HPAI HIGHLY PATHOGENIC AVIAN INFLUENZA
PRO-POOR HPAI RISK REDUCTION

Controlling Avian Flu and Protecting People's Livelihoods in the Mekong Region, Africa and Indonesia

Integrating CBA with Risk Assessment for the Synthesis Analysis

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IFPRI

ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

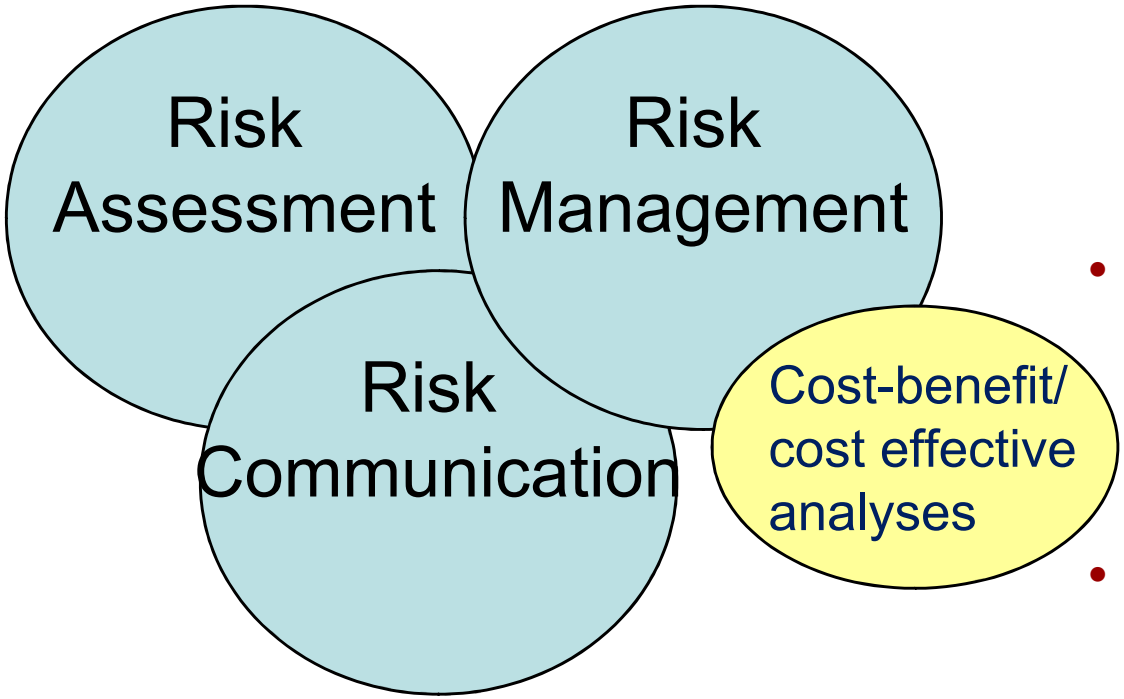
Figure 5. Drawing by S. Harris; © 1979 *The New Yorker Magazine*.

Risk analysis

A process composed of:

- Hazard identification
- Risk assessment
- Risk management
- Risk communication

Traditional Risk Analysis Framework

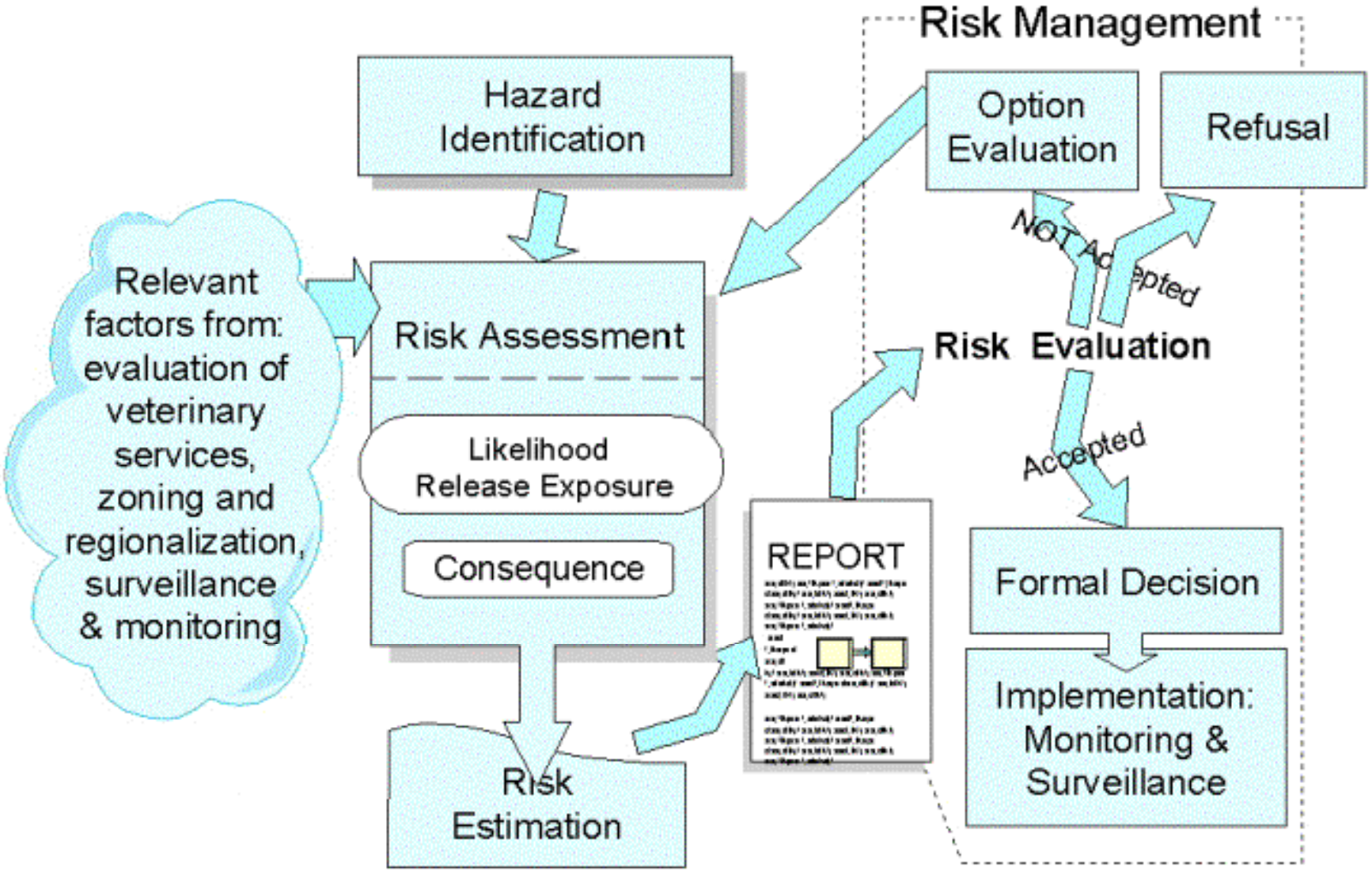


- Risk assessment - evaluation of the likelihood of entry, establishment, and spread of disease identified as the hazard as well as the biological and economic consequences of the disease.
- Risk management -evaluation of how to best mitigate the risk and to determine the cost to society of the action.
- Risk communication -identifying ways to interact with the public as stakeholders and inform them of risk findings so that their decisions can be adequately informed.

When to do a risk analysis interms of animal disease situation?

- When importing a new product or species
- When importing from a new country or zone
- When the health status of a country or zone changes
- During the process of regionalization or compartmentization
- To promote the export of commodities

Process of Risk Analysis



Hazard

- **Source for potential damage**
- **Cause of the adverse event**

Hazard identification

- Identify pathogenic agents associated with the product
- Determine diseases present in the exporting country or zone
- Establish priorities in the risk analysis

SPS Risk Assessment Definition

". . . evaluation of the likelihood of entry, establishment or spread . . ."

". . . according to the sanitary and phytosanitary measures which might be applied . . ."

". . . and of the associated potential biological and economic consequences [adverse effect] . . ."

Risk Assessments

- Can be quantitative or qualitative

Risk Assessment

- Release assessment
- Exposure assessment
- Consequence assessment
- Risk estimation

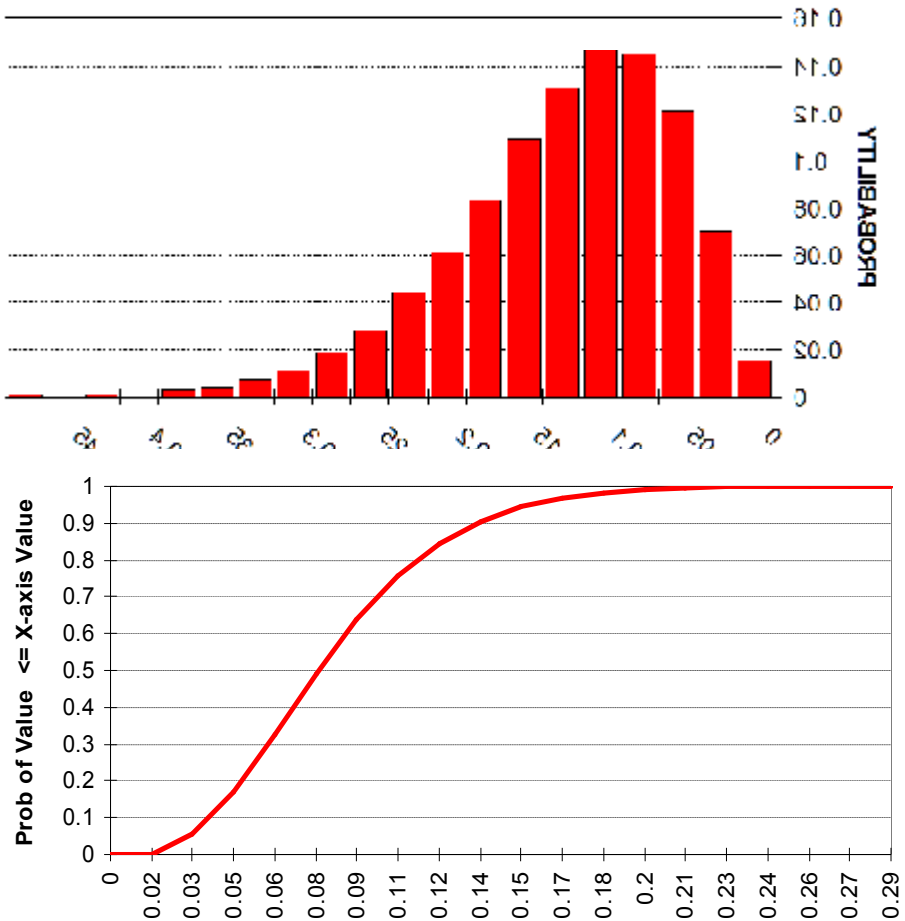
Output of traditional risk assessment

Probability of occurrence of an adverse event

and

the magnitude of consequences

Risk assessment results



- Frequently expressed as a distribution of probabilities
- These results reflect variability and uncertainty

Consequence Assessment

- Direct consequences
  - Production losses caused by disease or death of animals
  - Public health consequences

Consequence Assessment

- Indirect consequences
  - Cost of control and eradication
  - Compensation
  - Trade losses (domestic and international)
  - Environmental consequences

Direct and indirect consequences are being assessed under disease risk work stream, livelihood impact work stream, and synthesis analysis.

Livelihood impact outputs Indirect and Direct effects

- Micro level effects -Partial equilibrium of effects on micro regions where intensity of poultry is higher. In addition, estimates on price elasticities, income and consumption effects, and nutrition effects at HH level

- Economy wide – General equilibrium effects of disease and economy wide elasticities of effects

Institutional mechanisms outputs

- Value chain analysis
- Inventory of different institutional mechanisms to control HPAI
- Parameter estimates capturing the effectiveness of various institutional control measures

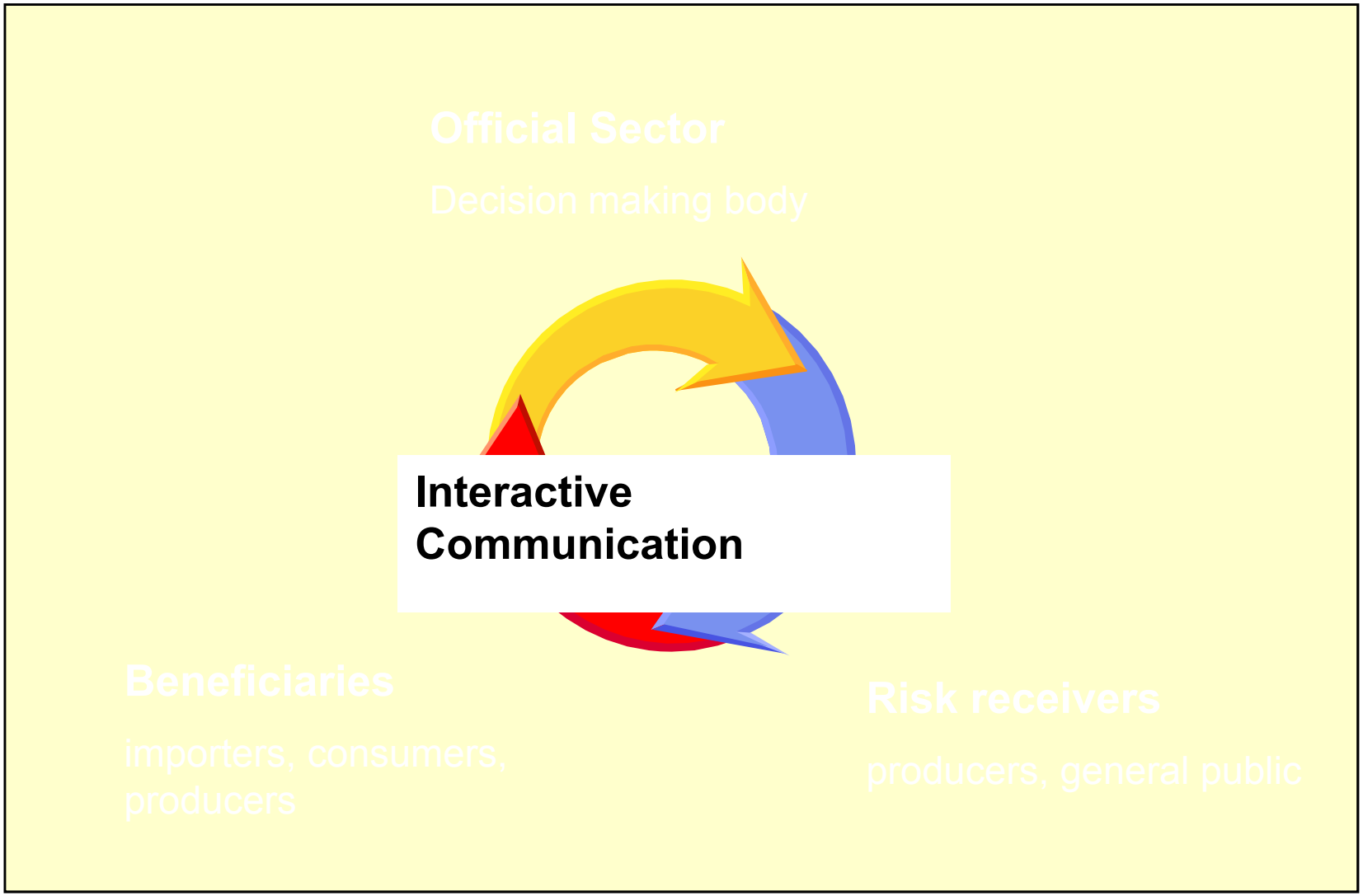
Risk Estimation for the Risk Anlaysis

- Integration of the results from
  - Release assessment
  - Exposure assessment
  - Consequence assessment

Risk Management

- Risk evaluation
  - Determination of the appropriate level of protection
- Option evaluation
  - How to best mitigate the risk and the cost to society of such action?
  - CBA evaluates the costs and benefits of possible control decisions (options)
  - CEA evaluates the cost effectiveness of possible control decisions (options) on risk
- Implementation
- Monitoring and review

Risk Communication



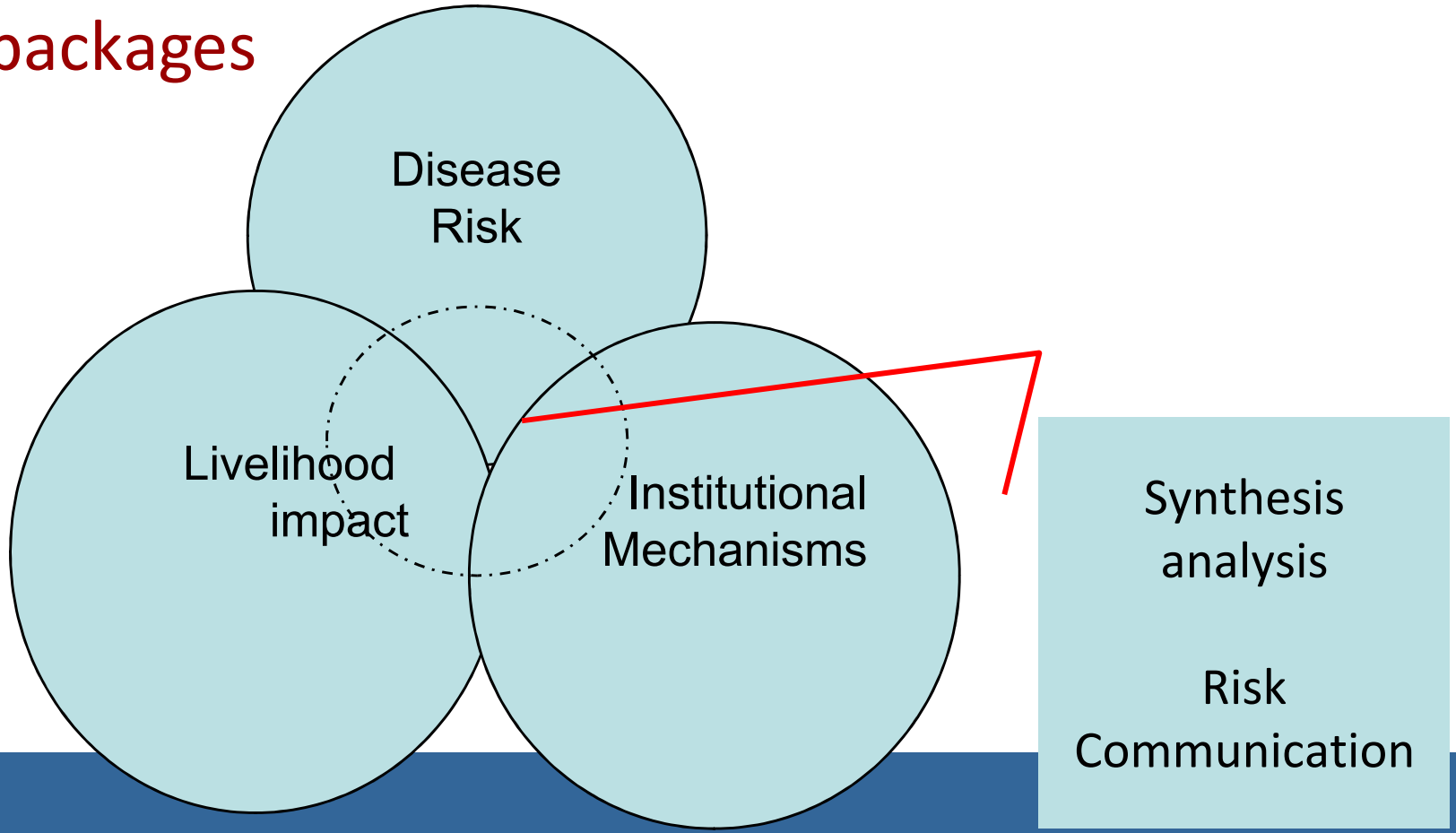
Risk Analysis Integrates All 3 components

- Risk analysis reduces subjectivity and provides a documented process
- Allows a more informed decision making process
- Requires training and good quality information

DfID funded Pro-Poor HPAI project

- Using a modified risk analysis approach, (risk analysis plus a number of other outputs) to inform decision makers of the potential impact of control measures on the poor

Work packages



Methodological Framework

HPAI HIGHLY PATHOGENIC AVIAN INFLUENZA
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Disease Risk
-Base line risk maps

-Risk pathways

-Disease probability models (qualitative and quantitative risk assessments)

-Spatial spread models

Livelihood Impact
- CGE analysis
- Household level analysis
- Nutritional analysis
-Qualitative analysis

Institutional Challenge
-Value chain analysis

--Assessment of role and effectiveness of various institutions in control efforts;

-Assessment of the costs and effects of risk reduction policies, institutional etc on disease risk

-Behavioral experiments

Synthesis

-CBA of various prevention/ control risk management options

-CEA of risk management options

-Simulation analyses capturing the effect of risk management strategies on:
a) biological efficacy of disease
b) economic efficiency
c) social desirability
d) political feasibility

Communication and advocacy

-Promotion of science-based, disease control decision-making with due consideration of socio-economic impacts)
- Analysis of (i) key stakeholders in poultry management in general and HPAI risk reduction and (ii) their key decisions that need supporting.
- Development of decision support tools suitable for various stakeholders.

Goal of the synthesis analysis

- To help governments to make informed decisions regarding HPAI control that minimize the impact on the poor.

Synthesis analysis work stream

- CBA/CEA associated with various prevention/ control measures (household, along value chain, institutional level).
- Simulation analyses capturing the effect of various risk management strategies on:
    - biological efficacy of disease
    - economic efficiency
    - social desirability
    - political feasibility
- Develop a decision tool utilizing all outputs to evaluate the spatial distribution of effects from HPAI and its control.

Cost benefit analysis

- Typically used by governments to evaluate the desirability of a given intervention in markets.
  - Understand the efficiency of the intervention relative to the status quo in an objective quantitative way of determining whether protections should be initiated, continued, or abandoned.

Economic efficiency

- Measured as the net contribution of an intervention to overall social welfare.

- For governments, acceptable (intervention) policies typically are when:

$$E(\text{Benefits}) \geq E(\text{Costs})$$

Optimal measure is:

$$E(MB) = E(MC)$$

Cost benefit analysis (CBA)

- Estimate the direct costs of control measures through data collection in study countries through household, value chain, and institutional surveys (analyzed synthesis analysis work stream)

Spread sheet model

$$C = L + R + P$$

Where:

C = direct cost per year

L = annual loss in expected outputs and wasted inputs due to disease

R = the increase in expenditures on non-veterinary recourses due to the disease

P = annual cost of disease prevention measures

Control methods in Indonesia

- Active and passive surveillance
- Ban on the movement of poultry and poultry products in and out of the infected area.
- Culling of affected and in-contact animals
- Paid compensation to layer farms with less than 10,000 hens and broiler farms with less than 15,000 bird per cycle
- Public awareness campaign
- Selective vaccination
- Closure of wet poultry markets in the area

Data needs for CBA

- Cost of improved biosecurity at household level (changes in housing structure, keeping wild birds from accessing feed and water supplies, thorough cleaning of all clothing, shoes, an equipment before coming into contact with birds); Costs for testing and diagnosis, and routine serology
- Vaccination costs and frequency, if done
- Education and technical assistance; public awareness campaign costs; training costs
- Surveillance costs to promote rapid disease reporting (farm level and value chain level) (public and private costs)
- Labor and distribution cost of control measures such as number of veterinary officers, assessors, cull teams, control strategy teams, travel requirements, disposal capacity (fed ministry)

Data needs (cont)

- Laboratory costs – budgets of vet institutes or private labs
- Compensation costs and eradication estimates (could be based on compensation paid out)
- Cost of depopulation and appropriate disposal, and loss of market value in the event of an outbreak
- Decontamination costs/cleaning and disinfection of infected and culled premises
- Disposal costs and associated transportation costs (incinerations, on-farm disposal, or off farm disposal)
- Travel and subsistence of staff working in the field, and salary of culling teams

Bio-economic simulation modeling approach

- Using Breukers, et al.'s (2008) method to assess the changes in outcomes from alternative disease management options
  - Adapted to simulate the propagation of disease through the supply chain with an economic consequences model and a cost-benefit analysis to create a cost-effectiveness trade-off curve that can inform policy decisions

Bio-economic model

Max profit = Poultry output prices - A priori costs + Expected costs of disease given the probability of the disease given a variety of interventions

Outputs of CBA

- Distribution of benefits and costs of HPAI control measures among different groups
- Excel spreadsheet model that estimates costs and benefits of control measures for decision makers to use
- Bio-economic model
- Decision toolkit comprising a set of possible consequences of one course of one action versus another (CEA)

Simulations

- No intervention - baseline
- Improved surveillance and increased flock segregation (including improved biosecurity and changes in patterns of poultry/people movement)
- Stamping out strategy
- Modified stamping, only culling animals with clinical signs
- Vaccination (once, twice, targeted, ring vaccination)
- Movement restrictions (live market and poultry movement)
- Targeted pre-emptive depopulations
- Combination of strategies