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Regional Office of the World Health Organization

http://www.paho.org

Taller Mercurio en el sector salud: uso, riesgos y tendencia internacional de sustitución

Toxicidad del mercurio, efectos a la salud y el ambiente

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Esbozo

Usos y emisiones de mercurio

Tranformaciones de mercurio en el ambiente

Fuentes de exposiciones y toxicologia:

- Mercurio metalico - Hg^{o}
- Mercurio inorganico - Hg^{++}
- Mercurio organico - $MeHg^{+}$ and EtilHg

Uso de mercurio en salud pública

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Mercurio: algunos factores de relevancia

- Diversidade de formas y compuestos – metalico, inorganico, organico
- Persistente = tiene una vida media larga

- Transporte a larga distancia - atmosfera o por la migracion de las cadenas alimentares - bio acumulado en la forma organica

- Peor: niveles relativamente bajos de exposicion al mercurio organico durante la vida prenatal pueden tener efectos negativos en el desarrollo neurocomportamental de las crianzas

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Fuentes ambientales de exposición

- Produción de chloro-alkali
- Mineria artisanal de oro y plata
- Mineria de mercurio
- Quema de combustibles fossiles
- Incineradores de desechos
- Volcanoes

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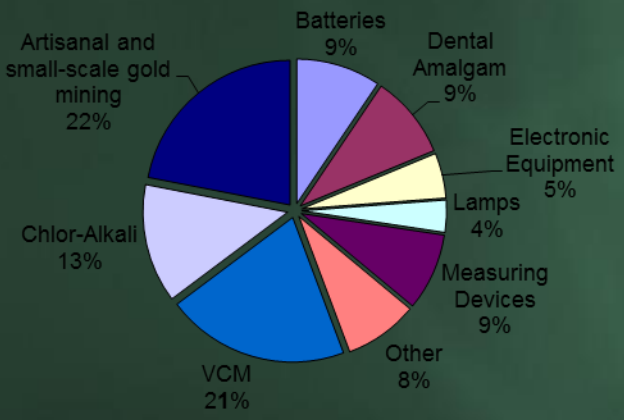
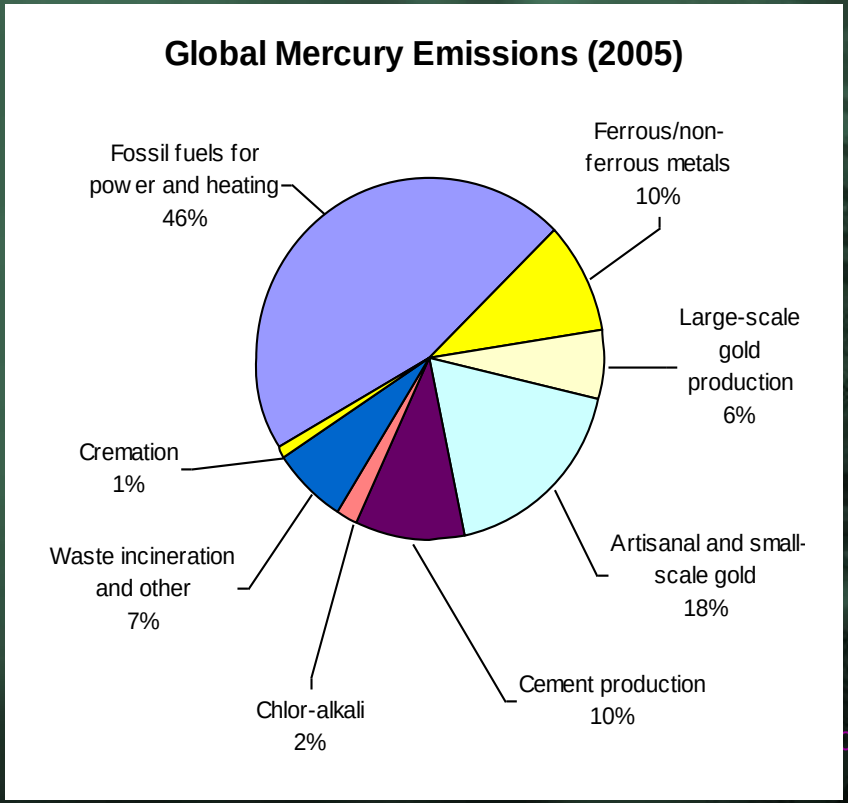
Mercury use and emission

Global Mercury Use
3760 Metric Tons, 2005

Atmospheric emission
1930 metric tons

Global mercury use





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Usos en sector salud

Amalgama dental

Thermometers

Esfigmomanometers

Thiomersal en vaccunas

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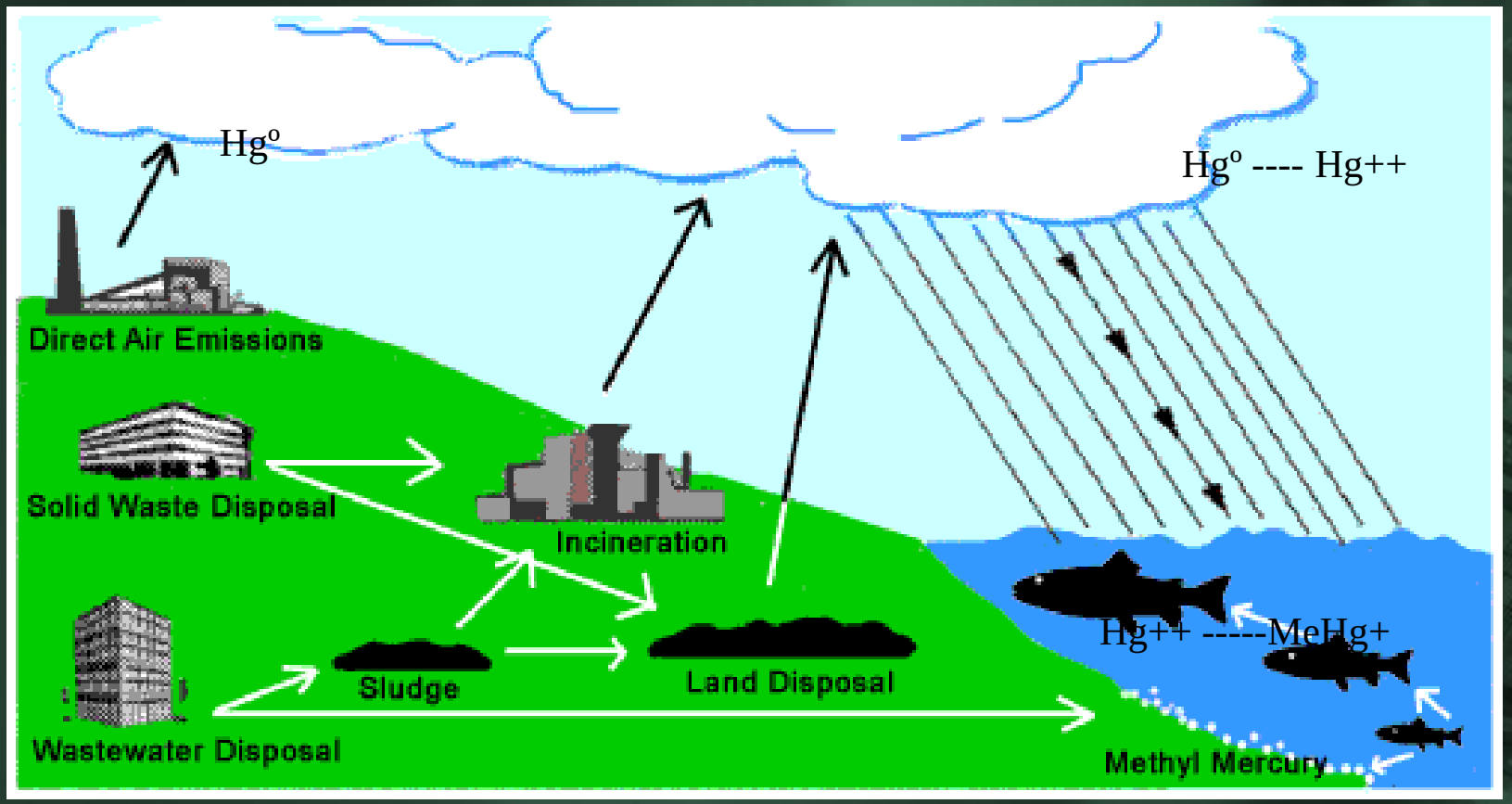
Mercurio en el ambiente



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Bioacumulacion

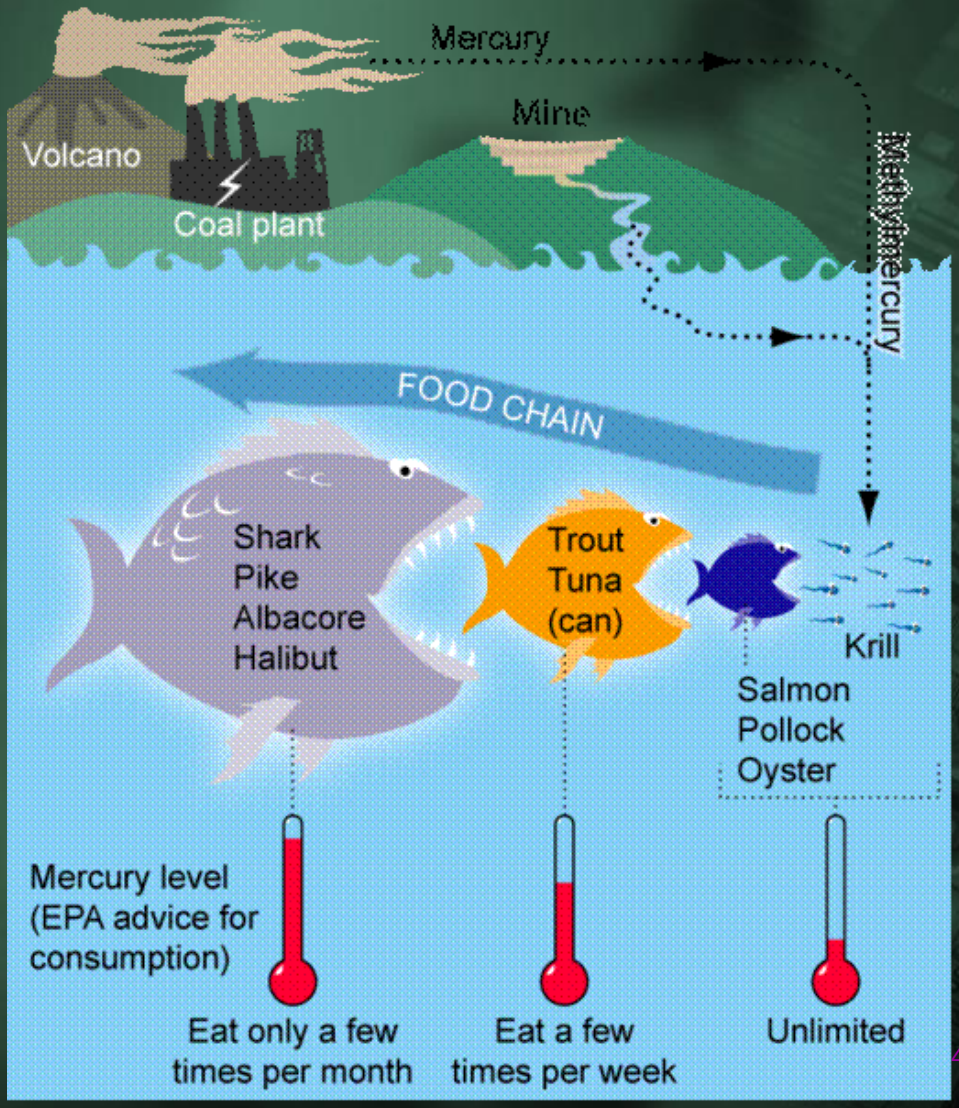
Cadenas alimentares

Nível trófico

Taja metabolica

Migración

Distribuición mercurio local



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Exposición mercúrio metálico

- Ocupacional
- Amalgam dental
- Rutas de exposición – inhalación (75-85% absorption)

- Central nervous system

- Acute exposure - psychotic reactions characterized by delirium, halluci-nations, and suicidal tendency

- Occupational exposure - irritability, fatigue, loss of memory, excitability, excessive shyness, and insomnia

- Continuing exposure - fine tremor develops of hands - eyelids, lips, tongue; violent muscular spasms in the most severe cases.

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Inorganic mercury

Oxidacion del mercurio metalico en sangre

Cremas de aclareamiento de piele – bloquea producion de melanina

Toxicidad – functiones renales

Riñones – proteinuria

Síndrome nefrótica – respuesta imunologica

Dermatites-pink disease

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Mercurio organico: metil mercurio

Crianzas y adultos

Ingestion – sangre - sistema nervoso central - cerebellum, visual cortex and sistema nervoso periferico - afinidade con sulfidril de las proteinas – cabello como biomarcador – recapitulacion de exposicion

Dependendo de la dosis – sintomas y siñales clinicos - paraesthesia (loss of sensation in the extremities and around the mouth), ataxia (impairment of the gait), dysarthria (impairment of speech), impairment of hearing, tremor in the limbs and constriction of the visual fields

Brote en Iraq - paraesthesia con niveles de mercurio en cabello 50 to 120 ppm ataxia, dysarthria y otros agravos mayores que 300 – 500 ppm Hg cabello

Minamata – peak of 700 ppm Hg cabello

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Metil mercurio – vida prenatal

Elevadas exposicione maternas (200 – 500 ppm Hg cabello) - parálisis cerebral, microcefalia, hyper-reflexia, gross motor and mental impairments, blindness and deadness.

Sistema Nervoso en desarrollo – MeHg afecta division y migración cellular – disrupciones en la sinteses the sustancias celulares, mitose, alteranciones nas formaciones sinapticas y citoarchitectura abnormal, etc

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Vida prenatal – bajas exposiciones

Exposiciones relativamente bajas (8 – 30 ppm Hg cabello) asociadas con atrasos en el desarrollo neuro motor durante los primeros 6 – 8 años de vida

- New Zealand – 8 – 10 o 20 – 25 ppm
- Faroes Islands 10 -20 ppm – similar to Iraq
- Seycheles – 20 -30 ppm

Beneficios de consumo de pescado - acidos grasos omega 3 fatty acids, selenium antagonistic efectos toxicidade MeHg

Riesgos y beneficios consumo de pescado
http://books.nap.edu/catalog.php?record_id=11762

Fish advisories based on each local context is required to ensure methyl mercury protection during prenatal and early postnatal life.

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Niveles de referencia

JECFA provisional tolerable weekly intake
1.6 µg/kg body weight/week

US EPA reference dose
0.1 µg/kg body weight/day

Agency for Toxic Substances and Disease Registry minimal risk level
0.3 µg/kg body weight/day

SOURCES: FAO/WHO JECFA, 2003; US EPA, 2001; ATSDR, 1999

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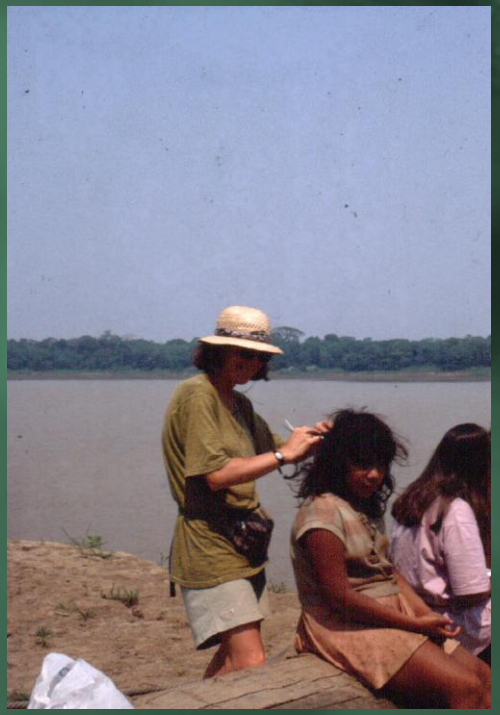

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Health sector use of mercury

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Health sector use of mercury: Dental amalgam

- Almost all countries use dental amalgam: Alternatives are more expensive and have technical limitations
- WHO 2009 technical meeting, co-supported by UNEP, recommended a phase down be pursued by:
  - Promoting disease prevention and alternatives to amalgam
  - Research and development of cost-effective alternatives
  - Education of dental professionals and raising public awareness

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Mercury thermometers and blood pressure measuring devices (BPMD)

- Breakage results in exposure of patients, health care workers, etc and creates hazardous waste
- WHO recommends use of mercury-free thermometers and BPMD in health-care and domestic settings.
- Validated and affordable alternatives are available, including for calibration in clinical setting.
- Thermometers are cheaper and have a shorter life than BPMD

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Thiomersal containing vaccines and global public health

- Thiomersal containing vaccines are essential medicines

  - used in over 120 countries to immunize at least 64% of global birth cohort each year

  - protect against four major killers; diphtheria, tetanus, pertussis, and *Haemophilus influenzae* type b disease

  - estimated to avert at least 1 400 000 child deaths per year

- Thiomersal-containing vaccines are also used by developed and developing countries to protect their populations against pandemic (influenza) and epidemic (eg meningitis in Africa) threats

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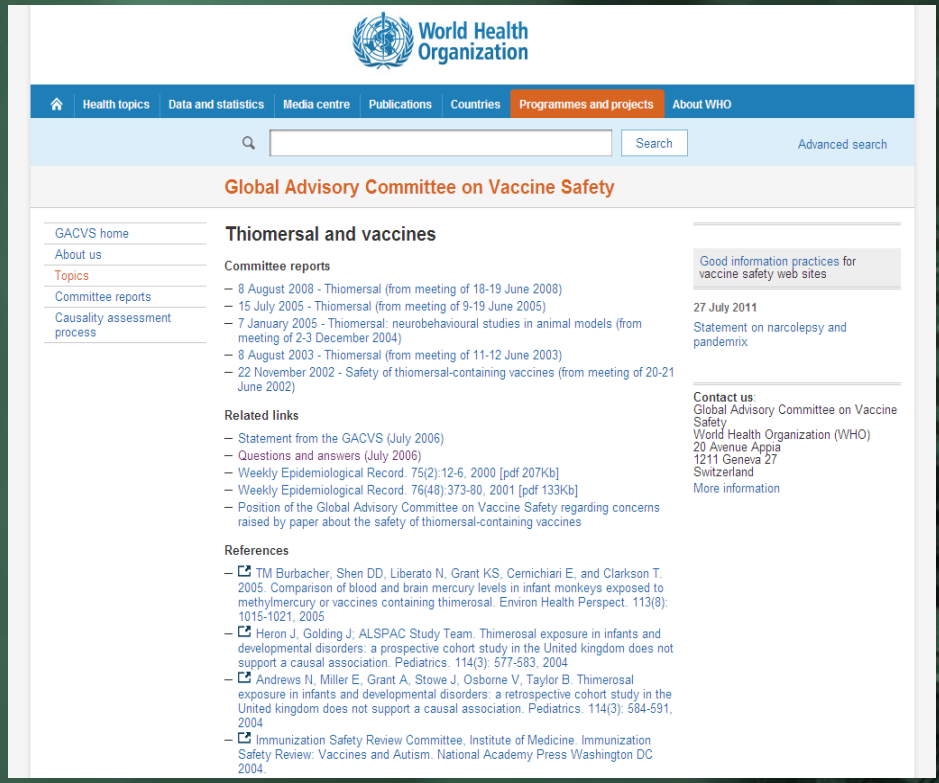
Thiomersal and vaccine safety

- High-quality population-based studies conducted in several countries since 2000 conclusively show that vaccines that contain thiomersal are very safe
- There is no credible scientific evidence that thiomersal-containing vaccines cause autism



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Alternative preservatives

- There is very little evidence that a range of vaccines can be preserved with alternatives such as 2 phenoxyethanol
- Extrapolation from a few examples (such as injected poliovirus vaccines) that all vaccines can be switched to an alternative preservative is not supported by evidence

Thiomersal-free vaccines

- Thiomersal-free vaccines would have to be available in 1 or 2 dose presentations, rather than the 10-dose products currently used by most countries
- This would double the cost of vaccines and the global immunization effort; as immunization will need to continue in the long term, this will be an additional cost long into the future
- A switch to single-dose vials alone would require more raw materials, more energy for manufacturing processes and transport, and more waste

The environmental impact of thiomersal-free vaccines is not negligible

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International distribution of vaccines

- Vaccines that contain thiomersal are manufactured in no more than 40 countries but used in over 120 countries
- Vaccines require import permits to be traded across international borders
- The introduction of new provisions on vaccines that contain thiomersal will introduce potential technical barriers to trade which may inhibit access to life-protecting products

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WHO response on the use of thiomersal in human vaccines

- The amount of mercury involved with thiomersal use in vaccines is very small compared to other sources of mercury
- There is no evidence that suggests a possible health hazard with the amounts of thiomersal currently used in human vaccines
- WHO recommends multi-dose vaccine vials for routine immunization programmes in many countries because they are safe and effective, they limit the required storage capacity and help reduce vaccine costs
- Alternative presentations would incur significantly higher costs in manufacturing procedures and new regulatory approvals, thereby limiting the ability to offer affordable vaccines

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Role of the health sector in addressing health impacts of mercury

1. Providing the health evidence and raising public awareness about the health implications of mercury exposure
2. Setting health-based guidelines and targets for mercury exposure
3. Providing clinical management and educating health workers
4. Reducing health sector use of mercury-added products
5. Working with other sectors in advocating effective health-positive interventions and safer alternatives, with special emphasis on vulnerable populations
6. Sharing knowledge and participating in international mechanisms to solve problems
7. Assessing impacts of policies through monitoring and evaluation

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Further Information

WHO INC3 Submission: INC3 website

WHO chemical safety website www.who.int/ipcs/en/

Global Tools for substitution
of mercury thermometers and BPMD in health care.
WHO HCWH project website
www.mercuryfreehealthcare.org

WHO Immunization, biologicals and vaccines website:
www.who.int/immunization/en/

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