FOREWORD

National Influenza Center (NIC), Mongolia has completed successfully in 2004-2009 a Cooperative Agreement Project "Development of Influenza Surveillance Network" (U50/CCU024411) and a reliable influenza surveillance capacity covering the most populated areas of Mongolia has been developed.

NIC, Mongolia has submitted again an application to CDC, USA in May 2009 asking to support further sustainable development of the established influenza surveillance structure in Mongolia in the next 5 years and has been awarded the next Cooperative Agreement Project "Developing sustainable influenza surveillance network" (1U51IP000331) to be executed in 2005-2014 amounting a total 2,000,000.00 USD (Notice of award dated Sept. 1, 2009) CDC, USA.

This second Project has been implemented successfully and a sustainable influenza surveillance system covering the whole territory of Mongolia has been established and a Plan of influenza surveillance sustainability (PISS) covering the period 2014-2018 has been developed. This booklet summarizes the synopsis of the achievements during the five years period 2009-2014.

The achievements have been resulted by the hard work and concerted efforts of many people in Mongolia and USA.

Therefore, I would like to thank, first of all, our Project Team members: Ms B.Tserendulam, BSc, assistant to the Project Director, Ms Ch.Maitsetseg, BSc, MSc, Project virologist, Mrs D.Tuul, Financial Officer, Dr (Mrs) B.Darma,

MD, PhD, Virology Team Leader, Dr (Mrs) A.Burma, MD, Epidemiology Team Leader, Dr (Mrs) Ch.Urtnasan, MD, Project Epidemiologist and Mr B.Gantsooj, BSc, Project Data-manager and Web-master for the dedicated work and professionalism in their activities. Also my sincere thanks have to address the medical staff composed more than 500 medical doctors and nurses, of our sentinel surveillance sites in Ulaanbaatar City and in all Provinces of Mongolia. The Health Ministers of Mongolia during this time period Mr S.Lambaa, PhD (2009-2011), Dr N.Khurelbaatar, MD, PhD (2011-2012) and Dr (Mrs) N.Udval, MD, PhD, DSc(Med) (since 2012) have rendered permanent supportive hands to our team for which I would like to express my thanks also.

Without substantial supports of many people in USA, especially Dr Nancy Cox, Director, Influenza Division, CDC, Ms Ann Moen, Director, International Programs, Influenza Division, CDC, USA, Dr Tomas Rodrigues, MD, PhD, Public Health Officer, International Programs, Influenza Division, CDC, USA and Mr Steward Nichols, Grant Management Specialist, International and Territories Acquisition and Assistant Branch, CDC, USA the successful implementation of the Project activities were not possible. I would like to thank these our friends for their everyday help to our Project.

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Principal Investigator/Project Director,
US/Mongolia Cooperative Agreement Project
IU51IP000331,

October 15, 2014, Ulaanbaatar, Mongolia

US–Mongolia Cooperative Agreement
"Developing Sustainable Influenza Surveillance Network"
IU51IP000331

PROJET GOAL

- To strengthen the existing influenza surveillance system and ensure its sustainable function enabling early detection and effective prevention of influenza pandemics.

PROJECT OBJECTIVES

1. to strengthen influenza epidemiological surveillance to cover the whole country,
2. to strengthen influenza virological surveillance ensuring rapid and efficient detection of seasonal and pandemic influenza viruses on territory of Mongolia,
3. to ensure sustainable development of influenza surveillance network by good and transparent management.

SUMMARY OF RESULTS

1. to strengthen influenza epidemiological surveillance to cover the whole country,

Thanks to the Project, the coverage and quality of influenza surveillance in Mongolia have been improved dramatically (Tables 1 and 2):

- a shift to the whole country coverage of ILI surveillance has been achieved in the 2009-2010 season by the Order No 323 of Minister of Health,

Mongolia issued on October 6, 2009 increasing of influenza sentinel surveillance sites (ISSSs) from 79 to 164 (Figures 1 and 2);

- successful control of A(H1N1)2009 pandemics in 2009-2010 (see the article 9 in the publications list);
- the real time on-line ILI reporting and information retrieval through website *www.flu.mn* starting October 1, 2010;
- Monthly audio-conference consultation of ISSSs and NIC, Mongolia via Skype since October 2011;

2. to strengthen influenza virological surveillance ensuring rapid and efficient detection of seasonal and pandemic influenza viruses on territory of Mongolia,

With support of the Project, the quality of detection and identification of influenza and other respiratory viruses improved substantially meeting fully the WHO requirements to NICs (Table 3 and Figure 3):

- rt-PCR testing patient samples with WHO-supplied kits for influenza viruses became routine procedure since August 2009, which ensured higher percentage of positive results;
- influenza virus isolation attempts on MDCK only rt-PCR positive samples have increased dramatically the virus isolation rates;
- multiplex rt-PCR screening of the representative samples for non-influenza respiratory pathogens became routine testing since October 2011 replacing fully the previously used immunofluorescent microscopy;
- antiviral resistance testing and reporting of the representative influenza virus isolates become routine

screening since October 2009 (Table 4);
- sequencing of genes of the representative influenza virus isolates become routine testing also since October 2009 and more than 170 gene sequences were deposited in GenBank or GISAID (Table 5);
- regular sharing of the representative influenza virus isolates with WHO Collaborative Centers in Atlanta, USA and Tokyo, Japan became routine activity;
- the web based FLULAB(1.0) Program was developed and tested for sample information, laboratory testing protocol, inventory system for reagents, supplies and data analysis and feedback report and it is in a routine use since October 2012;
- establishment of 2 regional virology laboratories in Orkhon and Darkhan-Uul provinces in 2010, and 2 additional regional virology laboratories in Khovd and Dornod provinces in 2014 become big step forward to advancement virology investigations at the province level. The laboratories were built up on funds of the World Bank project on influenza, and the training of the local manpower and external quality control and advisory functions were assigned to the Virology Laboratory, NCCD.

3. to ensure sustainable development of influenza surveillance network by good and transparent management,

- an open access to the epidemiological and virological ILI surveillance results have been granted by placing real-time all weekly surveillance information and ILI-related world and country news on the website *www.flu.mn*, the official website of the NIC, Mongolia since February 2009;

- regular holding of ISSSs Training Workshop inviting representatives from all ISSSs at the beginning of the new influenza season (the 4th week of September, or the 1st week of October of each year) doing refresher training and open discussion on achievements and weaknesses during the last season and the challenges in the coming season;
- a monthly audio-conferencing with ISSSs calling by Skype from the NIC, Mongolia during the influenza season (from October 1 to May 30 each year) since October 2010;
- assessment of main activities of ISSSs by the special scoring system quarterly since October 2010 and placing the results on *www.flu.mn* web-site and in the Mongolian Journal of Infectious Diseases Research became regular;
- regular participation in the quality reviews by WHO EQUAP (quarterly since 2007), CDC/APHL International LCRT (since 2010 once in 2 years), IPPP assessment (since 2009 once in 2 years);
- a Working Group on PISS (plan for influenza surveillance sustainability) has been appointed in December 2012 by the Order of the General Director, NCCD including representatives from all level of ISSSs and the PISS developed by the Working Group has been thoroughly discussed on the ISSSs Training Workshop in September 2013. The final edited version has been submitted to the Ministry of Health, Mongolia (MoH) and expected to be approved in October 2014.
- development and permanent improvement of in-country and international collaboration with GISN WHO HQ, WHO Collaborating Centers in Atlanta,

Tokyo, Melbourne and Beijing, and NICs and research institutions in the neighbouring countries.

Financially, from the total funds allocated (2,000,000.00 US$) it has been used for the following categories of expenses:

- activities (*supports for trainings, workshops, monitoring and the vehicle fuel and maintenance*): 384,184.29 US$ (19.2%);
- purchase of reagents and devices: 1,061,408.75 (53%);US$
- purchase of equipment: 106,022.00 US$ (5.3%); the main equipment purchased have been listed in the Annex1;
- salary for project team members: 376,968.00 (18.8%); US$
- cancelled: 71,416.96 US$ (3.6%).

Table 1

Comparative indicators of ILI in the outpatient visits in Mongolia in 2009/10 to 2013/14 seasons

Indicators	The previous 5 seasons average	2009/10 season	2010/11 season	2011/12 season	2012/13 season	2013/14 season
ILI/ total outpatient visits	6.2%	7.9%	5.1%	5.2%	5.2 %	5.8%
Total morbidity/10,000	805.6	2,170.9	1,371.7	1,331.7	1,443.6	1,542.9
Morbidity of 0-11 months olds /10,000	10,901.0	19,692.3	17,873.9	17,949.0	17,626.9	18,004.2
Morbidity of 1-4 years olds/10,000	3,198.7	7,920.6	5,570.1	5,514.3	6,231.1	6,491.7
Morbidity of 5-9 years olds/10,000	1,488.0	3,675.8	2,430.0	2,478.8	2,622.3	2,824.5
Morbidity of 10-15 years olds/10,000	789.6	2,750.4	1,184.6	1,175.5	1,346.1	1,453.8
Morbidity of 16-64 years olds/10,000	195.7	712.7	290.3	271.9	262.5	280.1
Morbidity of 65 year and older/10,000	368.6	1,027.6	559.9	518.8	442.3	479.2

Table 2

Comparative indicators of pneumoniae and sARI among hospitalized patients in Mongolia in 2009/10 to 2013/14 seasons

Indicators	The previous 3 seasons average*	2009/10 season**	2010/2011 season**	2011/2012 season**	2012/2013 season**	2013/2014 season**
Total registered hospital admissions	141,365	568,039	371,479	367,671	378,169	425,910
Total pneumonia admissions (% in total admissions)	9,542 (6.7%)	25,234 (4.4%)	19,603 (5.3%)	23,246 (6.3%)	24,378 (6.4%)	29,071 (6.8%)
Total pneumonia mortality (% in total pneumonia admissions)	36 (0.38%)	101 (0.40%)	55 (0.28%)	42 (0.19%)	43 (0.17%)	35 (0.12%)
Pneumonia mortality in 0-4 years olds (% in total pneumonia deaths)	30 (83.3%)	67 (66.3%)	48 (87.3%)	40 (95.2%)	38 (79.1%)	28 (80.0%)
Pneumonia mortality in 5-9 years olds (% in total pneumonia deaths)	1(2.8%)	1(1%)	1(1.8%)	0(0.0%)	3(7.0%)	0(0.0%)
Pneumonia mortality in 10-19 years olds (% in total pneumonia deaths)	1(2.8%)	5(4.9%)	1(1.8%)	0(0.0%)	0(0.0%)	1(2.9%)
Pneumonia mortality in 20-59 years olds (% in total pneumonia deaths)	3 (8.4%)	25 (24.7%)	5 (9.1%)	1 (2.4%)	2 (4.7%)	4 (11.4%)
Pneumonia mortality in 60 and older ages (% in total pneumonia deaths)	1(2.8%)	3(3%)	0(0.0%)	1(2.4%)	0(0.0%)	2(5.7%)

* data from 17 hospital-based sentinel sites;

** data from 37 hospital-based sentinel sites;

Table 3

Comparative indicators of ILI laboratory surveillance results in Mongolia in 2009/10 to 2013/14 seasons

Indicators	The previous 5 seasons average	2009/10 season	2010/11 season	2011/12 season	2012/13 season	2013/2014 season (as of June 30, 2014)
Number of samples collected	1,638	8,200	4,197	4,125	3,694	4,543
IV isolation / tested (%)	74.8/1,444 (5.1%)	387/2,102 (18.4%)	106/473 (22.4%)	107/444 (24.0%)	78 /461/ (16.9 %)	101/657 (15.3%)
IV A(H1N1) [%]	12.6 (16.8%)	0 (0.0%)	0(0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
IV A(H3N2) [%]	42.8 (57.2%)	0 (0.0%)	71 (67.0%)	18 (16.8%)	51 (65.4%)	8 (7.9%)
IV B [%]	19.4 (25.9%)	108 (28.7)	0 (0.0%)	81 (75.7%)	0 (0.0%)	32 (31.7%)
IV A(H1N1) pdm	0 (0.0%)	279 (71.3%)	35 (33.0%)	8 (23.5%)	27 (34.6%)	61 (60.4%)
(IV RNA by rt-RT-PCR:positive/ tested (%)	149/1,379 (10.80%)	2,102/8,200 (25.63%)	471/4,197 (11.22%)	474/4,125 (11.5%)	462/3,694 (12.5%)	657/4,543 (14.5%)
Among them: IV A(H1N1) [%]	144 (96.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
IV A(H3N2) [%]	4 (2.6%)	0 (0.0%)	361 (76.3%)	191 (40.3%)	362 (78.3%)	140 (21.3%)
IV B [%]	1 (0.6%)	306 (14.55%)	7 (1.5%)	249 (52.5%)	1 (0.2%)	306 (46.6%)
IV A(H1N1)pdm	0	1,796 (85.44%)	103 (21.8%)	34 (7.2%)	99 (21.4%)	211 (32%)
IFM on R-Mix: positive/tested (%)	121/1534 (7.89%)	115/1547 (7.4%)	19/686 (2.8%)	Not tested	Not tested	Not tested
Among them: IV A	42 (34.71%)	44 (38.26%)	0 (0.0%)			
IV B	7 (5.79%)	31 (26.95%)	0 (0.0%)			
RSV	10 (8.26%)	1 (0.86%)	4 (14.3%)			
AdV	12 (9.92%)	11 (9.56%)	9 (32.1%)			
PIV	51 (42.15%)	28 (24.34%)	6 (21.6%)			
FTD (multiplex rtPCR) positive / tested [%]	Not tested	Not tested	358/795 (45%)	342/654 (52.3%)	464/946 (49.0%)	204/570 (35,8%)
Among them: IV A(H1N1) pdm			6 (1.7%)	0 (0.0%)	9 (1.9%)	13 (6.3%)
IV A			28 (7.8%)	1 (0.3%)	24 (5.2%)	8 (3.9%)

IV B			0 (0.0%)	12 (3.5%)	0 (0.0%)	0 (0.0%)
RhV			73 (20.4%)	63 (18.4%)	107 (23.1%)	85 (41.7%)
RSV			72 (20.1%)	91 (26.6%)	77 (16.6%)	12 (5.9%)
Coinfection			55(15.4%)	53 (15.5%)	76 (16.4%)	6 (2.9%)
PIV			48 (13.4%)	31 (9%)	85 (18.3%)	6 (2.9%)
CoV			38 (10.6%)	44 (12.9%)	76 (16.4%)	20 (9.8%)
HuMPV			28 (7.8%)	32 (9.4%)	47 (10.01%)	24 (11.8%)
AdV			24 (6.7%)	30 (8.8%)	25 (5.4%)	20 (9.9%)
EV			20 (5.6%)	11 (3.2%)	16 (3.4%)	8 (3.9%)
HBoV			15 (4.2%)	21 (6.1%)	61 (13.1%)	10 (4.9%)
Mycoplasma			5 (1.4%)	6 (1.8%)	4 (0.9%)	0 (0.0%)

Abbreviations used:

IV - *Influenza virus*
AdV - *Adenovirus*
CoV - *Coronavirus*
EV - *Enterovirus*
HBoV - *Human bocavirus*
HuMPV - *Human metapneumovirus*
PIV - *Parainfluenza virus*
RhV - *Rhinovirus*
RSV - *Respiratory syncytial virus*

Table 4

Results of neuraminidase inhibitor (NAI) testing of influenza viruses isolated in Mongolia in 2009/10 to 2013/14 seasons

Sub-types	A(H1N1)			A(H3N2)			B		
Years	tes-ted	NAI re-sistant (%)	NAI sensitive (%)	tes-ted	NAI resis-tant (%)	NAI sen-sitive (%)	tes-ted	NAI resis-tant (%)	NAI sen-sitive (%)
2009/ 2010	228	(0%)	(100%)	0	-	-	18	(0%)	(100%)
2010/ 2011	34	1 (2.94%)	(97.06%)	0	-	-	NT	-	-
2011/ 2012	30	0(0%)	(100%)	2	(0%)	(100%)	NT	-	-
2012/ 2013	20	(0%)	(100%)	66	(0%)	(100%)	30	(0%)	(100%)
2013/ 2014	64	(0%)	(100%)	8	(0%)	(100%)	33	3 (9%)	(91%)
total	376	1 (0.26%)	(99.73%)	76	(0%)	(100%)	81	3 (3.7%)	(96.3%)

Table 5

Numbers of sequenced genes of influenza viruses isolated in Mongolia in 2009/10 to 2013/14 seasons

	HA	NA	PA	PB1	PB2	M2	NS	NP
2009/2010	21	13	1	1	1	6	1	1
2010/2011	21	8	0	0	0	7	1	0
2011/2012	0	0	0	0	0	0	0	0
2012/2013	9	6	0	0	0	3	2	0
2013/2014	16	29	1	1	1	30	0	1
total	57	56	2	2	2	46	4	2

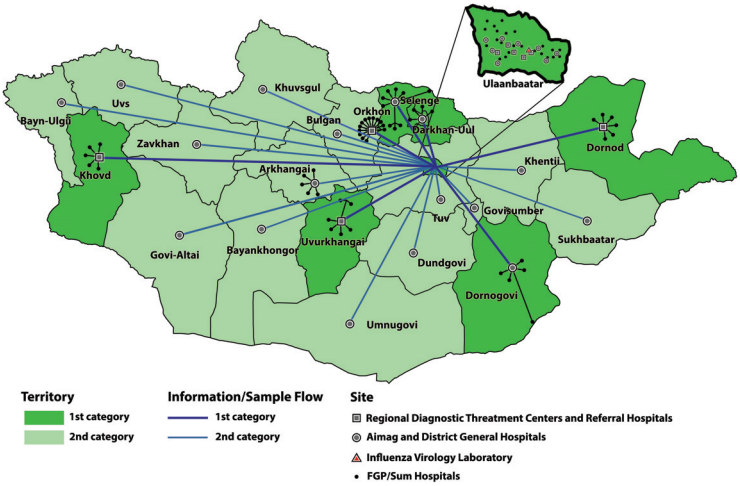

Figure 1. Influenza Surveillance Network in Mongolia in 2008

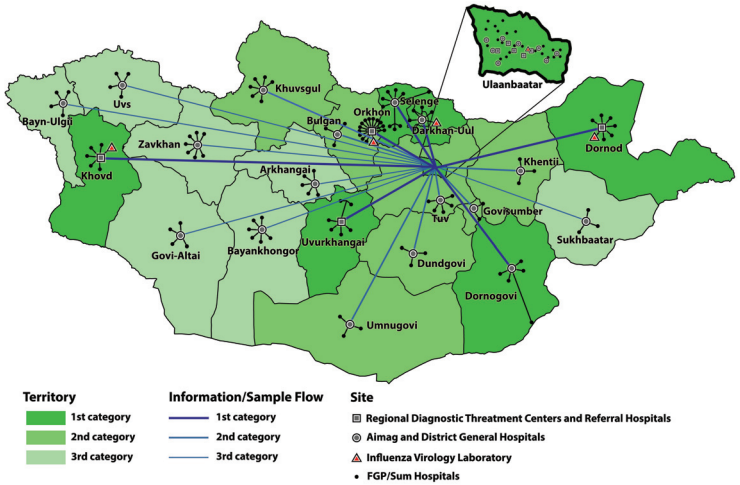

Figure 2. Influenza Surveillance Network in Mongolia in 2014

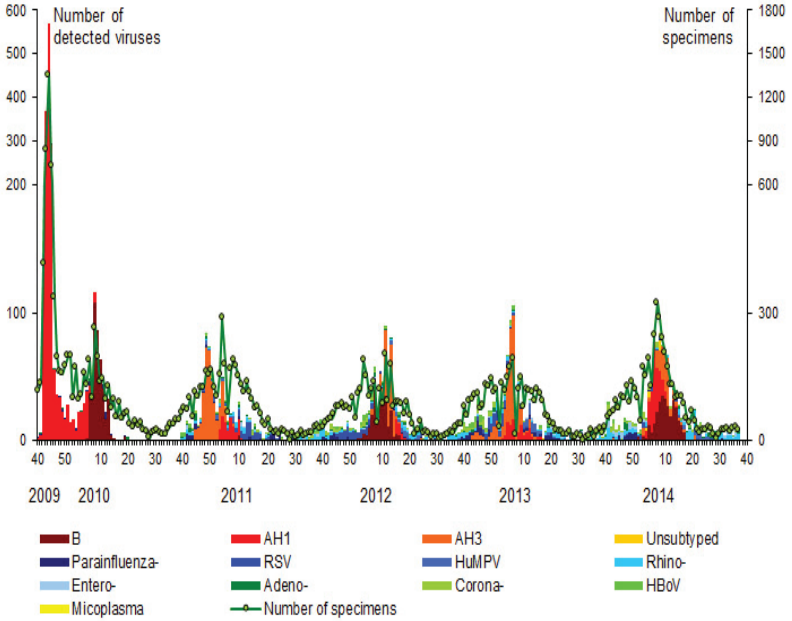

Figure 3. Dynamics of respiratory viruses detected by mx-rt-PCR in Mongolia in 2009/10 to 2013/14 seasons

ANNEX 1

ITEMS SUPPLIED IN 2009–2014 BY THE PROJECT COSTING OVER 5,000.00 US$

No	Items purchased	Pur-chase year	Quan-tity	Unit price US$	Total price US$
1	Primus 96, authorized thermal cycler for PCR, Biotech, USA	2009	1	7,700.00	7,700.00
2	7500 Fast Real-time PCR System with Dell tower Sequence Detection Software and Spectral Dye Calibration Kit 1, Life Technologies, USA	2010	1	75,000.00	75,000.00
3	NucliSens miniMAG, a semi-automated magnetic extraction system for nucleic acids, BioMerieux, France	2011	1	14,322.00	14,322.00
4	Freezer, Temp: -10°C to -80°C, Haier, PR China	2012	1	9,000.00	9,000.00
	TOTAL				**106,022.00**

LIST OF PUBLICATIONS

1. Books, Reports

1. **Annual Report: 2009/2010**, US/Mongolia Cooperative Agreement "Developing Sustainable Influenza Surveillance Network" IU51IP000331, Editor-in-Chief P.Nymadawa, Ulaanbaatar, 2010, 96 pp.;
2. **Annual Report: 2010/2011**, US/Mongolia Cooperative Agreement "Developing Sustainable Influenza Surveillance Network" IU51IP000331, Ulaanbaatar, Editor-in-Chief P.Nymadawa, 2011, 154 pp.;
3. **Annual Report: 2011/2012**, US/Mongolia Cooperative Agreement "Developing Sustainable Influenza Surveillance Network" IU51IP000331, Editor-in-Chief P.Nymadawa, Ulaanbaatar, 2012, 180 pp.;
4. **Annual Report: 2012/2013**, US/Mongolia Cooperative Agreement "Developing Sustainable Influenza Surveillance Network" IU51IP000331, Editor-in-Chief P.Nymadawa, Ulaanbaatar, 2013, 237 pp.;
5. **Annual Report: 2013/2014**, US/Mongolia Cooperative Agreement "Developing Sustainable Influenza Surveillance Network" IU51IP000331, Editor-in-Chief P.Nymadawa, Ulaanbaatar, 2014, 256 pp.;

2. Articles in the Peer–Reviewed International Journals and Proceedings

1. N.Nukiwa, A.Burmaa, T.Kamigaki, B.Darmaa, J.Od, I.Od, B.Gantsooj, Ts.Naranzul, S.Tsatsral, L.Enkhbaatar, R.Tuul, H.Oshitani, P.Nymadawa (**2010**): Evaluating influenza disease burden during the 2008-2009 and 2009-2010 influenza seasons in Mongolia. *WPSAR Vol 1*, № 1. 2010/doi: 105365/wpsar.2010.1.1.004 *www.wpro.who.int/wpsar*;
2. J.W.Tang, F.Y.L.Lai, P.Nymadawa, Y.M.Deng, M.Ratnamohan, M.Petric, T.P.Loh, N.W.S.Tee, D.E.Dwyer, I.G.Barr, F.Y.W.Wong (**2010**): Comparision of the incidence of influenza in relation to climate factors during 2000-2007 in five countries, *J.Med.Virol.*, 82(11) : 1958-1965;
3. Ts.Naranzul, B.Darmaa, D.Enkhsaikhan, S.Tsatsral, Ch.Maitsetseg, G.Nyamaa, L.V.Gubareva, P.Nymadawa (**2011**): Antiviral drug resistance study of influenza viruses isolated in Mongolia in recent years, *Influenza and other Respiratory Viruses*, 5(Suppl.1): 104-105;
4. S.Tsatsral, Ts.Naranzul, N.Naranbold, D.Enkhsaikhan, Ch.Maitsetseg, G.Nyamaa, B.Darmaa, P.Nymadawa (**2011**): Results of influenza virus detection using different methods, *Influenza and other Respiratory Viruses*, 5(Suppl.1): 142-144;
5. P.Nymadawa, A.Burmaa, B.Darmaa, D.Enkhsaikhan, S.Tsatsral, N.Naranbold, Ts.Naranzul, Ch.Maitsetseg, G.Nyamaa, B.Tserendulam, U.Naranchimeg, Ts.Bold-Erdene, Ch.Urtnasan, L.Enkhbaatar, R.Tuul, B.Gantsooj, N.Naranbaatar, A.Ambaselmaa, G.Surenkhand, D.Nyamkhuu (**2011**): The first wave of influenza A(H1N1)2009 pandemics in Mongolia, *Influenza and*

other Respiratory Viruses, 5(Suppl.1): 163-165;
6. A.Burmaa, S.Tsatsral, T.Odagiri, A.Suzuki, H.Oshitani, P.Nymadawa (**2012**): Cumulative incidence of pandemic influenza A(H1N1)2009 by a community-based serological cohort study in Selenge Province in Mongolia, *Influenza and other Respiratory Viruses*, 8(5):530-537;
7. N.Nukiwa-Souma, A.Burmaa.T.Kamigaki, I.Od, N. Bayasgalan, B.Darmaa, A.Suzuki, P.Nymadawa, H.Oshitani (**2012**): Influenza transmission in a community during a seasonal influenza A(H3N2) outbreak (2010-2011) in Mongolia: a community-based prospective cohort study, *PLoS ONE*, 7(3);e33046;
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9. K.J. Bolton, J.M.McCaw, R.Moss, R.S.Morris, S.Wang, A.Burma, B.Darma, D.Narangerel, P.Nymadawa, J.McVernona (**2012**): Likely effectiveness of pharmaceutical and non-pharmaceutical interventions for mitigating influenza virus transmission in Mongolia, *Bull World Health Organ,* 90:264-271;
10. Members of the Western Pacific Region Global Surveillance and Response System (**2012**): Epidemiological and Virological Characteristics of Influenza in the Western Pacific region of the World Health Organization, 2006-2010, *PLos ONE*, 7(5): e37568;
11. J.Baigalmaa, Ts.Tuul, B.Darmaa, E.Soyolmaa (**2012**): Analysis of fatal outcomes from influenza A(H1N1) pdm09 in Mongolia, *WPSAR*: 3(3);
12. N.Khurelbaatar, W.S.Krueger, G.L.Heil, B.Darmaa,

D.Ulziimaa, D.Tserennorov, A.Baterdene, B.D.Anderson, and G.C.Gray (**2013**): Sparse Evidence for Equine or Avian Influenza Virus Infections among Mongolian Adults with Animal Exposures, *Journal of Influenza and Other Respiratory Viruses*, 7(6):1241-1250;

13. P.Nymadawa, Ch.Maitsetseg, S.Tsatsral (**2013**): Non-influenza respiratory pathogens in Mongolia: results of multiplex real-time polymerase chain reaction (mx-rt-PCR) surveillance in 2008-2013 In: *Options VIII for the control of influenza,* Cape Town, South Africa, 5-10 September 2013, Abstract Book (p.560);
14. A.Burmaa, B.Darmaa, Ch.Urtnasan, Ts.Naranzul, Ch. Maitsetseg, G.Nyamaa, N.Bayasgalan, A.Ambaselmaa, P.Nymadawa (**2013**): The second and third waves of A (H1N1)pdm09 virus attacks in Mongolia In: *Options VIII for the control of influenza,* Cape Town, South Africa, 5-10 September 2013, Abstract Book (p.42-43);
15. A.Burmaa, T.Kamigaki, B.Darmaa, P.Nymadawa, H.Oshitani (**2013**): Epidemiological analysis of influenza-like illness (ILI) and severe acute respiratory infections (sARI) in Mongolia 2007-2012, In: *Options VIII for the control of influenza*, Cape Town, South Africa 5-10 September 2013, Abstract Book (p.44);
16. P.Nymadawa, J.Batbold, B.Gantsooj, A.Burmaa, B.Darmaa (**2013**): Development of an online, real-time information retrieval system for influenza surveillance data collection and sharing in Mongolia, In: *Options VIII for the control of influenza,* Cape Town, South Africa, 5-10 September 2013, Abstract Book (p.63);

17. P.Nymadawa, D.Enkhsaikan, B.Gantsooj, Ts.Naranzul, Ch.Maitsetseg, B.Darmaa (**2013**): Evolution of hemagglutinin genes of influenza viruses isolated in Mongolia, In: *Options VIII for the control of influenza*, Cape Town, South Africa, 5-10 September 2013, Abstract Book (pp.167-168),
18. Members of the Western Pacific Region Global Surveillance and Response System (**2013**): Seasonal influenza vaccine policies, recommendations and use in the World Health Organization's Western Pacific Region, *WPSAR*, 4(3);
19. S.G.Muthuri and PRIDE Consortium Investigators, (**2014**): Effectiveness of neuraminidase inhibitors in reducing mortality in patients admitted to hospital with influenza A/H1N1pdm09 virus infection: a meta-analysis of individual participant data, *Lancet Resp Med*, http://dx.doi.org/10.1016/S2213-2600(14)70041-4;
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