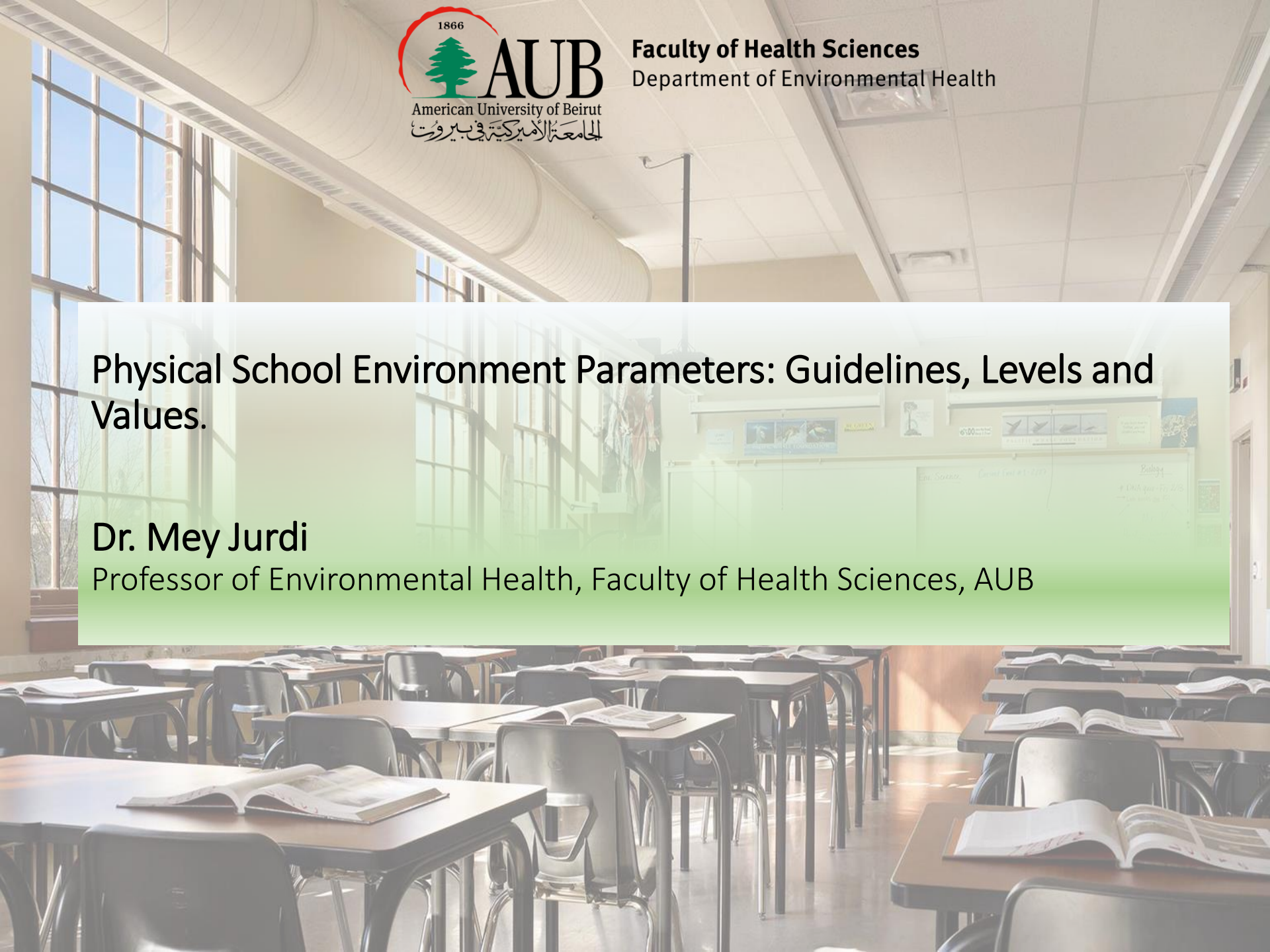

1866 AUB American University of Beirut الجامعة الأميركية في بيروت

Faculty of Health Sciences
Department of Environmental Health

Physical School Environment Parameters: Guidelines, Levels and Values.

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Physical School Environment Importance:

WHO estimates that between 25% and 33% of the global burden of disease can be attributed to environmental risks (ERs). Preventing childhood exposure to environmental hazards (Ehs) is instrumental in:

- Preventing infections and diseases with longer latency periods such as cancer,
- Developments disabilities (autism, neurological impairment, and malnutrition), and
- Immediate diseases, such as, respiratory infections and diarrheal diseases.

World Health Organization

School Site and Premises

- The school site should not be on a steep hill or slope.
- The site should be easily drainable and suitable for recreational facilities.
- The site should not be within 3 km of facilities emitting hazardous air pollutants (industries, incinerators etc.).
- The school should be built at least 10 m from main roads and highways and 6 m from internal roads (Ministry of Education Decree 9090/2002 “Guidelines and Standards Governing Public Schools’ Buildings”).
- The school site should be away from dust and heavy traffic.
- The school site should be selected where external noise levels do not exceed 70 dB.

School Site and Premises

- The school premises should be kept clean and well maintained at all times:

  1. The school premises should be constantly maintained to ensure safety; the constant inspection of paintwork, windows, doors, floor coverings should be performed, and all required repairs and cracks should be addressed, accordingly.
  2. The school premises should be free from mosquito breeding areas, and facilities should be insect and rodents proof.

School Site and Premises: school area

The acceptable **school area** in densely populated zones should not be less than 750m2, and the school area outside such zones should not be less than 1500m2 (Ministry of Education Decree 9091/2002).

Furthermore, the decree specifies the size of the area of open spaces in schools (play grounds, parking area and green space) as follows (Table 1):

Educational level	Play Grounds m^2/student	Parking Area m^2/student	Green Area m^2/student
Primary	1.2-1.8	4.8-9.0	1.6-3.0
Elementary	1.2-1.8	3.6-6.8	1.6-3.0
Intermediate	1.2-1.8	4.8-9.0	1.6-3.0
Secondary	1.2-1.8	4.8-9.0	1.6-3.00

Table 1: Recommendation Stipulated by Ministry of Education Decree 9091/2002 for School Area >1500m2

School Site and Premises

- The school zones should be clearly defined in the following manner:

1. The presence of a school sign (the minimal safety requirement).

2. The presence of yellow road stripes marking the school zone.

3. The introduction of street pumps defining the school zone intended to enforce the reduction of traffic speed.

4. The adoption of a set speed limit in the school zone not to exceed 30 km/hr (a visible sign indicating speed limit should be posted at the entry and the exit points of the defined school zone).

5. The presence of yellow blinking site lights at the entry and exit points of the defined school zone to insure safety of the school community

School Fence

The school fence (Decree 9090/2002) should be:

- 2m high, if neighboring a building (any type of institution) or a vacant land, and 1.2 m, if neighboring a public garden or a street.
- This concrete fence should be topped by protective metal bars or screen (1.2 m in height).
- The Overall school fence height should be between 2.5-3.5 m.

Green Fence

A living green fence helps in trapping windblown dust, dirt and fumes from passing traffic. Furthermore, a dense hedge can also function as a sound barrier. However, it is important not to plant fruit trees as they have the following disadvantages:

- Falling fruits may affect students playing under these trees,
- Throwing of sticks and stones to collect the fruits may lead to unintentional accidents,
- Climbing into trees may lead to possible falls and injuries, and
- Fruits attract more wasps and bees and expose children to insect bites.

Leylandi

- Dense foliage acts as sound barrier.
- Best at filtering particulates (air pollution) from passing traffic
- Grows in any type of soil

Students Drop and Loading Area

The lack of student loading and drop off generates a major safety concern (for all age groups). Students are not protected from the traffic movement which constitutes a major environmental risk. As such, it is a must to provide at the main entrance adequate space for waiting and pickup activities.

- A gravel fire lane should surround the school building as an exterior walkway for students loading.
- The width of this side walk should not be less than 1.5 meters.
- The sideway should be shaded or covered to prevent excessive exposure to sunlight and rain.
- The parking for buses and cars should be paved with asphalt.
- The parking lot should be designed to limit exposure of students to direct bus emissions.
- The bus parking area should be designed so that the buses are not lined up head to tail.
- The bus engines should not be on during student loading to reduce exposure of students to combustion gases.

Classrooms

1-General Characteristics:

- The classroom floor should be clean, smooth and in good repair.
- The ceiling and overhead structures should be painted with a light color (reflection factor of at least 80%).
- The color of the walls should be selected based on a reflection factor of 60%
- Double doors (7-8 inches) should be used for proper sound isolation.
- Each classroom should have a properly closed waste basket for waste collection; to prevent littering and pest infestation.
- All class room windows should have protective screens (all educational levels); even when it is only one floor high
- Coat hooks (30 units) should be provided near to the exterior classroom door

Classrooms

2- Classroom Size:

The size of a classroom depends on the number of students; air and floor space; adequate natural light; good acoustical quality; and space required for classroom

3- Location, Elevation and Color of Class Board:

- The class board should be placed on the front wall

- The class board should not be located between windows or at the side of the classroom.

The height of the lower end of the board should be adjusted at the following elevations to avoid vision fatigue:

- 60 cm for primary school,
- 70 cm for upper elementary and intermediate school, and
- 80 cm for secondary school.

Classrooms

4-Class Seating:

- The seating patterns should be diagonal to secure better lighting by preventing shadowing
- The desks should be arranged so as the students' left hand should be nearer the window;
- The top cover of desks should be kept in good repair, smooth and clean.
- Seats for left handed students should be insured.
- The size and depth of the seat must be such that the seated child has his/her feet on the floor..
- The desk space available for each student should be adequate;
- The desk should not have sharp squared edges.

Classrooms

Classroom Lighting:

- Proper combination of daylight and full spectrum lighting is essential in classrooms
- The recommended “Glass Area to Class Area” should be at least 20%
- Classroom window area should extend about 120 cm from the floor to within 15 cm of the ceiling to maximize day light penetration.
- Light fixtures in classrooms should be properly distributed to. At least 30 foot-candle of illumination should be provided per desk station.
- The light in the room must not be too bright (>300 foot-candles)
- It is preferable that light fixtures use high efficiency T-8 or T-5 fluorescent lamps with a minimum color rendering index of 80.
- The use of indirect light fixtures is recommended
- The suspended light fixtures should be at a height of 2.45 m from floor level and a maximum of 45 cm suspension from the ceiling to prevent shadowing.
- Wall colors should be selected based on a reflection factor of 60%.

Classrooms

Bad Lightening

Good Lightening

Light Meter

Recommended classroom illumination: 300 lx

Classrooms

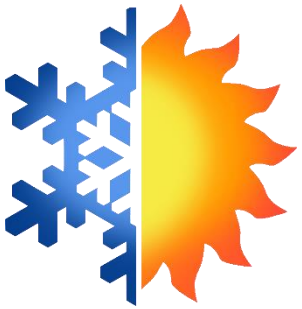
Classroom Ventilation:

Proper classroom ventilation is essential to enhance the quality of indoor air quality as it impacts the learning environment for staff and students. It can cause or exacerbate illness in adults and children and leads to absences and reduced school performance.

- The minimal air space of 5.66 m3 /school child is recommended.
- The recommended ventilation rate is 15-20 cubic feet of air per school child per minute.
- The temperature and humidity should be maintained within the “comfort zone” that is impacted by the exposed population age.
- Proper air exhaust should be insured and differential pressures should be maintained to avoid exposure to air pollutants.
- The concentrations of CO2 in indoor air should not exceed 1ppm.

Classrooms

Heating/Cooling of Classrooms:



Provision of a comfortable thermal environment is essential in classrooms to increase alertness, improve performance and better the moral and effectiveness, especially for teachers.

- Provide functional heating/cooling units to insure uniform temperature during all seasons.
- All Fans and stoves should be properly encased to reduce exposure to accidents.
- The ambient temperature in a classroom should be maintained at around 20 0C.
- The humidity in a classroom should be maintained between 30% and 60% (optimal 50%).

Classrooms

Humidity Meter

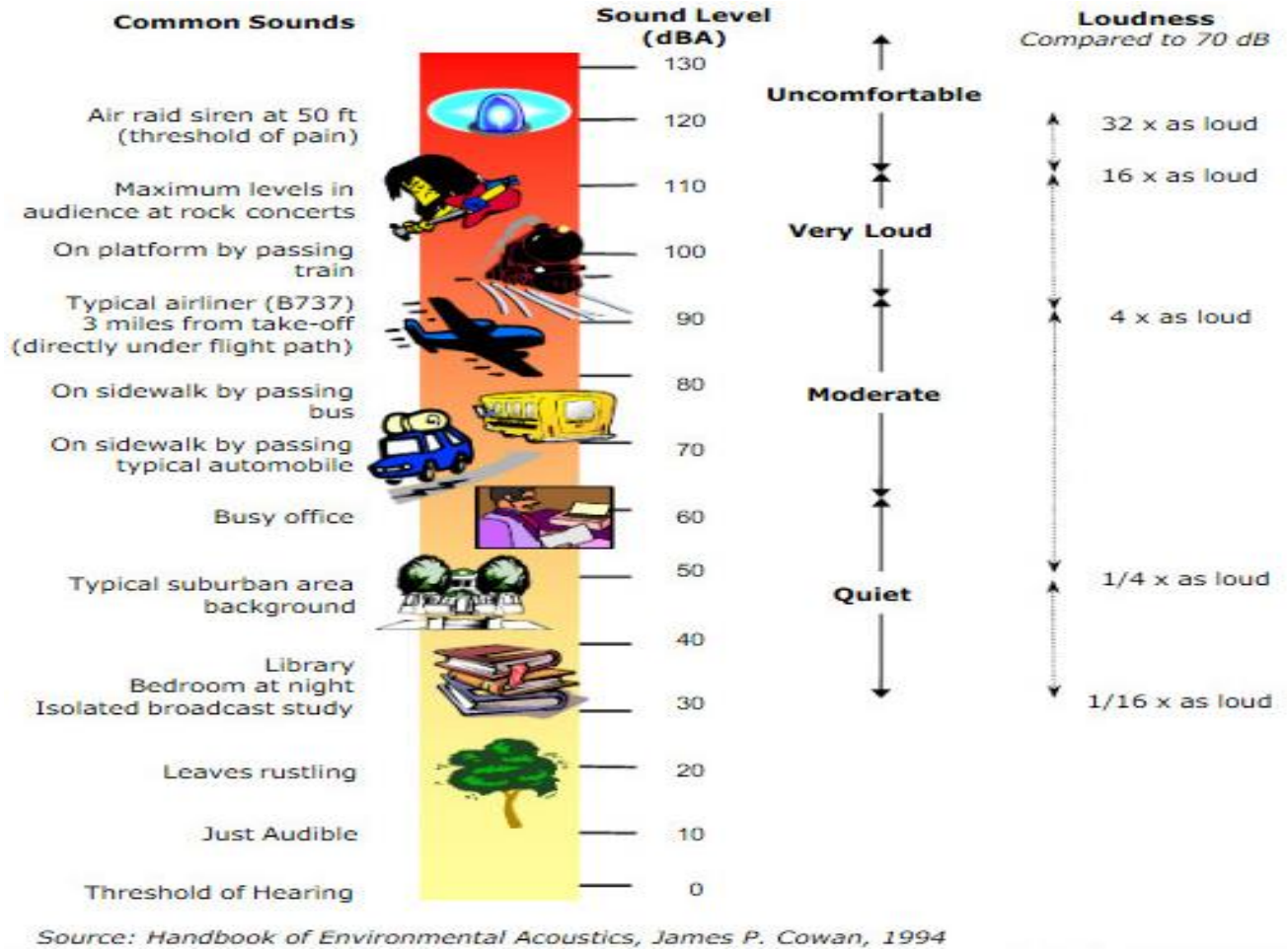
- Classrooms should be maintained at 20°C
- Humidity should be maintained between 30 and 60%

Acoustics:

- The acceptable noise levels in the school surrounding should not exceed 70 dB.
- The acceptable noise level in different school areas is:
  - Cafeteria : 50-55 dB
  - Classrooms: 35-40 dB
  - Playgrounds: < 70 dB
  - Music rooms: < 40 dB

- Sound absorbing material should be used on walls and ceilings to reduce reverberation.
- Suspended ceilings should be used in multilevel buildings to reduce noise impact.
- Classroom carpets and soft floor surfaces should be used to reduce noise levels.
- Noisy spaces (e.g. music rooms, cafeteria, gym area, playground and mechanical room) should be placed away from instruction areas.

Acoustics:



Source: Handbook of Environmental Acoustics, James P. Cowan, 1994

School Gymnasium:

Physical education is a critical component for the development and growth of children. The quality of physical education has been associated with the promotion of social, cooperative and problem solving competencies.

- A separate specified area for sports should be provided to create a stimulating inductive environment for physical activity training.
- The recommended gym area is between 325 m^2 and 650m^2.
- The wall surfaces should be hard to allow rebound of balls to a height of 2.4 m.
- The gym and auditorium should have direct exits that lead to the outside.
- All lighting devices should have protective wire guards to reduce the risk of accidents.

Any supervised physical activity must provide clean changing rooms, locker area, toilets and wash room facilities.

School Playground:

- The Ministry of Education Decree 9091/2002 specifically emphasizes the need to have playgrounds. And, states that in the case that the school area does not allow enough space for having a playground, the roof area should be transferred for this purpose after making sure that the safety requirements are met.

- Size of the playground; some guidelines recommend 18-60 m2/child (18: substandard; 30: minimal; 45: good; 60: best) as the basis for computing the play ground area. The Lebanese standard however recommends a minimal area of 1.2-1.8 m2/student.

- At least 25% of the overall area playground area should be protected from sun and rain. This is essential for students to practice sports or enjoy the break in a comfortable way.

- Playgrounds should be properly maintained as broken surfaces expose students to physical injury and increases the incidence of accidents.

School Playground:

Rubber tiles

- Slip resistant,
- Easy to maintain and available in a variety of thicknesses to meet varying needs,
- They drain well,
- Provide an even surface for playing,
- wheelchair and stroller accessible.

School Playground:

- It is recommended to have green or shock absorbent material (safety-tested rubber or rubber-like materials) for playgrounds depending on availability of a gymnasium area. The choice of the cover material is important to reduce the severity of injuries.
- Swings, seesaws, and other equipment should be located in an area separate from than the rest of the playground.
- The height of climbing equipment should not exceed 1.8 m to insure student safety.
- Metallic equipment should be placed in a shaded area as metal can heat up to 1200C and cause burns for children.
- Metal equipment may need to be repainted periodically. All paints and other similar finishes should have no more than 0.06% lead by dry weight.
- Play ground equipment should be surrounded by protective surfaces (e.g. rubber mats) that should extend at least 2 m in all direction from the play ground equipment.

School Playground:

A developed playground injury plan should include:

- Training programs for supervisors and children on playground safety.
- Injury response plans; detailed emergency procedures to follow in case of injury.
- Injury documentation (student injury report form); includes information on student name, age, date and time of injury; first aid given; body part injured; type of injury expected suspected; action taken; explanation of accident; accident location; type of surface in contact; activity causing injury; equipment involved in activity (if applicable); and detailed description of how injury occurred.
- Annual evaluations should be conducted at least once/year to determine the effectiveness of the implemented response plans.

General Safety Measures

General Air Safety Measures:

Maintaining safe air quality is essential in school environments. Contaminated air will promote the spread of airborne diseases; aggravate asthma, allergies, and other respiratory illness.

- To enhance air quality in schools the following should be observed:
- Prohibit the use of air-refreshers.
- Use non toxic art supplies and dust free chalk.
- Schedule painting, floor refinishing and renovations during vacations or in times where windows can be kept open.
- Avoid wood furniture treated with chromated copper arsenic, creosote and pentachlorophenol.

General Safety Measures

General Air Safety Measures:

- Avoid use of products that can cause an inhalation hazard
- Avoid the use of cold water dyes or commercial dyes and replace by vegetable dyes.
- Use water based paints, wood finishes and sealants.
- Avoid the use of hazardous solvent-based products
- Properly exhaust the janitor's room and other storage areas (fuel, cleaning solvents, pesticides etc.).
- Store cleaning supplies and other volatile material in air-tight child proof containers.
- Implement non-smoking policies to prevent smoking by teachers in schools. Children look up to their teachers; as such they should not set a bad example Furthermore, smoking is a major indoor air pollutant that should not be ignored.
- Implement integrated pest management control in schools to reduce the risk of exposure of students to these toxic substances.

General Safety Measures

Documented Emergency Plan

- The development of environmental emergency response plans is essential in schools the school “Environmental Emergency Response Checklist” should:

  - Identify the primary contact person,
  - Present the “Decision Tree” to determine the incidental or emergency nature, and how to seek external help,
  - Include the emergency response numbers,
  - Identify the location of chemical spill clean up equipment (school laboratory unit), if available, and the location of fire extinguishers,
  - Include a map locating the chemical storage areas, and
  - Include a documented school evacuation plan, for emergencies in general, and fires in particular.

- The school personnel should be aware of these emergency plans, and should be trained to implement them effectively.

- A mock evacuation plan, should be practiced twice/year to insure proper response (e.g. fire drill practice).

General Safety Measures

Emergency Exist Signs and Facilities:

- School buildings with 2 or more floors should be equipped with a standard fire escape facility.
- Exit facilities should be properly planned.
- Exit signs indicating emergency exist doors and staircase should be clearly posted, and should be fire proof.
- Stairways should be continuous from the first floor to the top floor.
- The stairway size should be enough to empty the school in 3 minutes.
- The stairway should be at least 1.5 m wide, with a 15-17.5 cm riser and a tread of 25-30 cm wide (entire length of stairs).

General Safety Measures

Fire Extinguishers:

- School fires usually start in different places such as heating/cooling units, janitor rooms where cleaning supplies are stored, school kitchen etc.. As such the location of fire extinguishers is essential.

- Fire extinguishes must be available, on each floor of each school building.
- Fire extinguishers should be periodically examined (twice/year) and kept functional.

- A chart indicating the maintenance schedule should be posted above the fire extinguisher unit.
- Fire drills should be conducted at least once/school year to insure proper response in case of emergencies.

General Safety Measures

Staircase Safety:

- All staircase steps should be concrete, in good shape, with all edges rounded and of sufficient width.
- All staircases should be provided with at least one handrail running the full length of the stairs.

First Aid kit:

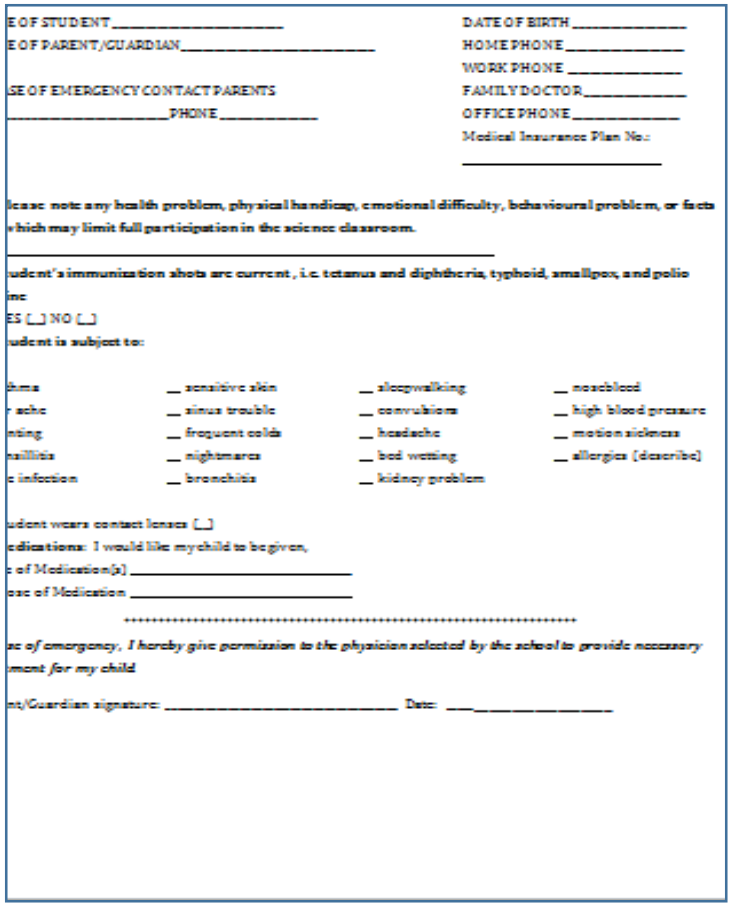
- Each school should be provided with a first aid kit for direct health interventions in case of emergencies.
- Basic first aid training should be provided to faculty and staff to insure proper response to health emergencies.

General Safety Measures

Documented Reporting of Accidents:

Reporting accidents is very important to document the type of risks to which students are exposed and accordingly, preventive interventions can be planed and implemented.

- Records for reporting accidents should be properly kept at school.
- Records should include information on the name of student; age; type of accidents; resulting health impacts (short term=>long term); management of case; and measures taken to prevent such accidents.



E OF STUDENT _____ DATE OF BIRTH _____
E OF PARENT/GUARDIAN _____ HOME PHONE _____
WORK PHONE _____
SE OF EMERGENCY CONTACT PARENTS FAMILY DOCTOR _____
_____ PHONE _____ OFFICE PHONE _____
Medical Insurance Plan No.:
_____

lease note any health problem, physical handicap, emotional difficulty, behavioural problem, or facts which may limit full participation in the science classroom.

_____

udent's immunization shots are current, i.e. tetanus and diphtheria, typhoid, smallpox, and polio inc

ES (_) NO (_)

udent is subject to:

thma	__ sensitive skin	__ sleepwalking	__ nosebleed
r ache	__ sinus trouble	__ convulsions	__ high blood pressure
nting	__ frequent colds	__ headache	__ motion sickness
nillitis	__ nightmares	__ bed wetting	__ allergies (describe)
c infection	__ bronchitis	__ kidney problem	

udent wears contact lenses (_)

edications: I would like my child to be given,

e of Medication(s) _____

ose of Medication _____

.....

se of emergency, I hereby give permission to the physician selected by the school to provide necessary tment for my child

nt/Guardian signature: _____ Date: ___/_____/_____

Water Supply

Drinking Water Fountains:

Drinking water fountains of different elevation above ground level should be provided to accommodate for school children of different heights (preschool, elementary, intermediate and secondary).

The Ministry of Education Decree 9091/2002 specifies a total number of 1 drinking water fountain/ 12 preschool children and 1 drinking water fountain/20 boys and additional 1 drinking water fountain/20 girls for all other educational levels.

Types of Water Storage Tanks:

- The use of “Food Safe UV Stabilized (UV rating >16) Polyethylene Resin”
- The use of stainless steel water storage tanks

Water Supply

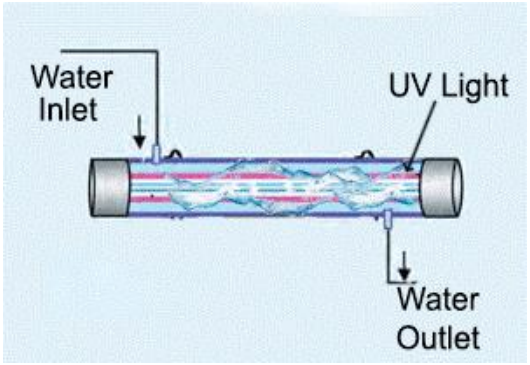
Cleaning and Disinfecting Potable Water Storage Tanks

All potable water storage tanks should be located in an easily accessible area away from direct sunlight (enclosed or shaded location).

All potable water storage tanks require regular cleaning and maintenance. Tanks should be cleaned at least once/year preferably twice/year. Cleaning a tank regularly will overcome problems of odors and bad taste due to turbidity and bacteriologic contamination.

Onsite Disinfection of Potable Water Supply:

- Disinfection by Chlorination
- Disinfection by UV Radiation



Water Supply

Monitoring Potable Water Quality in Schools:

- Monitoring protocols should be introduced and sustained.
- Water samples should be tested weekly (mainly in schools having more than 250 students).
- Standard methods for bacteriological water testing should be followed to detect the presence of fecal organisms in water.
- Municipal water sources disinfected by chlorination should be checked for the level of the free residual chlorine levels (0.2-0.5 mg/L) at least twice/week to insure bacteriologic water safety.
- Assessment of the water quality chemical profile should be done at least twice/year.

Water Basins:

- All schools should have water basins to promote hand washing and as such personal hygiene practices.
- Wash basins should be located near toilets, preferably in the room leading to the toilet.
- All washing basins should have running cold and hot water, soap and paper towels.

Food Safety and Nutrition:

- Food handlers must be in good physical health, be free of symptoms of communicable diseases, and not have skin conditions such as open or infected cuts, burns, or sores.
- Food handlers must have clean hands at all times and should not wear rings. Hands must be washed with soap and hot running water before beginning work; after using the toilet; coughing; sneezing; using a handkerchief or handling any object that may contaminate food; and between other operational functions and the return to food preparation or handling functions.
- Fingers should be kept out of the mouth and away from the hair, face, and nose. And, workers must not eat, drink, or use tobacco products in food areas.

Food Safety and Nutrition:

- Food handlers should wear plastic gloves when handling food.
- Food handlers must also wear clean white aprons and secure their hair with a hairnet, hat, or fastener.
- Adequate equipment must be provided and maintained
- All perishable food should be stored at 4 degrees Celsius.
- Food thermometers should be used to monitor temperatures constantly at all stages of food handling (storage and preparation).
- Food and the food handling areas should be protected from contamination
- Hazard Analysis of Critical Control Points (HACCP) should be implemented in managing raw and prepared food products.
- Food handlers should be trained on HACCP to insure food safety at school.
- Nutritional programs should be initiated and implemented in schools to limit consumption of junk food.

Sanitation:

- Toilet facilities should be located in separate rooms for boys and girls.
- Toilets should have outside exposure and should receive ample sunlight.
- Basement toilets should be avoided due to lack of direct sunlight and difficulty in ventilation.
- Doors of toilets should be self-closing.
- Toilets should be properly vented by windows and functional toilet fans (suction fans).
- The total number of toilet fixtures should be divided equally among toilet rooms.
- A distance of 60 cm between back to back toilets should be allowed for maintenance access.
- Sanitary fixtures in mixed schools (girls and boys) should include water closets and urinals.
- All toilets should have running water and should be provided by toilet paper to promote personal hygiene practices.

Solid Waste Management:

- The school must be kept free of accumulated refuse. The following practices are recommended:
  - The storage of solid waste in containers that are waterproof and rodent-proof, with tight-fitting lids,
  - The use of plastic bags to line covered containers, and
  - The removal of solid waste daily from classrooms and other school areas.

- Schools should take a leadership role in recycling.
- Good record keeping is essential to the success of solid waste reduction programs.
- Solid waste audits should be conducted at school.
- Students are an excellent resource for waste stream record keeping. At the end of the audit period, students can report to the whole school about their findings.

Housekeeping:

- Cleaning sidewalks, floors, carpets, laboratories, toilets, dusting desks and chairs and emptying wastebaskets should be performed daily.
- Cleaning and dusting blinds and shades and waste baskets and scraping floors should be done weekly.
- Dusting walls, cleaning light fixtures and washing windows should be done monthly.

Certified Staff at School:

- Certified school nurses are needed in all schools to promote the provision of basic health services, promote health record keeping and to provide emergency health services.
- Schools should be provided with an equipped nurse room and a first aid kit.
- Psychoanalysts and speech therapists should be available in schools to insure proper psychosocial counseling and proper speech therapy. As a start, such services can be made available at the district level based on a properly documented school referral system.
- Health advisors should be available in all schools. This category of certified personnel is very important and should be trained and mobilized to promote the healthy school environment (deliver awareness on violence prevention; sex education and STDs awareness; tobacco and drug abuse).

Routine and Emergency Medical Care Systems:

- Routine documented physical check up should be provided in all schools.
- This type of health care should cover all children in all schools throughout the country, and should be provided units approved by units the Ministry of Public Health.
- Health records in schools should be properly maintaining to evaluate potential environmental health/safety risks. This can serve as a warning system to direct environmental interventions and reduce risks.
- Health insurance schemes against accidents and in case of death should be provided by schools and should cover all school children.
- Schools should have a defined documented plan on how to deal with heath emergencies; first aid assistance, means of transfer to health center/hospital and how and when to inform parents.

Provision of Services for Physically Challenged Students

- Schools should have a special wheel chair slanted entrance where school entry is through a stairway.
- Physically disabled children should be allowed to use, where available, the school elevator.
- Schools stairways should have special supportive rails.
- Schools should have a bathroom with a special supportive rail for use by physically challenged children.
- The Ministry of Education Decree 9091/2002 specifies that schools should provide all the necessary facilities to accommodate children that are physically challenged.


Thank you!