Interim Draft

1. Executive summary

Influenza, in its pandemic, zoonotic and seasonal epidemic forms, remains a formidable foe throughout the world. Since its initial detection in April 2009, the pandemic (H1N1) 2009 virus has spread quickly throughout the world causing death especially for those who are at risk of severe infection. Zoonotic infection by avian influenza remains a threat to human and avian species in many regions of the world. The potential of such animal viruses to evolve into pandemic viruses requires continuous monitoring. Seasonal influenza epidemics can result in an estimated 250,000 and 500,000 deaths worldwide each year. However, in many countries the magnitude of influenza’s burden is unknown; further, prevention and control measures are a low priority in view of competing public health priorities and uncertainty as to which measures are most effective.

The goal of The WHO Public Health Research Agenda for Influenza is to support the development of evidence needed to strengthen public health guidance and actions essential for limiting the impact of pandemic, zoonotic and seasonal influenza on individuals and populations. The research agenda aims to facilitate discussion, coordination and interaction among researchers, donors/funding agencies and public health professionals worldwide.

The agenda is a broad-based public health research strategy for influenza. It is built around areas of particular importance to public health decision-makers, especially those in less resourced countries. The research agenda is organized around a framework of five key research areas or "streams:")

- Stream 1: Reducing the risk of emergence of pandemic influenza
- Stream 2: Limiting the spread of pandemic, zoonotic and seasonal epidemic influenza
- Stream 3: Minimizing the impact of pandemic, zoonotic and seasonal epidemic influenza
- Stream 4: Optimizing the treatment of patients
- Stream 5: Promoting the development and application of modern public health tools

Within the research agenda, each research stream is represented with specific areas of focus as they were identified, supported by a brief rationale and a list of proposed research topics of interest is provided. Realization of this type of research can provide an evidence-based platform for policy decisions and public health practices to reduce the burden of influenza infection and its attendant morbidity and mortality globally.

Development of the research agenda is the result of input from public health decision makers, academic researchers and donor/funding agencies. Implementation of the research priorities outlined in The WHO Public Health Research Agenda for Influenza would be expected to provide benefits over a medium-to-long term period of approximately 10 years.
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3. Introduction

Influenza, in its zoonotic, seasonal epidemic and pandemic forms, remains a formidable foe throughout the world. The recent emergence of pandemic (H1N1) 2009 virus is a good example. Since its initial detection in Mexico and the United States in April 2009, the pandemic virus has spread quickly throughout the world, particularly among young people from ages 10 to 45. At this time, WHO considers the overall severity of the influenza pandemic to be “moderate” reflecting that 1) most people recover from infection without the need for hospitalization or medical care; 2) overall, national levels of severe illness appear similar to seasonal influenza, although high levels of disease have occurred in some local areas and institutions; and 3) hospitals and health care systems in most countries have been able to manage the numbers of people seeking care, although some facilities and systems have been stressed in some localities. Current patterns of serious cases and deaths that are occurring primarily among young persons, including the previously healthy and those with pre-existing medical conditions or pregnancy, is a concern.

WHO estimates that as many as 15 to 45 percent of the world’s population ultimately may become infected with the pandemic virus. Although the ultimate impact of pandemic (H1N1) 2009 is uncertain, previous pandemics have had substantial health-and economic-related costs.

The continuous circulation and reassortment of influenza viruses in nature represents an ever-present public health threat to both animals and people. The highly pathogenic avian influenza (HPAI) (H5N1) virus has exacted a heavy toll on poultry and the national economies of affected countries since its initial emergence in 1997 and subsequent extensive geographical spread. In addition, severe infections leading to death in human cases of avian H5N1 infection have occurred. Concern about the pandemic potential of H5N1 spearheaded a renewed focus on pandemic planning and response.

The very young, the elderly and persons with chronic medical conditions – a country’s most vulnerable populations – typically face the highest risks of death and serious costly complications from annual seasonal influenza. Seasonal influenza epidemics can affect up to 15% of the population and result in more than 500,000 deaths worldwide each year. However, in many under-resourced countries the magnitude and scope of influenza’s burden are poorly understood and prevention and control measures for both animal and human influenza are ceded a low priority in view of competing public health priorities.

The Need for a Public Health Research Agenda

Decreasing the risk and impact of influenza and improving how decision makers and health authorities handle such events could save large numbers of lives, prevent enormous health costs and economic loss and mitigate potential societal disruption. However, insufficient knowledge in many areas has hampered efforts to more effectively plan for and address pandemic influenza as well as zoonotic and seasonal influenza epidemics. A robust scientific knowledge base, therefore, is an essential foundation for modern public health practices and policy development related to influenza.

A number of WHO planning and guidance documents have highlighted the importance of research to fill gaps in our understanding of influenza disease and identified priority areas for immediate attention (1-4). Several animal and human health agencies and other organizations also have developed research priorities for influenza further supporting the need for extensive work in this area (5-12).
Despite these efforts, an overarching public health research agenda for influenza has not been developed to date. Moreover, international coordination has been lacking to prioritize and facilitate the funding and implementation of such an agenda. Previously identified research priorities have tended to focus on basic science questions and research and development related to antiviral drugs and vaccines. Although a public health research agenda must be underpinned by basic science, applied science and operational research are areas of particular interest to public health decision-makers, especially those in less resourced countries.

Scope of the Research Agenda

Although The WHO Public Health Research Agenda for Influenza takes into account issues raised by the pandemic (H1N1) 2009 virus, the global spread and zoonotic potential of HPAI (H5N1) and seasonal outbreaks of human influenza, it is a broad-based public health research strategy for influenza. It is not intended to be an exhaustive compilation of all possible research questions. Instead it is a focused, succinct framework of key research areas or "streams" related to public health control measures and policy development for influenza. Realization of this type of research can provide an evidence-based platform for policy decisions and public health practices to reduce the burden of influenza infection and its attendant morbidity and mortality globally.

Implementation of the research priorities outlined in The WHO Public Health Research Agenda for Influenza would be expected to provide benefits over a medium-to-long term period of approximately 10 years.

4. Development of the WHO Public Health Research Agenda

WHO is organizing a consultation meeting on 17-20 November 2009 to bring together public health decision makers, academic and clinical researchers and donor/funding agencies to finalize the research agenda for influenza based on public health priorities. In advance of the consultation WHO had developed the current interim draft of The WHO Public Health Research Agenda for Influenza after requesting input from technical experts and regional public health experts. In addition, the document builds on relevant priority activities and recommendations from the 2002 Global Agenda on Influenza (13,14) that remain incompletely realized, as well as research recommendations from recent consultations.

This interim WHO Public Health Research Agenda for Influenza will serve as the basis for discussion and review during the consultation. In addition, a Background Paper will be developed for each of the five public health research streams as outlined in this document. Each paper will review the existing evidence base for that stream and identify information gaps that impede the development of more effective public health control measures for influenza, especially in underresourced countries.

A final version of The WHO Public Health Research Agenda for Influenza will be published after the consultation.
5. WHO Public Health Research Agenda for Influenza: An Interim Draft

Goal

The goal for the development and implementation of a WHO public health research agenda for influenza is to support the development of evidence needed to strengthen public health guidance and actions essential for limiting the impact of pandemic, zoonotic and seasonal influenza on individuals and populations.

Objectives

The principal objectives of this research agenda are to:

- Provide a framework reflecting public health research priorities for pandemic, zoonotic, and epidemic influenza
- Identify specific research topics, reinforce and prioritize their importance in meeting public health needs over a medium-to-long term period
- Maintain a focus on relatively less well addressed areas such as operational research and research with applications in under-resourced countries
- Facilitate discussion, coordination and interaction among researchers, donors and public health professionals
- Highlight the need and benefits of a multidisciplinary approach to address knowledge gaps in public health related to influenza and its control

Organization of the Research Agenda

The research agenda is organized as a framework around five major public health research streams as follows:

- Stream 1: Reducing the risk of emergence of pandemic influenza
- Stream 2: Limiting the spread of pandemic, zoonotic and seasonal epidemic influenza
- Stream 3: Minimizing the impact of pandemic, zoonotic and seasonal epidemic influenza
- Stream 4: Optimizing the treatment of patients
- Stream 5: Promoting the development and application of modern public health tools

Within each research stream, specific areas of focus are identified supported by a brief rationale and a list of proposed research topics of interest.

Stream 1: Reducing the Risk of Emergence of Pandemic Influenza

The emergence of the pandemic (H1N1) 2009 virus and the global spread of HPAI (H5N1) have underscored the challenges in preventing the emergence of influenza viruses with pandemic potential. Any possibility of doing so will require a better understanding of the underlying factors that most strongly contribute to the emergence of zoonotic and pandemic viruses and methods to assess what risk such viruses may pose to people. Identification of effective control measures at the animal source and human behavioral modifications to reduce transmission at the human-animal interface are also needed.
1.1 Factors Associated with the Emergence of Influenza Viruses with Zoonotic or Pandemic Potential

Rationale: It has been possible to reconstruct the molecular events that likely have led to the emergence of past pandemic viruses. For example, the 1918 pandemic virus may have emerged after adaptive mutation(s) from an avian virus while the pandemic (H1N1) 2009 virus appears to have originated from reassortment between several different viruses circulating in pigs and other animals. However, the processes and factors leading to the emergence of pandemic influenza viruses remain incompletely understood both on a molecular level and on an ecological/human-animal interface level. Further, while it is well known that the genetic composition of circulating influenza viruses evolves continually, the specific changes that are predictive of pandemic potential in these variants are not known.

Current topics of interest:

1.1.1 Role of pigs, migratory birds and other intermediate hosts in the emergence and spread of influenza viruses with pandemic potential
1.1.2 Role of household flocks and herds, live animal markets, commercial farms and other animal husbandry systems in the maintenance and cross-species transmission of animal influenza viruses
1.1.3 Virus-specific factors associated with pandemic potential (e.g. infectivity, transmissibility and pathogenicity)
1.1.4 Development of enhanced virus information sharing platforms across multi-disciplinary fields (veterinary, medical and basic science research)

1.2 Factors Associated with Human Infection at the Human-Animal Interface

Rationale: Studies of past pandemics have highlighted the importance of domestic poultry and pigs in the evolution and emergence of animal influenza viruses which can be transmitted to humans. However, specific risk factors, activities and behaviors that have led to instances of human infections with animal influenza viruses have been difficult to elucidate. Further complicating this issue is the diversity of settings in which people interact with animals such as households, commercial farms and live animal markets.

Current topics of interest:

1.2.1 Potential modes of transmission in human infection with animal viruses
1.2.2 Role of human behavioral factors associated with infection by animal viruses
1.2.3 Identify genetic or other factors related to human susceptibility to infection with animal viruses

1.3 Preventive Measures and Surveillance at the Human-Animal Interface

Rationale: The primary prevention measure for human infection with animal influenza viruses requires elimination and control of influenza in animals. For example, poultry vaccination, culling of infected birds and decontamination of live bird markets have been used to control HPAI H5N1 and in some instances have been temporally associated with a decline in reported poultry and human infections. Since it is highly improbable that influenza viruses can be eliminated from animal populations, secondary prevention measures are needed to protect humans from infection after exposure to infected animals. These measures must be based on a clear understanding of risk factors associated with human infection. Surveillance for animal and human infections can give advance warning of circulating animal influenza viruses with zoonotic or pandemic potential and help assess the effectiveness of prevention and control measures.
Current topics of interest:

1.3.1 Evaluation of public health effects of animal (e.g. poultry and swine) vaccination policies under different epidemiological and field conditions
1.3.2 Development of joint animal and human health surveillance system to monitor influenza viruses with zoonotic or pandemic potential in countries with varying capacity and resources
1.3.3 Surveillance to assess human infections with animal influenza viruses among occupationally exposed populations including keepers of household flocks and herds
1.3.4 Trans-disciplinary research to identify biosafety and behavioral measures to reduce the exchange of influenza viruses between humans and animals that can be adapted to different social and cultural contexts
1.3.5 Development of social, political, economic and legal strategies for wider (broader) animal influenza outbreak reporting

Stream 2: Limiting the Spread of Pandemic, Zoonotic and Seasonal Epidemic Influenza

The rapid global spread of the pandemic (H1N1) 2009 virus, as well as the spread of seasonal influenza viruses within local communities and institutional settings such as schools, illustrates how difficult it is to limit human influenza transmission. Improvements in this area will require a better understanding of how influenza viruses are transmitted between people, the usefulness and feasibility of various public health control measures at the individual and population levels and an understanding of the dynamics of virus spread.

2.1 Factors Affecting Person-to-Person Transmission

Rationale: Influenza viruses can be transmitted by respiratory droplets, direct and indirect contact and small airborne particles. However, the relative importance of each of these routes and the role of virological, environmental, epidemiological and host-specific factors in establishing infection remain unclear. Refinement of recommendations for infection control and social distancing measures would benefit from a better understanding of influenza transmission.

Current topics of interest:

2.1.1 The relative importance of droplet, contact and airborne transmission in seasonal and pandemic influenza
2.1.2 Evaluation of transmission patterns and co-factors that influence infectivity in different settings (e.g. households, healthcare facilities, airplanes, schools, workplaces)
2.1.3 Transmission of influenza during different stages of infection in humans from incubation to recovery
2.1.4 Stability of human influenza viruses on different environmental surfaces and under varying conditions (e.g. humidity, temperature, presence of organic matter)

2.2 Public Health Measures to Limit Transmission

Rationale: Individual, household and community-level measures have been used during seasonal epidemics and pandemics to reduce transmission; however, their effectiveness remains unclear. These measures are not easy to implement and can incur substantial costs. For these reasons, public health decision makers need a firmer evidence base to support their use.

Current topics of interest:

2.2.1 The effectiveness and feasibility of individual-level measures to limit influenza virus transmission such as hand hygiene, natural ventilation in health-care and community settings and the role of masks and/or respirators in limiting transmission among patients, contacts and health-care providers
2.2.2 The effectiveness and feasibility of community-level social distancing measures to limit influenza virus transmission such as school closures and cancellation/restriction of public or mass gatherings

2.2.3 Evaluation of factors such as the extent of spread, severity of illness, demographic and resource settings and different social mixing patterns (e.g. schools versus businesses) that can influence the selection of public health measures and the timing of their implementation for seasonal and pandemic influenza

2.3 Dynamics of Virus Spread at Global and Local Levels

Rationale: Early observations of the pandemic (H1N1) 2009 virus have highlighted the role of travel and school outbreaks as early amplifiers of transmission in communities. Population mobility, factors that influence seasonal versus year-round circulation of human influenza viruses, transmissibility of variant strains and population-level susceptibility are some of the other factors that would likely affect transmission dynamics at global and local levels. A better understanding of the dynamics of influenza spread is needed to optimize use of public health measures.

Current topics of interest:

2.3.1 Understanding the seasonality of influenza virus infection in different regions and its implication in global spread of epidemic and pandemic influenza

2.3.2 Assessing the spread of epidemic and pandemic influenza under different epidemiological settings (e.g. rural vs. urban, tropical vs. temporal climates, closed vs. open settings)

2.3.3 Evaluating the utility and timing of different response strategies during the early spread of human cases of an animal or pandemic influenza virus (e.g. slowing/delaying spread vs. mitigating/reducing the peak impact)

Stream 3: Minimizing the Impact of Pandemic, Zoonotic and Seasonal Epidemic Influenza

Immunization against influenza is an essential public health intervention to control both seasonal epidemics and pandemic influenza. However, many countries, particularly those that are under-resourced, have not developed strategies to vaccinate their populations at risk for seasonal or pandemic influenza. This is related in part to insufficient local information on the social determinants of health, the burden of influenza disease and their social, economic and health impacts to the community. There also are marked differences between countries in terms of their respective capacities, priorities and resources to establish seasonal influenza vaccination policies and programmes, and to produce and distribute vaccine. During a pandemic these differences will be further accentuated. Also, limited quantities of a vaccine likely will be available, especially at the start of a pandemic, and public health authorities will need to make decisions about prioritization of its use.

3.1 Assessment of Disease Burden and Social Impact

Rationale: Disease burden data are not available for most under-resourced countries. While data are generally more available for well-resourced countries, there is limited information about influenza’s complications and its toll in pediatric and other high-risk populations. The appearance of variant disease patterns may signal changes in the circulating influenza viruses. Well-designed disease burden studies can assess the incidence and prevalence of influenza, its severity, complications and socioeconomic impacts. Such studies may also provide information on possible prevention and control strategies. In addition, the assessment on the local social determinants of health and the impact of influenza pandemics on such determinants can have the potential to be a powerful driver for public health policy development in all countries.
Current topics of interest:

3.1.1 Assessment of the clinical and economic burden of seasonal and epidemic influenza, especially in countries where there is little recognition of influenza and control policies and programmes are not in place

3.1.2 Application of influenza disease burden data, coupled with cost-effectiveness analyses, to advance development or expansion of influenza control programmes

3.1.3 Evaluate the role of secondary infections (such as pneumococcal or meningococcal infections) in the disease burden analysis of influenza

3.1.4 Assessment of social determinants of health under different epidemiological setting and evaluate the social impact of influenza outbreaks and pandemics base on such determinants

3.2 Improve Immunogenicity, Availability and Access to Influenza Vaccines

Rationale: Seasonal influenza vaccines present significant challenges: they must be updated, produced, clinically evaluated for safety and efficacy and administered every year. The overall efficacy of the vaccine may vary depending on how well vaccine and circulating strains are matched and the recipient’s age and immune status. Improvements of vaccine formulations that can provide broader range of protection against influenza strains may reduce the frequency of vaccination and providing better protection against new strains. In the context of a new pandemic virus, critical issues related to the safety, immunogenicity and rapid distribution of vaccines come into sharper focus.

Current topics of interest:

3.2.1 Evaluation of the safety and immunogenicity of conventional and new-generation influenza vaccines using innovative clinical trial methodologies

3.2.2 Increased seasonal and pandemic vaccine production capacity through development of new, less costly technologies that can be transferred to under-resourced countries

3.2.3 Development of new vaccine formulations including "universal" vaccine that are easier to store and administer, especially in under-resourced country settings

3.2.4 Development of rapid deployment, administration and monitoring strategies for vaccine use in the context of a pandemic

3.3 Public Health Policies to Reduce the Impact of Disease

Rationale: Public health programmes and policies to combat seasonal influenza are limited principally to well-resourced countries with access to vaccines and a well-organized health care infrastructure. Implementation of similar programmes are challenging for under-resourced countries with unique and competing health issues, inadequate public health financing system and insufficient medical infrastructures. In the context of a pandemic, all countries face the difficult issues of how influenza immunization policies will be developed, implemented and evaluated.

Current topics of interest:

3.3.1 Research to support the formulation of policies and programmes to reduce the impact of seasonal epidemic and pandemic influenza through immunization (e.g. evaluation of risk-group vs. general population for seasonal immunization policies)

3.3.2 Development of best practices to evaluate both the implementation (e.g. immunization rates) and effectiveness of immunization policies and programmes in limiting seasonal and pandemic influenza

3.3.3 Evaluation of best practices to incorporate public input in the development of health policies and their effectiveness for the control of seasonal epidemic and pandemic influenza
Stream 4: Optimizing the Treatment of Patients

Improved clinical management can substantially reduce the incidence of severe infection and associated complications for zoonotic, seasonal epidemic and pandemic influenza. Optimization of clinical management must be underpinned by a better understanding of the pathogenesis of influenza infections, advances in laboratory diagnosis, development and application of effective antiviral drugs and other treatment modalities and access to good quality health services.

4.1 Factors Associated with Pathogenesis and Clinical Severity

**Rationale:** There are many gaps in our basic understanding of how and why influenza viruses cause disease in people and what influences illness severity. Host immune responses, underlying co-morbidities, age and opportunities for prior exposure to related epidemic and pandemic influenza virus strains and the properties of the circulating virus can all impact disease severity. In addition to host and viral factors, secondary bacterial pneumonia can influence disease outcome.

Current topics of interest:

- 4.1.1 Pathogenesis of human infections associated with animal, seasonal epidemic and pandemic influenza viruses, including sites, duration and levels of virus replication and shedding
- 4.1.2 Clinical spectrum of human infections associated with animal, seasonal epidemic and pandemic influenza viruses, including frequency of sub-clinical or mild infections and severe disease
- 4.1.3 The incidence and etiology of secondary bacterial infections associated with influenza, as well as optimal treatment modalities and prophylactic and/or preventive measures
- 4.1.4 The role of novel and other host genetic pre-disposing factors that influence susceptibility and severity of infection and/or person-to-person transmission
- 4.1.5 The possible effect of cofounding medical conditions on the susceptibility to and severity of infection with influenza, as well as its treatment

4.2 Improve Clinical Management of Patients

**Rationale:** The nonspecific clinical presentation of influenza makes it difficult to distinguish from other febrile or respiratory illnesses. Rapid and reliable diagnostic testing can facilitate the institution of timely and appropriate antiviral treatment and infection control measures. Rapid tests are commercially available but limited in their diagnostic capabilities. Although antiviral drugs can reduce the duration and severity of illness and help control outbreaks, they are not widely used for treatment or prophylaxis in both under-and well-resourced countries during annual epidemics. They must be taken soon after the onset of illness and resistance can develop. Expansion of the current repertoire of antiviral drugs and refinement of alternative treatment modalities such as statins, passive immunotherapy and traditional medicine that are suitable for use in under-resourced areas would be most beneficial.

Current topics of interest:

- 4.2.1 Development of new clinical and laboratory diagnostic tools, particularly point-of-care testing and other clinical tests that are indicative of progressive disease
- 4.2.2 Development of new antiviral treatments including alternative treatment modalities those are cost effective and easy to administer in pediatric and intensive care settings particularly in under-resourced countries
- 4.2.3 Optimizing management of persons at risk of severe disease and/or complications
- 4.2.4 Optimizing management of patients with severe and/or progressive influenza infection particularly in resource-limited settings
4.2.5 Development of best practices in clinical intensive care of severely ill patients including the use of new treatment approaches such as ECMO and other oxygen therapy approaches as compare to traditional mechanical ventilation.

4.3 Health Care Capacity and Response

Rationale: The availability and quality of health services influences the impact of both seasonal epidemic and pandemic influenza. The same virus that may have a modest impact on morbidity and mortality in countries with well-organized health systems can be devastating in other countries where healthcare systems are sub-optimal.

Current topics of interest:

4.3.1 Evaluation of surge capacity needs including development of triage schemes in different health care and resource settings and surge planning to maintain adequate staffing
4.3.2 Development of alternative health delivery systems for care of patients including home care, community facilities other than hospitals and other venues
4.3.3 Development of best practices that provide protection of health care workers and other care-givers in different health care and resource settings such as the use of nebulizers in hospital wards and clinics
4.3.4 Identification of evidence-driven clinical care pathways and principles which optimize health care delivery in low resource settings.

Stream 5: Promoting the Development and Application of Modern Public Health Tools

New public health tools need to be harnessed to help reduce the impact of seasonal epidemic and pandemic influenza in a globalized economy and a modern world. Use of innovative communication channels, such as the internet and mobile phone networks, have the potential to facilitate outbreak investigation and rapid risk assessment and dissemination of accurate information. Mathematical modeling and risk communication are cross-cutting areas with potential applicability across all streams of research.

5.1 Modern Tools for Early Detection and Monitoring of Disease

Rationale: Some well-resourced countries use state-of-the-art approaches for early disease detection and monitoring such as syndromic surveillance in hospital emergency departments and tracking of over-the-counter pharmaceutical purchases. Computerized health-care and laboratory-based information systems also are in place for seasonal epidemic influenza and adaptable to monitor a pandemic in some countries. Recent reports have demonstrated correlation of internet search engine queries with increased influenza incidence. These approaches are not feasible for many under-resourced countries. However, WHO’s “eHealth” initiative and the United Nations Foundation’s “Health for Development” champion innovative technologies such as mobile phones to collect and transmit health data in real-time, track diseases, educate and train. Applicability of these tools in influenza disease and pandemic surveillance especially in under-resourced countries should be investigated.

Current topics of interest:

5.1.1 Adaptation of modern technologies for early seasonal epidemic and pandemic influenza detection and surveillance, especially in under-resourced countries
5.1.2 Development of innovative approach and channels for influenza surveillance including integrated disease/syndromic surveillance with other existing disease monitoring systems such as dengue and malaria surveillance in tropical countries
5.1.3 Development of efficient mechanisms to address the global challenges for sharing information, clinical specimens, viruses and tools with consideration for local ethical and legal perspectives

5.2 Role of Modeling in Public Health Decision Making

Rationale: Evidence-based public health decision making requires access to information. However, information is often incomplete, evolving and derived from an increasingly complex array of sources such as basic science researchers, epidemiologists, social and political scientists, economists and others. Mathematical modeling is a useful tool that can incorporate diverse data to provide public health policy and decision-makers estimates of key parameters for influenza spread and infection and the potential impact of various pharmaceutical and public health control measures. Building capacity in the use of such modern tools in under-resourced countries is a priority.

Current topics of interest:

5.2.1 Application of modeling to estimate key parameters for public health pandemic policy planning under different epidemiological settings
5.2.2 Application of modeling in public health policy planning and strategic decision making under field conditions
5.2.3 Analysis of models following seasonal outbreaks and pandemic waves to assess their accuracy and utility and assist in refinement and improvements for future epidemics and pandemics

5.3 Modern Tools for Risk Communication

Rationale: Risk communication is a key strategy in epidemic and pandemic management. The SARS outbreak in 2003 reinforced that a timely and transparent public information policy could help reduce excessive and inappropriate public health responses and minimize the social disruption and economic consequences of a fast-moving global epidemic. Successful tools for influenza-related risk communication can have broader applicability to other public health problems.

Current topics of interest:

5.3.1 Development of best practices and tools to inform communities and promote appropriate risk reduction practices to limit transmission of zoonotic, seasonal epidemic and pandemic influenza
5.3.2 Understanding the dynamics of rumors and inaccurate information including how to track rumors and mitigate the adverse consequences of inaccurate information
5.3.3 Development of tools to rapidly and accurately measure the public's knowledge about an influenza-related outbreak or pandemic, their perception of risk and risk reduction actions and behaviors that can facilitate refinement of risk communication strategies in different cultures
5.3.4 Evaluate the relative importance of different channels of communication such as radio, TV and other community level communications for the transmission of information and/or rumors as the bases of changing social behavior under different cultural environments.
6. References


8. Influenza research at NIAID, National Institutes of Health, USA (http://www3.niaid.nih.gov/topics/Flu/default.htm; accessed October 2009).


