ENVIRONMENTAL MEDICINE

RISK ASSESSMENT & HEALTH EFFECTS

4 : Models of Risk Assessment

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WHO definition of health

‘A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’

It is well established that health is influenced by a very broad range of factors

Models of Risk Assessment

Key Factors That Determine Health

Fixed	Social & Economic	Lifestyle & Behaviour	Access to Services	Environment
Genes	Poverty	Diet	Education	Air quality
Gender	Employment	Physical activity	Health services	Noise
Age	Social exclusion	Smoking	Social services	Housing
	Community	Alcohol	Transport	Water quality
	Structure & supporting infrastructures	Sexual behaviour	Leisure	Social environment
		Drugs		Sun exposure
		Coping skills		Disease vectors (eg mosquitoes)

RISK:

The probability that, in a certain timeframe, an adverse outcome will occur in a person, group of people, plants, animals and/or ecology of a specified area that is exposed to a particular dose, or concentration, of a hazardous agent.

RISK ASSESSMENT:

The process of estimating the potential impact of a chemical, physical, microbiological psychosocial hazard on a specified human population, or ecological system, under a specific set of conditions and for a certain timeframe.

Issue of

VOLUNTARY RISK

vs

IMPOSED RISK

The community is very accommodating of Voluntary Risk, and much less of Imposed Risk

TABLE 1: RISKS TO INDIVIDUALS IN NEW SOUTH WALES

	Chances of Fatality per Million person years
Voluntary Risks (average to those who take the risk)	
Smoking (20 cigarettes/day)	
• all effects	5000
• all cancers	2000
• lung cancers	1000
Drinking alcohol (average for all drinkers)	
• all effects	380
• alcoholism and alcoholic cirrhosis	115
Swimming	50
Playing rugby football	30
Owning firearms	30
Transportation Risks (average to travellers)	
Travelling by motor vehicle	145
Travelling by train	30
Travelling by aeroplane	
• accidents	10

Cont…….

…Cont. Table 1: Risks to Individuals in New South Wales

	Chances of Fatality per Million person years
Risks Averaged over the Whole Population	
Cancers from all causes	
• total	1800
• lung	380
Air pollution from burning coal to generate electricity	0.07-300
Being at home	
• accidents in the home	110
Accidental falls	60
Pedestrians being struck by motor vehicles	35
Homicide	20
Accidental poisoning	
• total	18
• venomous animals and plants	0.1
Fires and accidental burns	10
Electrocution (non-industrial)	3
Falling objects	3
Therapeutic use of drugs	2
Cataclysmic storms and storm floods	0.2
Lightning strikes	0.1
Meteorite strikes	0.001

Models of Risk Assessment

Predominantly **Risk Assessment** focuses on major disasters/catastrophies. There is little provision with current models of Risk Assessment to incorporate adverse health effects that have long outcome periods.

Worth noting that with all disease/injury ("ill health") the community adopts a position anyway. If not predicted or forecast, does become expensive for:

- Government
- The business entity/organisation
- The employees
- The local community
- Social services
- Health services
- The environment

The long term aim of any **Risk Assessment** process is to ensure that any activity undertaken (a business; building; process) does not adversely affect the health of the community. This is the responsibility of Occupational, Environmental and Public Health Physicians.

> "Health considerations should form part of any impact assessment for developments, or decisions, that could have health consequences".

There is overwhelming evidence that development can have a **beneficial effect** on health and wellbeing; through the creation of employment, promotion of economic advancement and providing circumstances which can improve living standards. Development can also have **adverse effects**, through problems such as noise, water and air pollution, and increased risks of injury and disease transmission. Development may also impact on the social and emotional status of individuals and communities through, for example, alienation and dis-empowerment. Some community members may be particularly susceptible to both the physical and social impacts, such as children and the elderly.

CONCEPT OF 'SUSTAINABILITY'

Community

On the broadest scale – "there is no net loss of human and natural capital"

Government

Continues to attract business, industry and development, so generating income, noting the costs for this in the short and long term.

Industry

Their project/enterprise will be viable for the life of the endeavour and encouragement to reinvest for long term commitment.

Models of Risk Assessment

NSW – *Environmental Risk Impact Assessment Guidelines – Hazardous Industry Planning Advisory Paper No. 3 –*
Department of Planning 1991.

- Preliminary Hazard Analysis at "early stage" of project. During development application and Environment Impact Statement (EIS)
  - Identify all potential hazards
  - Analyse effect (consequence) on people and environment and likelihood (probability) of occurrence
  - Quantify resultant risk levels to surrounding land use and environment

NSW Guidelines

1 month prior to commencement of construction

- construction safety study, to assess hazardous incidents
- hazard and operability study
- final hazard analysis and risk assessment
- fire safety study
- transport of hazardous materials

2 months prior to commencement of operations

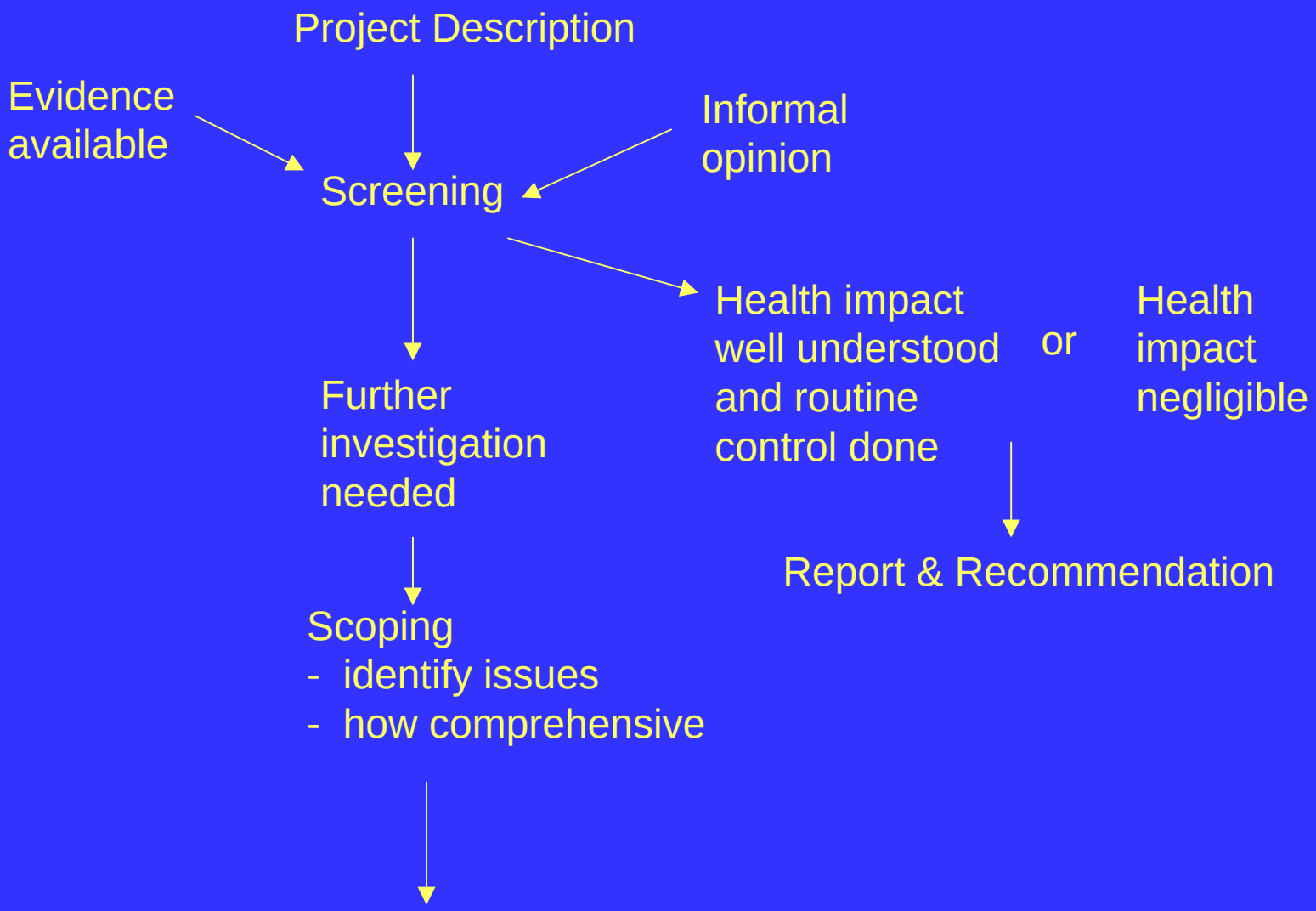
- emergency plan (to include detailed procedures for the safety of people in areas outside the development
- safety monitoring programme and record keeping
- maintenance programme and records

Incidence reporting

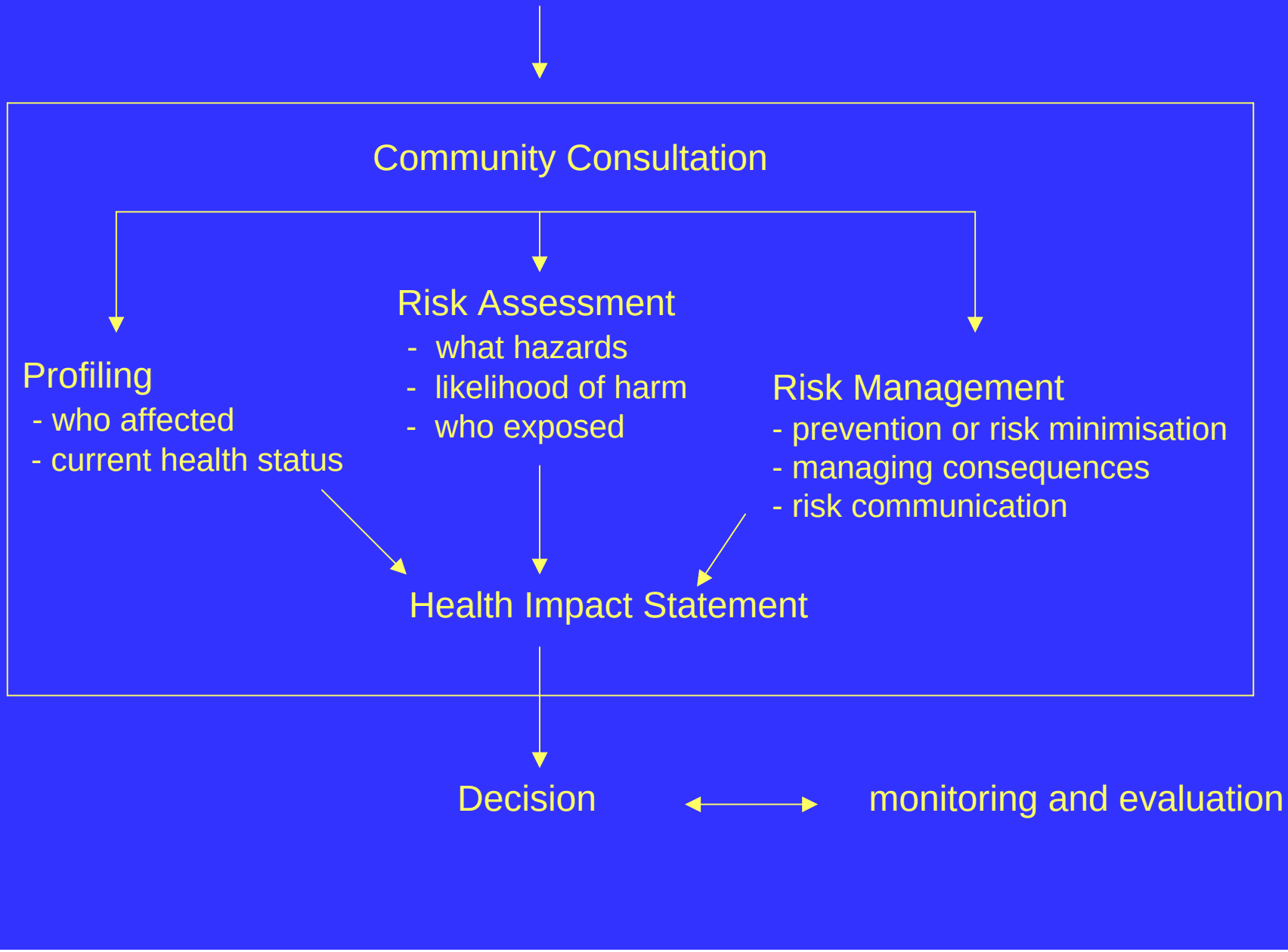
Hazard audit 12 months after commencement of operations.

Compliance

New Project Activity



Models of Risk Assessment



Health Impact Assessment (HIA)

Environment Impact Assessment (EIA)

HIA

The process of estimating the potential impact of a chemical, biological, physical or social agent on a specified human population group under a specific set of conditions and for a certain timeframe.

By ensuring that immediate and future health needs can be protected, the possibility of sustainable development is strengthened by HIA.

Health Impact Assessment

This needs to predict what the community expects, both currently and in the future. The community anticipates long duration good health. Any adverse health issues will reflect:

- visible (smoke, plumes, fugitive emissions, waste dumps)
- odour
- noise (plant, vehicles)
- dust
- spillage (in-plant, access roads)
- chemicals (arsenic, cyanide, acids, alkalis)

Issue of large plants often very visible and belong to well-known corporate organisations

vs

Multiple small businesses often in small suburban areas, little information, no knowledge of regulations/requirements.

An HIA seeks to ensure both positive and negative impacts on health are effectively considered.

Box 1

Examples of potential health impacts that may need to be considered during HIA

General environmental aspects that may impact on health:

- Increased demand and/or improvements to public infrastructure (water supply, sewerage, waste management, health, education, other government services).
- Altered risk from acute hazards, eg. Fires, spills during transport or handling of materials.
- Altered motor vehicle traffic leading to changed risk of injury or air pollution.
- Damage to vulnerable ecosystems that are of importance to human health.
- Impact on health or amenity through changes to odour, noise, dust, insects, shade, vibration, light spill, etc. (including what are historically referred to as environmental health nuisances).
- Encourage/discourage health forms of physical activity eg. Walking or cycling.

Potential impacts on physical health:

- Communicable/infectious diseases (eg. Spread of STDs, mosquito-borne disease).
- Non-communicable diseases – cardiovascular disease, cancer, asthma, etc.
- Exacerbation of existing conditions.
- Injury, eg. From trauma.

Cont…..

Cont…. Examples of potential health impacts that may need to be considered during HIA

Social impacts which have a health effect:

- Employment opportunities created/lost
- Effect on local government revenues.
- 'Spin-off' effects on local industry.
- Changes in social conditions (way of life) or demographic changes leading to health consequences eg. the likelihood of changes to alcohol consumption in an area.
- Mental and emotional wellbeing of a community (eg. is the development likely to cause or allay stress, anxiety, nuisance, discomfort).
- Altered (improved or decreased) opportunity for recreation or socialisation.
- Increased or decreased isolation of individuals.
- Shifts of population into or out of the affected area and the health impacts of such shifts.

Special populations that may need to be considered include:

- the elderly;
- the disabled;
- persons of low socio-economic status;
- children – born and unborn;
- persons with a non-English speaking background
- indigenous Australians;

Specific examination of the demography of the area under consideration may reveal other groups to be considered.

Models of Risk Assessment

In WA we learn that during the early planning phase of a project, it is only the project proposers who are expected to consider issues of Health Impact.

If they nominate there is potential for such impact, they "notify" the DOE. The DOE indicates it is not their problem and refer the issue to DOIR (ex Department of Mines).

At DOIR there is no process for HIA. There is an elaborate process for Risk Assessment regarding major events, fire, spillage, emissions. The negotiated result usually pleases no one.

Long term liabilities are never addressed!

Models of Risk Assessment

There is no “formula” and no specific guideline on how to proceed, or complete such a process. Experience and “corporate memory” remains important.

I contend that Public Health Physicians and Occupational Physicians are best placed to facilitate this process by:

- Their knowledge of health issues
- Association of health effect with exposures
- Previous knowledge of “classic examples”
- “Corporate measuring”

A process is needed to ‘predict’ possible long-term issues for the benefit of

Government costing
Industry insurance
Community development
Possible liabilities

It is expensive dealing with angry and disillusioned communities and individuals

Thank you

Brian Galton-Fenzi

Items for consideration during HIA

- General environmental aspects
- Potential impacts on physical health
- Social impacts which have a health effect
- Special populations needing consideration

It is the proponent's role to prepare an HIS (Health Impact Statement) addressing the issues identified during scoping.

With the Health Authority providing it's view on the health risks requiring attention:

Along with data needed for a general impact assessment, additional data for an HIA includes:

- demographic and health status of involved groups, children, elderly
- environmental health data including impact on food grown, animal husbandry
- additional demands on community infrastructures, sewerage, water, waste management, schools, health and social services
- transport issues, risk of injury, pollution, amenities
- social and economic impacts

An example:

Major mining operation resulting in a waste heap of material with minor raised radioactivity. Debate now focussed on rehabilitation now the mining has ceased.

Requirement to return the land to it's former condition. Problem relates to the heap site as, despite returning the material to the mined area, local levels of radioactivity will always remain above background levels.

What issues for : local fauna
: animal husbandry
: no rehabilitation