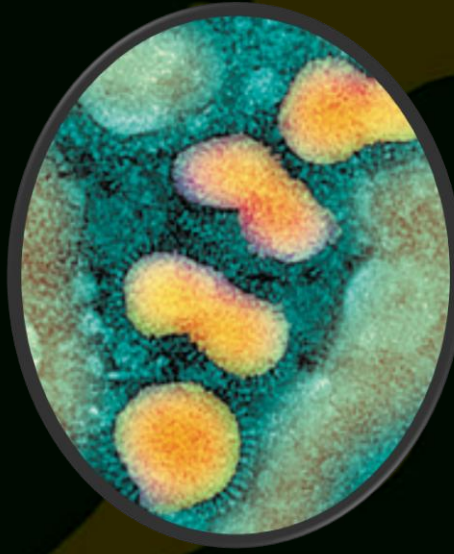




Human Influenza A(H5N1) virus of Avian/Animal Origins



By
Michael Fraser RN



Timeline of Emergence of Some Influenza Viruses in Humans

(Asiatic) Russian Influenza

B

Russian Flu (H2N2) 1889/1890 1 million

1900 Old Hong Kong Influenza H3N8?

Old Hong Kong Influenza

Spanish Influenza

1918 (Spanish Flu) (H1N1) 20-40 million deaths

H3

Hong Kong Influenza

H2

1957 (Asian Flu) 1-4 million deaths H2N2

Asian Influenza

H7

Russian Flu (H1N1)A/USSR/90/77 approx 1 million

H1

Pandemic A(H1N1)v 2009 Virus 18,499+ Deaths

Avian Influenza

H5

1997: In Hong Kong, A/H5N1 18 (6 deaths)
2003 Avian influenza A(H5N1) 381Deaths of 644 cases

H9

1997-2009:Avian influenza A(H9N2)

1980- 2003: Avian influenza A(H7N7)

"Triple reassortment"
Aggressive H3N2
Swine to Human

Quadruple Reassortment Result

2009 Hybrid "quadruple reassortant" Noval
Pandemic Influenza A(H1N1) 09 Virus —a human
virus, an avian virus , and 2 porcine viruses

"Pandemic (H1N1) 2009"



Pandemic vaccines

Seasonal vaccines

1918

1957

1968

1977

1993

1997

1998-9

2003

2009

2010

2012

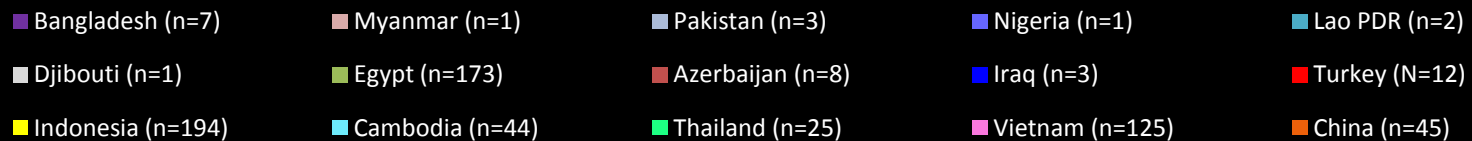
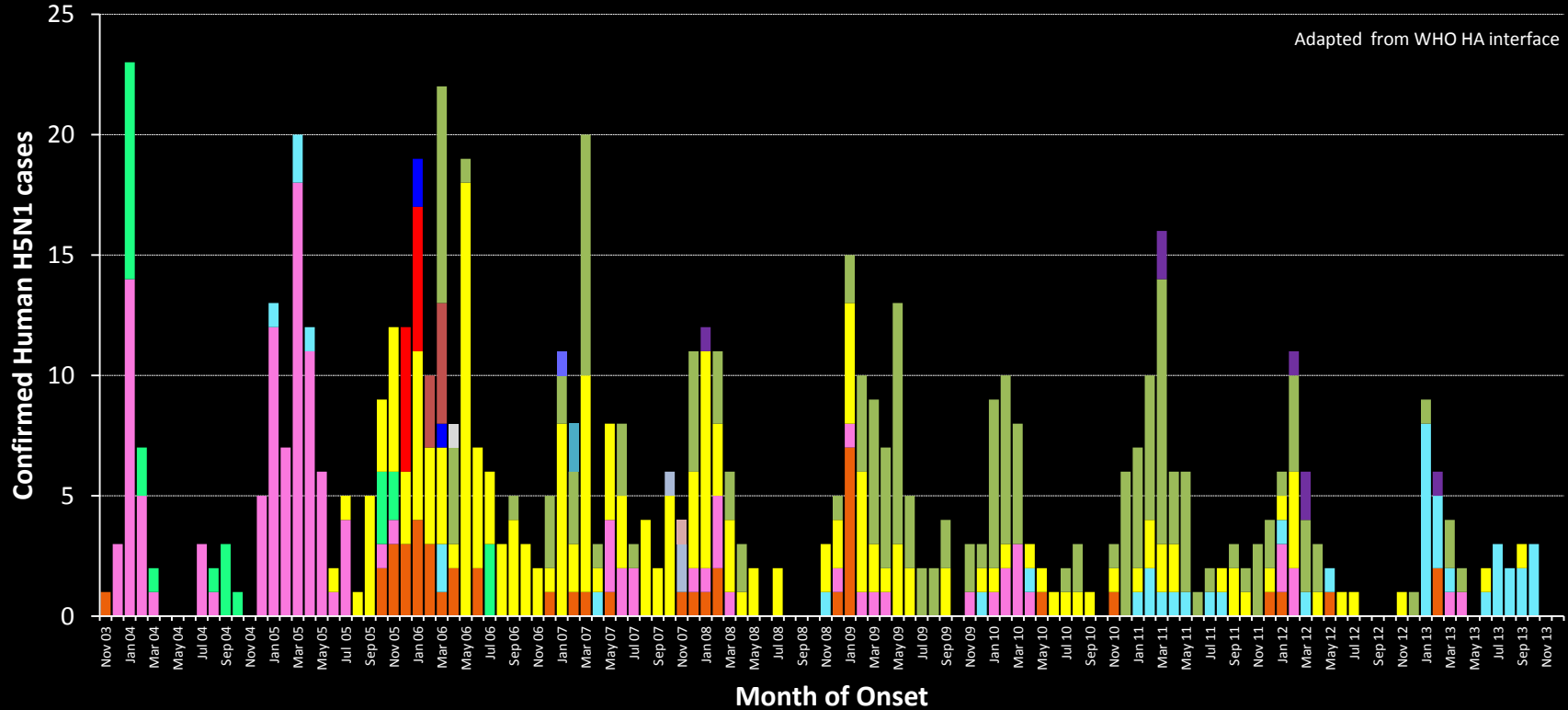
11/8/2013

US 1976 Swine Influenza

By 1993, a bird flu virus had adapted to pigs, grabbed a few human flu virus genes, and infected two young Dutch children, even displaying evidence of limited human-to-human transmission.



Human Avian influenza A(H5N1) Cases by Onset Month and Country (n=644)





Distribution of H5N1 Survivors and Deaths by age group
[Data as of 4th ,November, 2013 [n=644 (381 deaths) 59.16%]

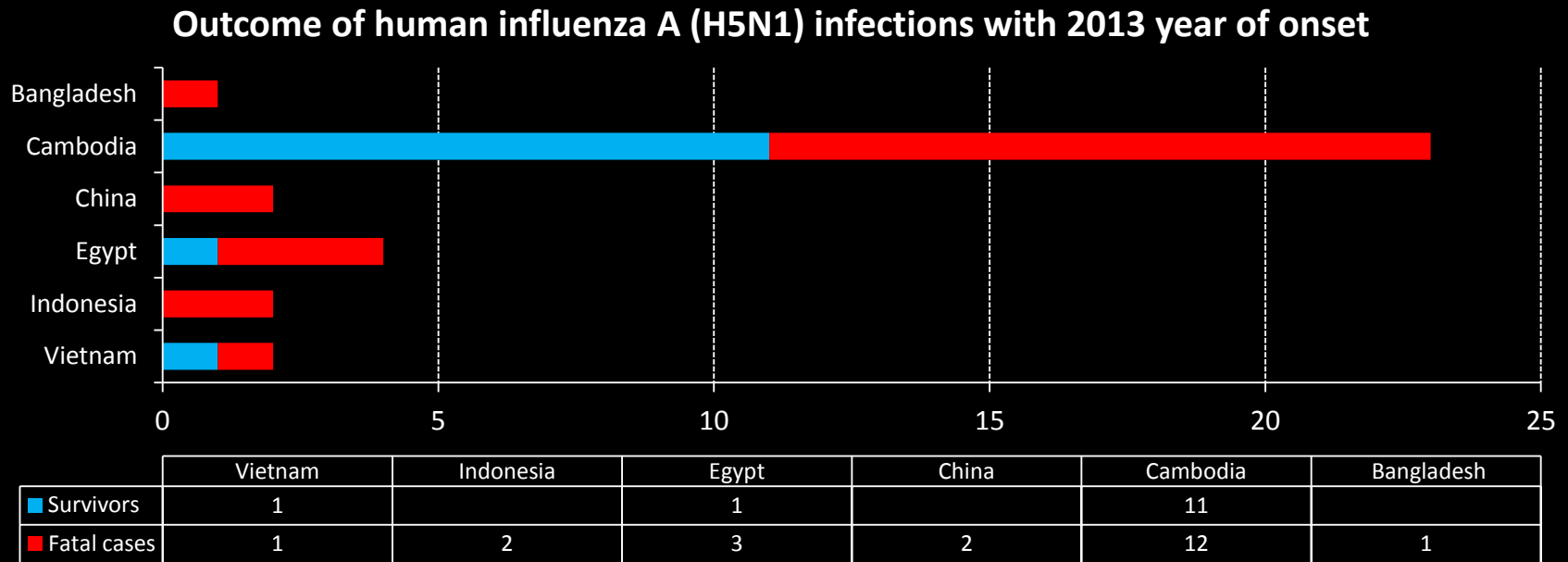


Human Avian influenza A(H5N1) Cases by Age Group (n=644)									
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	over 70	Total
Fatal	79	90	97	71	16	4	3	1	361
Survivors	122	32	43	28	17	12	2	3	259
Total	201	122	140*	99	33	16	5	4	620
Unknown Outcome	0	0	0	0	0	0	0	0	n=24 (20)
Summary	Adapted from WPRO,,, * note WPRO 20-29 has 138 cases in the 20-29 group pending update review for possible variance in 2011 October-December!								644



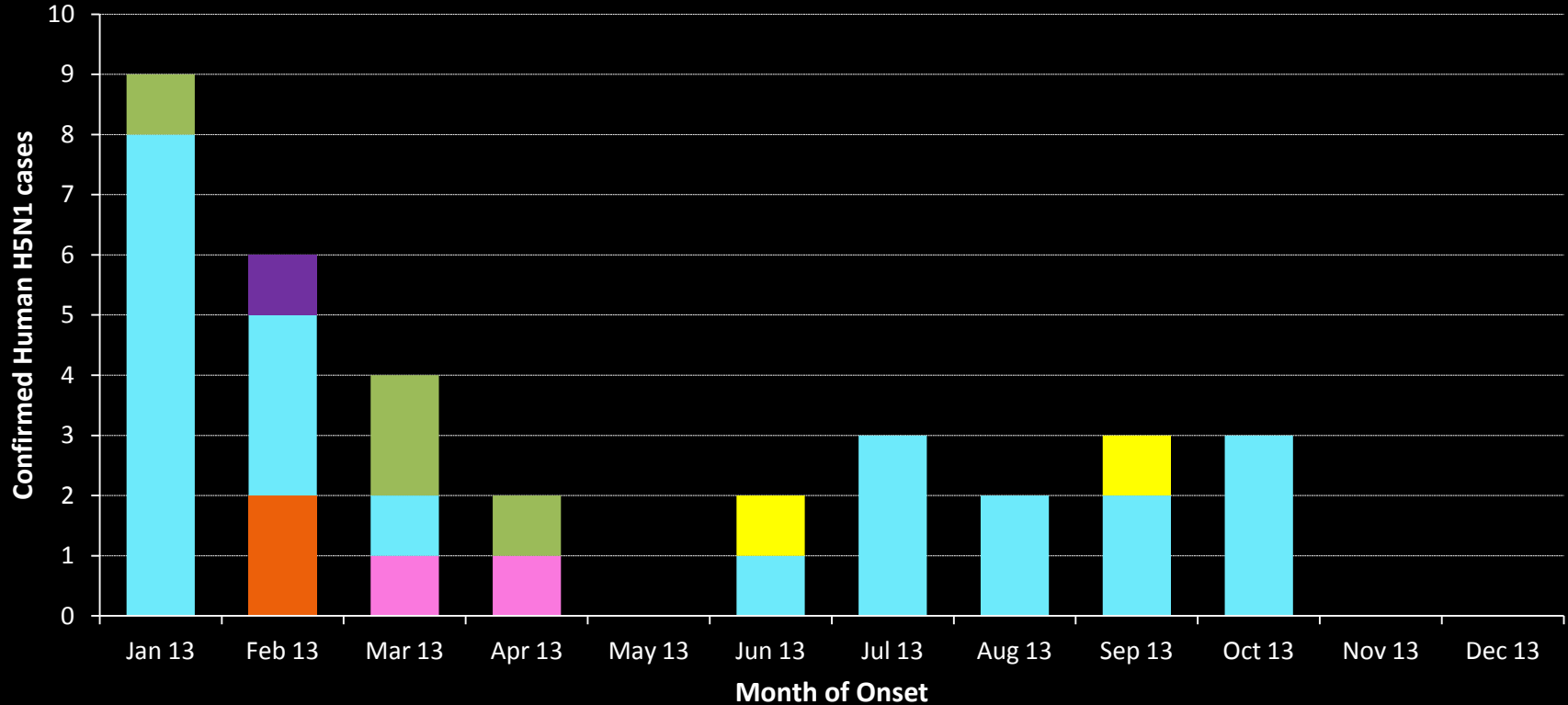
Interim Outcome of human influenza A (H5N1) infections with 2013 year of onset

Interim number of confirmed cases (n=34) 21 deaths (CFR=59.09)





Human Avian influenza A(H5N1) Cases by Onset Month and Country (n=34)



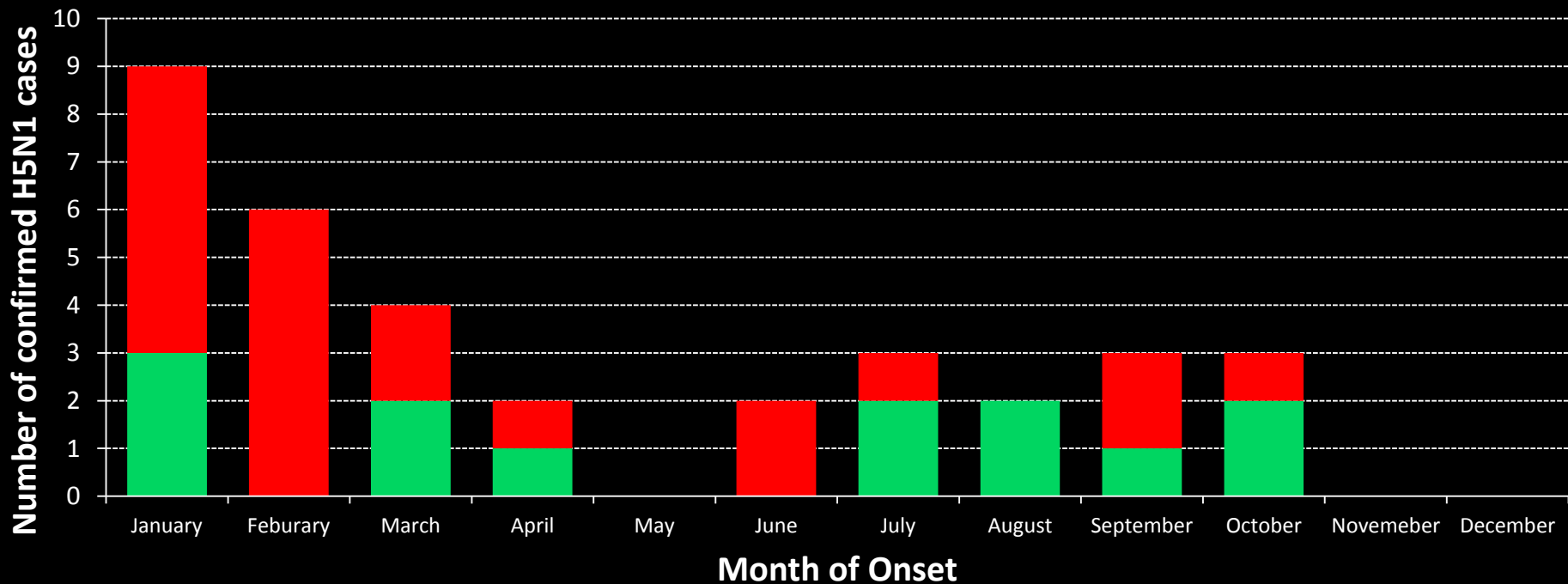
■ Bangladesh (n=1) ■ Egypt (n=4) ■ Indonesia (n=2) ■ Cambodia (n=23) ■ Vietnam (n=2) ■ China (n=2)



2013 Human Influenza A(H5N1) Cases by Month of Onset

Interim Distribution of Human H5N1 Confirmed Survivors and Deaths by Month of Onset (n=34)

■ Survivors (n=13) ■ Deaths (n=21)





2013 Human Influenza A(H5N1) Cases

Interim Distribution of 2013 Human Influenza A/H5N1 Confirmed Cases and Deaths by Sex, Age and Outcome (n=34)

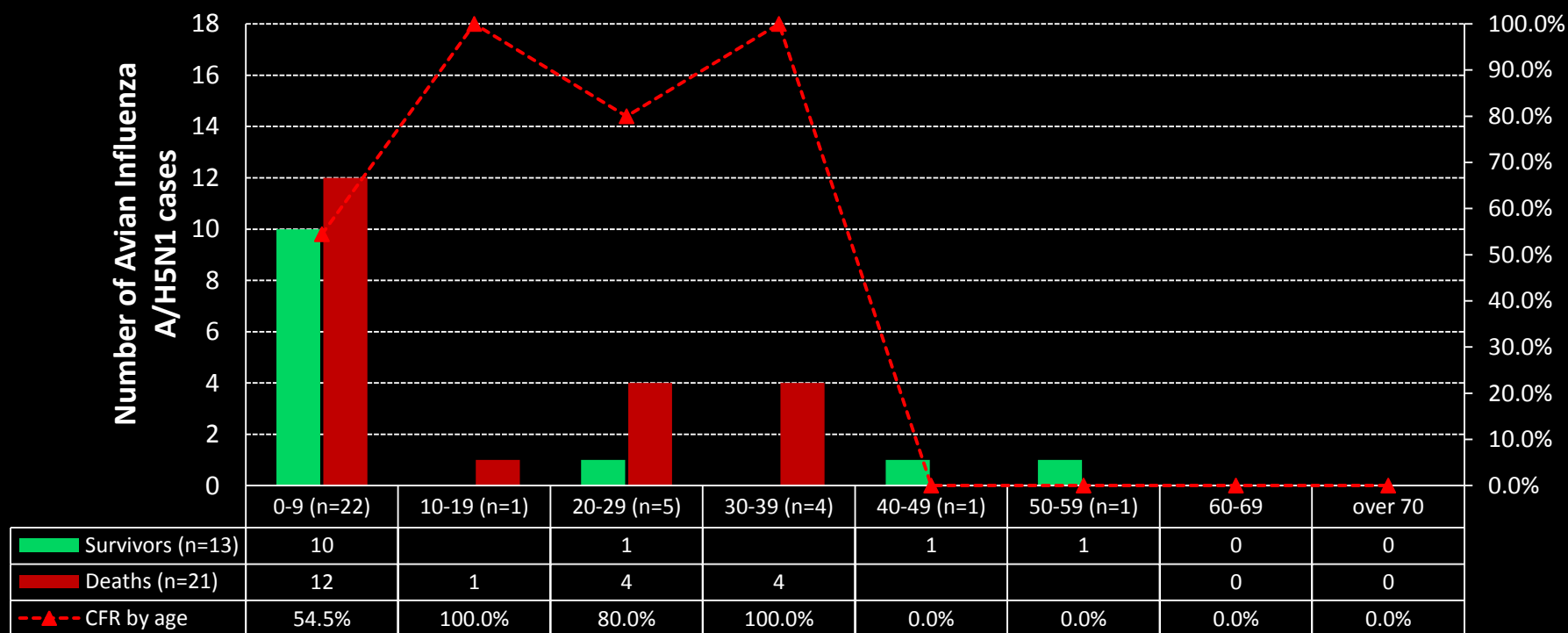
Age groups	Male	Female	Male survivors	Male deaths	Female survivors	Female deaths	Total	Survivors	Deaths	CFR
0-9 (n=22)	10	12	6	4	4	8	22	10	12	54.45%
10-19 (n=1)	0	1	0	0	0	1	1	0	1	100%
20-29 (n=5)	2	3	0	2	1	2	5	1	4	80.0%
30-39 (n=4)	3	1	0	3	0	1	4	0	4	100%
40-49 (n=1)	0	1	0	0	1	0	1	1	0	0.0%
50-59 (n=1)	1	0	1	0	0	0	1	1	0	0.0%
60-69 (n=0)										0.0%
≥70 (n=0)										0.0%
Total	16	18	7	9	6	12	34	13	21	61.76%
n=34	n=34		n=16		n=18		n=34	34 (100%)		n/a

Source –WHO Avian Influenza [Situation update archives](#) 2013
5 (F) in August from Kendal pending outcome- critical condition!



2013 Human Influenza A(H5N1) Cases

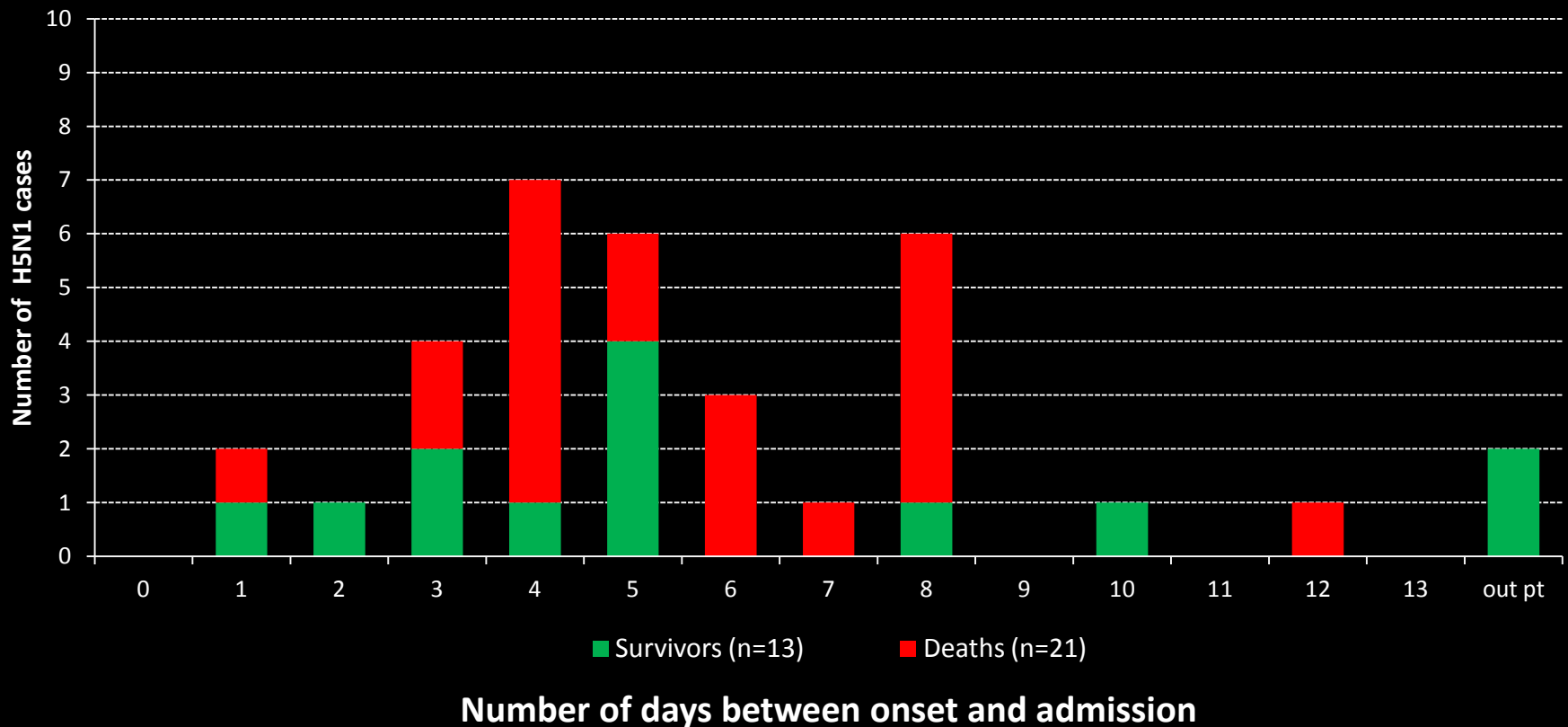
Interim Distribution of H5N1 Survivors and Deaths by age group
[Data as of 4th , November, 2013 (n=34)]





2013 Human Influenza A(H5N1) Cases

Interim Human Influenza H5N1 Cases Number of days between onset and hospitalisations (n=34)





Interim Cambodia Avian Influenza H5N1 Confirmed Cases from 2005-2013 (n=44)





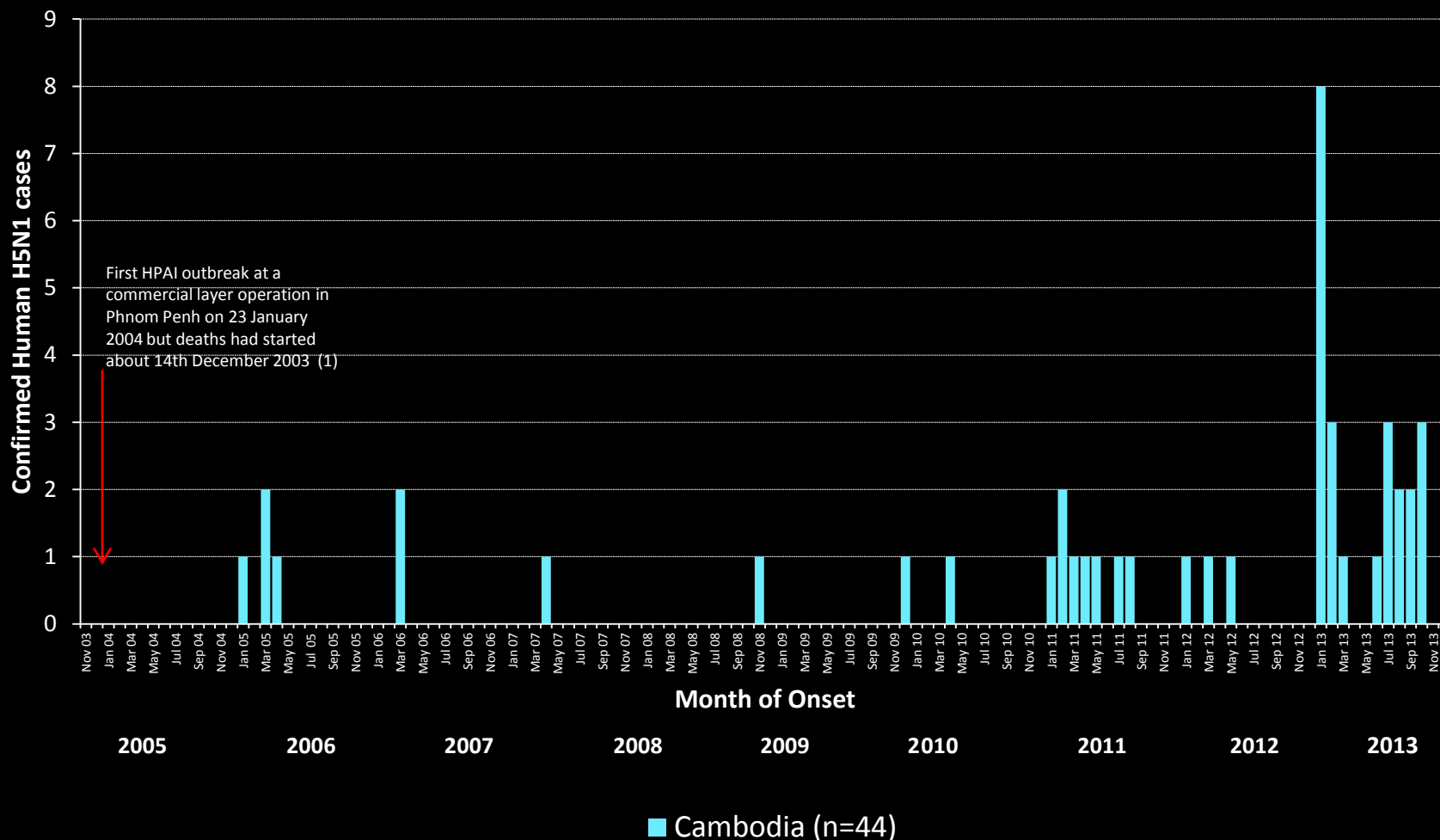
Cambodia Avian Influenza H5N1 Line List

2005-2013 (n=44)

Case #	Age	Sex	Province (sub list)	District (sub list)	Onset	Admission	Antiviral	Outcome	Exposure
Suspect	14 ^a	Male	Kampot (0)	Kampot Trach	Mid Jan	No data	No data	Fatal 24-Jan	Father's chickens died ^c
1	25 ^a	Female (1)	Kampot (1)	Kampot Trach (1)	21-Jan-05	28-Jan-05 ^b	No data	Fatal 30-Jan-05	Father's chickens died ; slaughtered fowls for meal 2 weeks before onset ^c
2	28	Male (1)	Kampot (2)	Bantey Meas (1)	17-Mar-05	21-Mar-05	No data	Fatal 22-Mar-05	Direct contact with dead chickens 1 week before onset , defeathering and consumed ^d
3	8	Female (2)	Kampot (3)	Bantey Meas (2)	29-Mar-05	7-Apr-05	No data	Fatal 7-Apr-05	Had contact with died poultry but not within 2 weeks of onset
4	20	Female (3)	Kampot (4)	Kampot Trach (2)	No data	19-Apr-05 ^e	No data	Fatal 19-Apr-05	Part time poultry vendor at school
5	3	Female (4)	Kampong Speu (1)	Kong Pisey (1)	14-Mar-06	20-Mar-06	No Data	Fatal 21-Mar-06	known to play with sick and dead poultry 1 week prior to onset
6	12	Male (2)	Prey Veng (1)	Mesang (1)	29-Mar-06	4-Apr-06	No data	Fatal 5-Apr-06	Known to have collected sick and dead chickens around house
7	13	Female (5)	Kampong Cham (1)	Ponhea Kreak (1)	2-Apr-07	3-Apr-07	No Data	Fatal 5-Apr-07	consumed sick chicken prior to onset (backyard poultry (chickens and ducks) in one village (5 households) ¹
8	19	Male (3)	Kandal (1)	<u>Tunsay Keuch village</u> , Kandal Steung (1)	28-Nov-08	2-Dec-08* (WPRO) or 3- Dec-13 (NCDM)	No Data	Recovered	consumed sick chicken prior to onset (backyard poultry (chickens and ducks) in one village (5 households) ¹ ; 16-Nov-08 reported to have received a dead chicken from a military camp in Kandal Strung district returned to Kampong Speu and developed symptoms on 28-Nov-08 and returned to Tunsay Keuch village, sample taken at NAMRU-2 FSS; private clinic in , Admitted to TB centre 3-Dec-10, referred to Calmette 11-Dec-08 (NCDM Mar-09)
9	57	Male (4)	Kampong Cham (2)	Ponhea Kreak (2)	11-Dec-09	16-Dec-09	No Data	Recovered	Backyard poultry including chickens and ducks (1,012 chickens and 204 ducks). 875 birds corresponding to 751 chickens and 124 ducks were culled. La-ak, Ponhea Kreak
10	27	Male (5)	Prey Veng (2)	Kampong Leav (1)	13-Apr-10	16-Apr-10	No Data	Fatal 17-Apr-10	prepared and consumed sick poultry in the 7 days before onset of symptoms.
11	5	Female (6)	Phnom Penh (1)	Reussey Keo (1)	30-Jan-11	3-Feb-11	4-Feb-11	Fatal 4-Feb-11	contact with sick poultry during the 7 days before onset of symptoms
12	19	Female (7)	From Banteay Meanchey (1) [Prey	Malay (1)	5-Feb-11	12-Feb-11	No data	Fatal 12-Feb-11	Mother was exposed to eating and preparing sick poultry while visiting relatives in Prash Sdach district, Prey



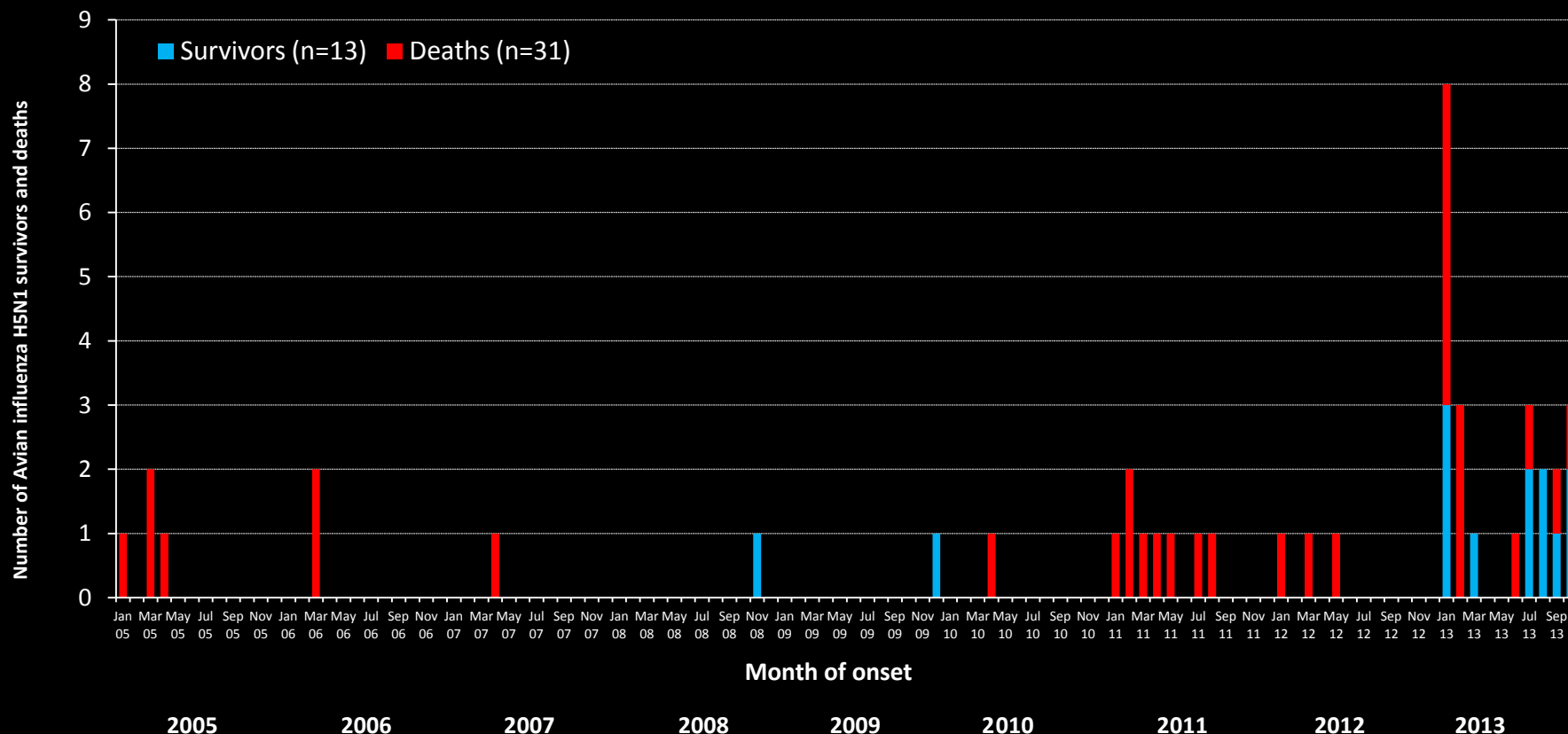
Human Avian influenza A(H5N1) Cases by Month of Onset in Cambodia (n=44)





Avian Influenza H5N1 in Cambodia 2005-2013

**Epidemiological curve of Human Avian Influenza A(H5N1)
confirmed cases in Cambodia by month of onset (n=44)**

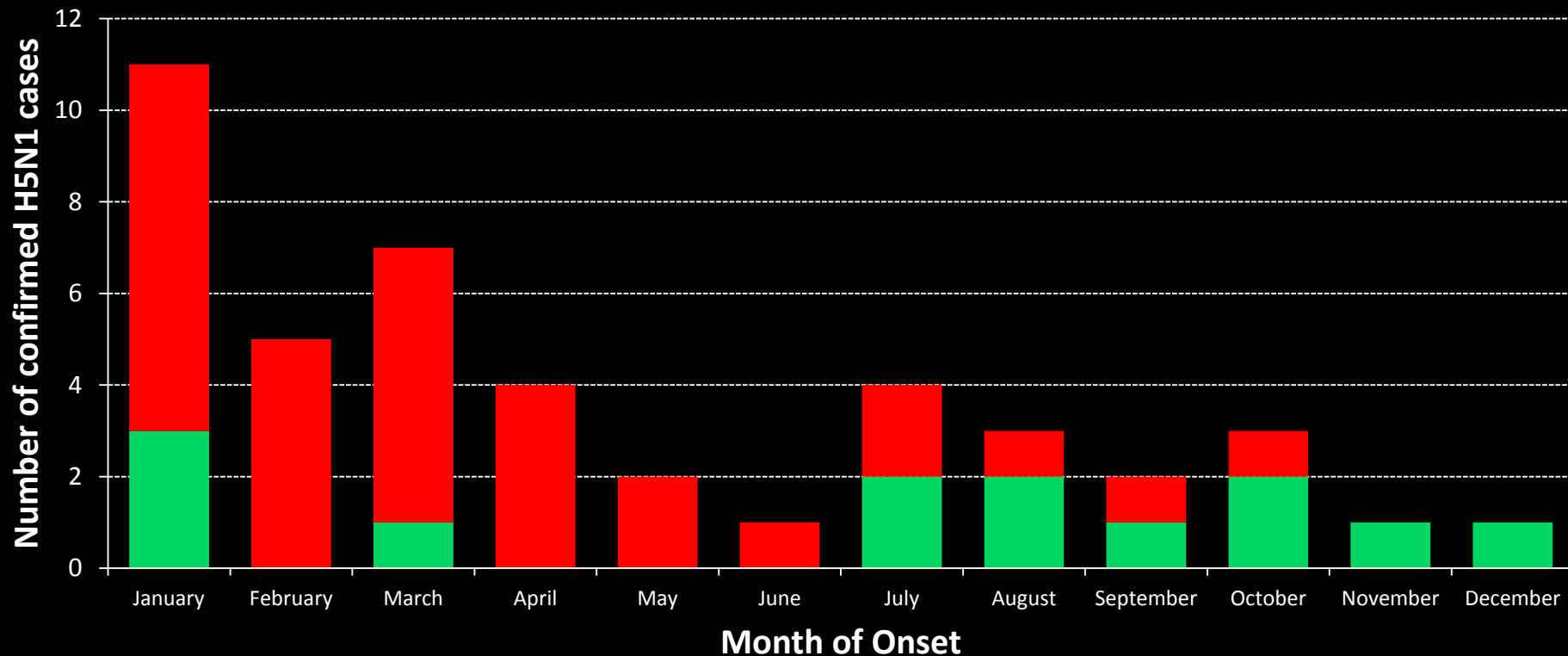




2005-2013 Human Influenza A(H5N1) Cases by Month of Onset in Cambodia

Distribution of Human H5N1 Confirmed Survivors and Deaths by Month of Onset from 2005-2013 (n=44)

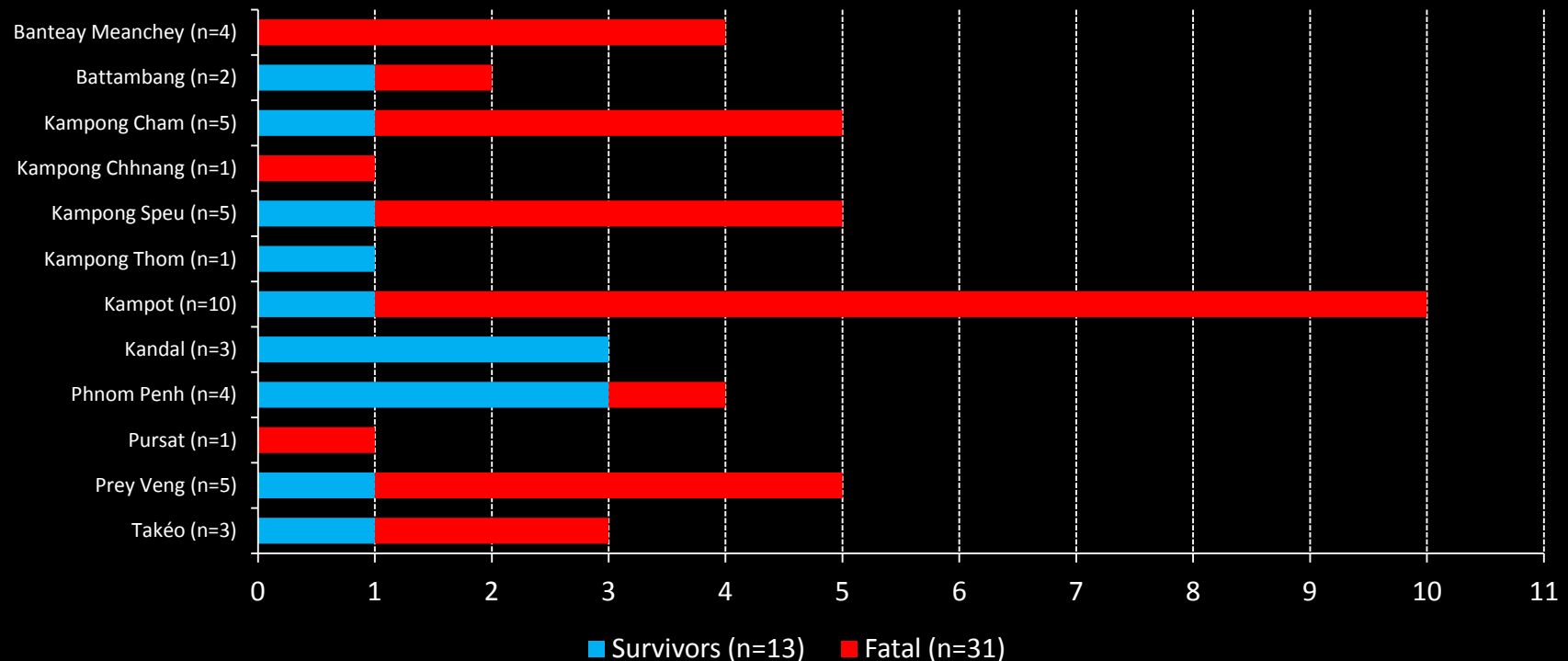
■ Survivors (n=13) ■ Deaths (n=31)





Human Avian influenza A(H5N1) in Cambodia by Provinces and Outcome

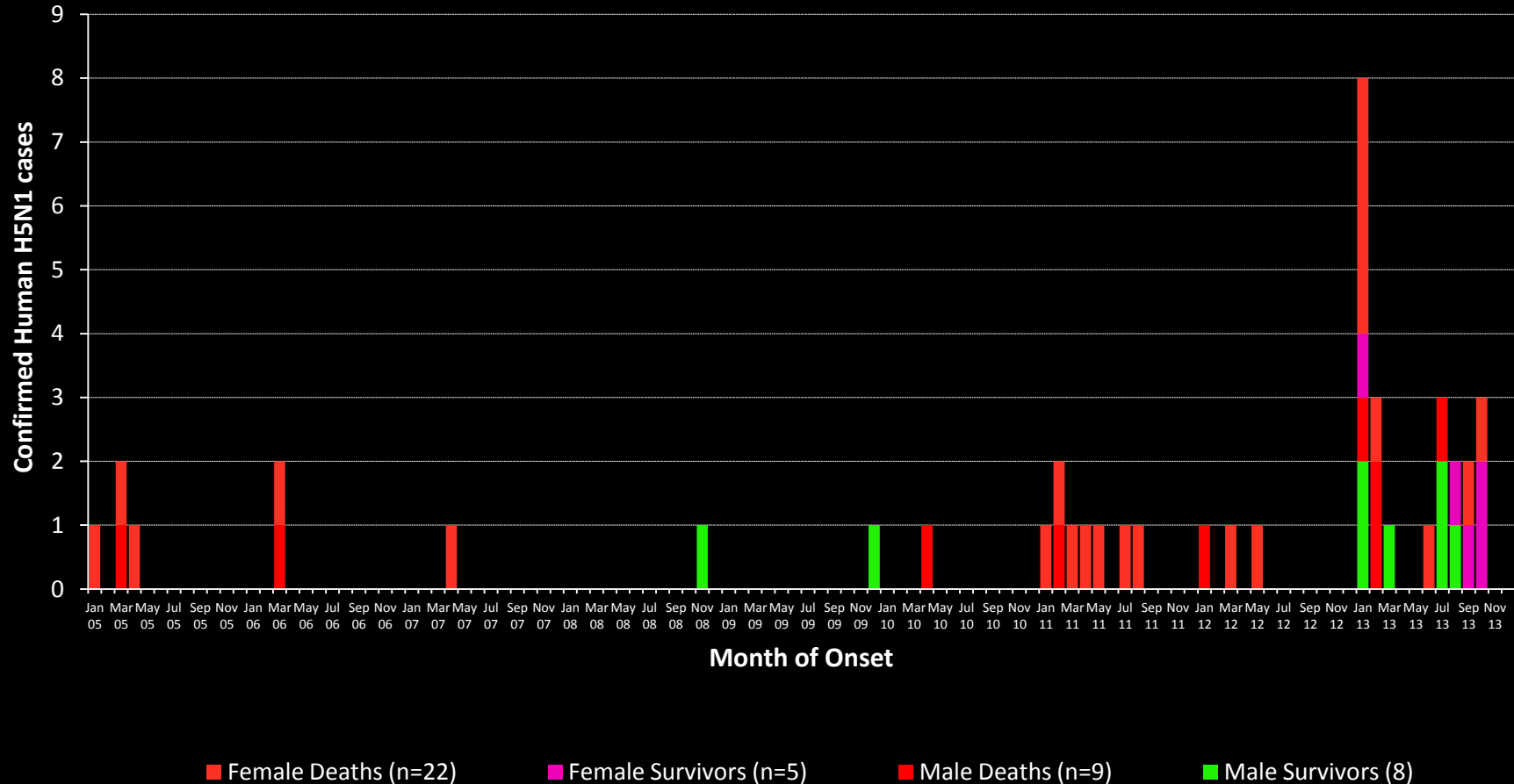
Interim Human Avian influenza A(H5N1) by
Cambodian Provinces and Outcome (n=44) 31 deaths (CFR=70.45%)



Note: 2 fatal cases from Banteay Meanchey province acquired infection in Prash Sdach, Prey Veng respectively!



Human Avian influenza A(H5N1) Cases by Onset Month, Sex and Outcome (n=44)





Cambodia Avian Influenza H5N1 Confirmed Cases by Sex, Age and Outcome (n=44) 2005-2013

Cambodia Avian Influenza H5N1 Confirmed Cases and Deaths by Sex, Age and Outcome (n=44) 2005-2013										
Age Groups	Male	Female	Male survivors	Male deaths	Female survivors	Female deaths	Total Cases	Survivors	Deaths	CFR
0-9 (n=29)	9	20	5	4	5	15	29	10	19	65.52%
10-19 (n=7)	2	5	1	1	0	5	7	1	6	85.71%
20-29 (n=4)	2	2	0	2	0	2	4	0	4	100.00%
30-39 (n=2)	2	0	0	2	0	0	2	0	2	100.00%
40-49 (n=0)										0.00%
50-59 (n=2)	2	0	2	0	0	0	2	2	0	0.00%
60-69 (n=0)										0.00%
≥70 (n=0)										0.00%
Total	17	27	8	9	5	22	44	13	31	70.45%
n= 44	n=43		M= 17		F= 27		n= 44	100% of cases		n/a

Comparison of CFR's in Cambodia from 2005-2012 and 2005-2013

Cambodia Avian Influenza H5N1 Confirmed Cases and Deaths by Sex, Age and Outcome From 2005-2012 (n=21)										
Indicators	Male	Female	Male survivors	Male deaths	Female survivors	Female deaths	Total Cases	Survivors	Deaths	CFR%
Total	7	14	2	5	0	14	21	2	19	n/a
Cumulative total	21		Male-CFR- 71.42%		Female CFR- 100%		21	2	19	90.00%

Cambodia Avian Influenza H5N1 Confirmed Cases and Deaths by Sex, Age and Outcome from 2005-2013 (n=44)										
Indicators	Male	Female	Male survivors	Male deaths	Female survivors	Female deaths	Total Cases	Survivors	Deaths	CFR%
Total	17	27	8	9	5	22	44	13	31	n/a
Cumulative total	44		Male-CFR- 52.94%		Female CFR- 81.48%		44	13	31	70.45%



Interim Cambodia Avian Influenza H5N1 Confirmed Cases by Sex, Age and Outcome (n=23) 2013

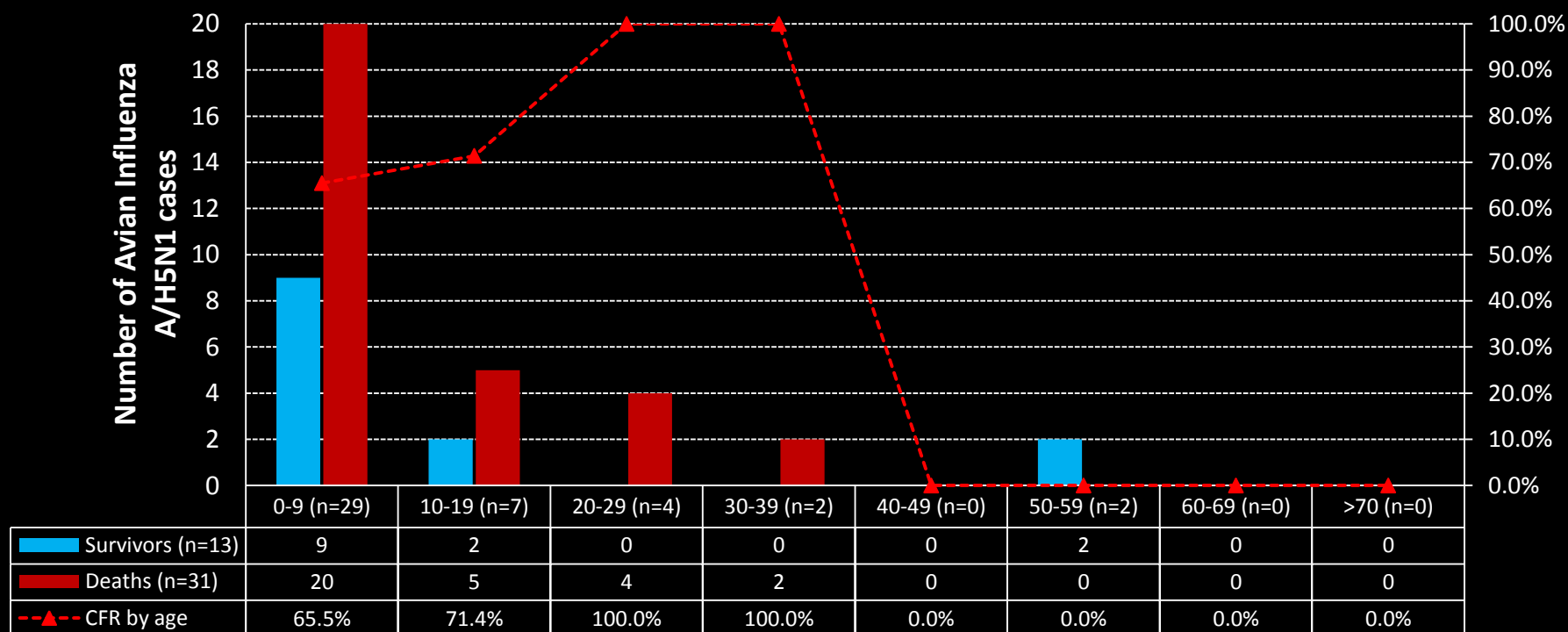
Interim Cambodia Avian Influenza H5N1 Confirmed Cases and Deaths by Sex , Age and Outcome (n=23) 2013										
Interim 2013 Age Groups	Male	Female	Male survivors	Male deaths	Female survivors	Female deaths	Total Cases	Survivors	Deaths	CFR
0-9 (n=19)	7	12	5	2	5	7	19	10	9	47.37%
10-19 (n=1)		1				1	1	0	1	100.00%
20-29 (n=0)										0.00%
30-39 (n=2)	2			2			2	0	2	100.00%
40-49 (n=0)							0	0	0	0.00%
50-59 (n=1)	1		1				1	1	0	0.00%
60-69 (n=0)							0	0	0	0.00%
≥70 (n=0)							0	0	0	0.00%
Total	10	13	6	4	5	8	23	11	13	56.52%
n= 23	n= 23		M= 10		F= 13		n= 23	100%		n/a

Cambodia Avian Influenza H5N1 Confirmed Cases and Deaths by Sex , Age and Outcome 2005-2013 (n=44)										
Indicators	Male	Female	Male survivors	Male deaths	Female Survivors	Female deaths	Total Cases	Survivors	Deaths	CFR%
Total	17	27	8	9	5	22	44	13	31	n/a
Cumulative total	44		Male-CFR- 52.94%		Female CFR- 81.48%		44	13	31	70.45%



2013 Human Influenza A(H5N1) Cases

**Interim Distribution of H5N1 Survivors and Deaths by age group
in Cambodia [Data as of 4th, November, 2013 [n=44 (31)]]**





Cambodia Avian Influenza H5N1 Line List

2005-2013 (n=44)

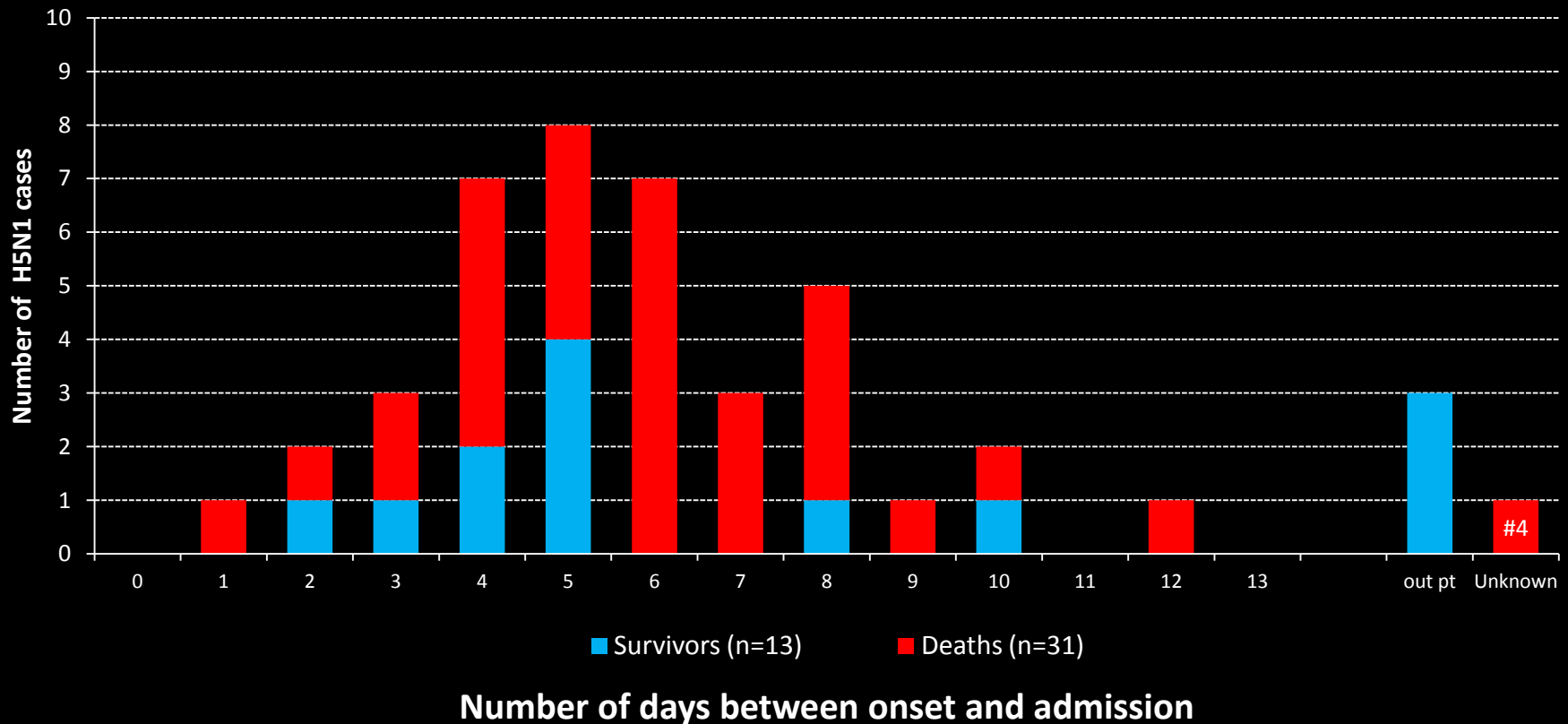
Case #	Age	Sex	Province	Onset	Admission	1 st medical contact	2 nd medical contact	Days between onset and hospitalisation	Outcome	Date of outcome	Days between onset and death	Days between hospitalisation and death
Suspect	14 ^a	Male	Kampot	Mid Jan 2005	Died at home	local practitioner	N/A	N/A	Fatal	24-Jan-05	N/A	N/A
1	25 ^a	Female (1)	Kampot	21-Jan-05	27/28-Jan-05 ^b	local clinic in Kampot	Kien Giang Provincial Hospital, Vietnam	6	Fatal	30-Jan-05	9	3
2	28	Male (1)	Kampot	17-Mar-05	21-Mar-05	in a Phnom Penh hospital	N/A	4	Fatal	22-Mar-05	5	1
3	8	Female (2)	Kampot	29-Mar-05	7-Apr-05	district referral hospital in Kampot	Kantha Bopha Children's Hospital, Phnom Penh	9	Fatal	7-Apr-05	9	0
4	20	Female (3)	Kampot	No data	19-Apr-05 ^e	Vietnamese hospital in Kien Giang, Vietnam	N/A	ukn	Fatal	19-Apr-05	ukn	ukn
5	3	Female (4)	Kampong Speu	14-Mar-06	20-Mar-06	Kantha Bopha Children's Hospital, Phnom Penh	N/A	6	Fatal	21-Mar-06	7	1
6	12	Male (2)	Prey Veng	29-Mar-06	4-Apr-06	1-Apr-06 brought to Phnom Penh for Tx	Calmette Hospital	6	Fatal	5-Apr-06	7	1
7	13	Female (5)	Kampong Cham	2-Apr-07	3-Apr-07	A Phnom Penh hospital (? Calmette)	N/A	1	Fatal	5-Apr-07	3	2
8	19	Male (3)	Kandal	28-Nov-08	3-Dec-08	30-Nov-08 and again 2-Dec-08 visited local health centre (enrolled in FSS)	WPRO- admitted 2-Dec-08; 11-Dec-08 currently being treated at Calmette hospital, Phnom Penh	5	Recovered	No data	N/A	N/A
9	57	Male (4)	Kampong Cham	11-Dec-09	16-Dec-09	<u>13-Dec-09</u> symptoms identified by Local Influenza ILI Research Study	16-Dec-13 Kampong Cham Provincial Hospital	5	Recovered	No data	N/A	N/A
10	27	Male (5)	Prey Veng	13-Apr-10	16-Apr-10	local hospital in Prey Veng	17-Apr-05 Calmette Hospital, Phnom Penh ICU	3	Fatal	17-Apr-10	4	1



2005-2013 Human Influenza A(H5N1)

Cases in Cambodia

Interim Cambodian Human Influenza H5N1 Cases
Number of days between onset and hospitalisations (n=44)



Exposure		Direct contact	Indirect contact	Food prep	Playing	Back yard	H2H
Father's chickens died ^c	possible		possible				
Father's chickens died ; slaughtered fowls for meal 2 weeks before ^c ; cannot rule out H2H with suspected brother or enviroment	yes	yes		yes			FALSE
Direct contact with dead chickens 1 week before onset , <u>defeathering</u> and consumed ^d	yes	yes		yes			
Had contact with died poultry but not within 2 weeks of onset	not confirmed						
Part time poultry vendor at school	yes	yes					
known to play with sick and dead poultry 1 week prior to onset	yes	yes	yes		yes		
Known to have collected sick and dead chickens around house	yes	yes				yes	
consumed sick chicken prior to onset (backyard poultry (chickens and ducks) in one village (5 households) ¹	yes	yes				yes	
consumed sick chicken prior to onset (backyard poultry (chickens and ducks) in one village (5 households) ¹ ;	yes	yes				yes	
Backyard poultry including chickens and ducks (1,012 chickens and 204 ducks). 875 birds corresponding to 751 chickens and 124 ducks were culled. La-ak, Ponhea Kraek	yes					yes	
prepared and consumed sick poultry in the 7 days before onset of symptoms.	yes	yes		yes			
contact with sick poultry during the 7 days before onset of symptoms	yes	yes					
Mother was exposed to eating and preparing sick poultry while visiting relatives in Prash Sdach district, Prey Veng a few days before onset ^a	yes	yes		yes			FALSE
Son had multiple exposures to sick and dead poultry in the same time frame while visiting relatives in Prash Sdach district, Prey Veng a few days before onset ^a	yes		yes				FALSE
Were reports of poultry die off in her village	not confirmed		possible				
Were reports of poultry die off in her village (Isolate is closely related to environment sample)	yes		yes				
Were reports of poultry die off in her village and exposed to sick poultry, almost 1/3 cases exposed in Prey Veng (including case 12 and 13)	yes		yes				
Evidence of poultry die off in the village and the case had consumed dead chicken prior to becoming sick (OIE-Follow-up report No.: 3 Report reference: 321-322-323/2011, OIE Ref: 11313, Report Date: 21/11/2011, Country: Cambodia-Birds – 580 – 100 – 100 – 480 – 0	yes	yes		yes			
Evidence of recent deaths among poultry in the village and the patient had contact with sick or dead poultry and their waste prior to becoming sick	yes	yes					
Evidence of recent deaths among poultry in the village and the patient had contact with sick or dead poultry [backyard poultry] prior to becoming sick.	yes	yes				yes	
Reported that the patient had contact with sick or dead poultry prior to onset of illness	yes	yes					
Pring village, Toul Sala positive chicken and Duck 30-05-12 EMPRES-1; Report reference: 577/12 NaVRI, OIE Ref: 12032, Report Date: 11/06/2012, Country: Cambodia	yes	yes					
History of coming into contact with poultry prior to becoming sick	yes	yes					
Evidence of recent deaths among poultry in the village and the patient prepared sick chicken for food prior to becoming sick; Report reference: 38/13 NaVRI REF OIE 12931, Report Date: 27/01/2013, Country : Cambodia . Backyard poultry started being sick and dying in the village from 9 January 2013.	yes	yes				yes	
Evidence of recent deaths among poultry in the village and the patient prepared sick chicken for food prior to becoming sick	yes	yes		yes			
Evidence of recent deaths among poultry in the village and the girl had history of coming into contact with poultiry prior to becoming sick. (different village)	yes	yes					
Evidence of recent deaths among poultry in the village { Non official- contact exposure to backyard poultry)	yes	yes				yes	
Evidence of recent deaths among poultry in the village and the girl had a history of coming into contact with poultiry prior to becoming sick.	yes	yes					
Evidence of recent deaths among poultry in the village and the girl had history of coming into contact with poultiry prior to becoming sick	yes	yes					
Evidence of recent deaths among poultry in the village. (different village)	yes		yes				
Evidence of recent deaths among poultry in the village and the man had history of coming into contact with sick poultry prior to becoming sick, [Non official slaughtered, prepared and consumed 2 infected ducks]; Report reference: 38/13 NaVRI, Reference OIE : 12947, Report Date : 30/01/2013, Country : Cambodia	yes	yes					
Exposure under investigations, not known whether the boy had direct contact with poultry; Wild birds were seen in area Unknown, exposure to poultry is/was being investigated; co-infection with Influenza A(H1N1) 30-Jan-13 Influenza and 2-May-13 H5N1 ; [retrospectively confirmed ~]	not confirmed						
Exposure not reported; co-infection with influenza (influenza strain not reported) 9-Jan-13 influenza and 21-Jun-13 H5N1 [retrospectively confirmed ~]	not confirmed						
Recent poultry deaths in the village and the girl was likely to be exposed to sick and dead poultry before she became sick	yes		yes				
Were recent deaths among poultry in the village and the boy was likely to be exposed to sick and dead poultry before he became sick	yes		yes				
Were recent deaths among chickens and ducks in the village, He carried dead and sick ducks and chickens from a cage for food preparation by his sister prior to onset ; Report reference: 646/13 NaVRI REF OIE 13939, Report Date: 19/08/2013, Country : Cambodia- Damnak Dangkor Village, Raing Kesey commune, Sang Ke	yes	yes		yes			
Were recent deaths among poultry in the village.	yes		yes				
Came into contact with sick poultry	yes	yes					
Exposure to poultry, Ministry of Health's Rapid Response Teams (RRT) in the village to determine whether the child came into contact with sick or dead poultry.	yes	pending					
Ministry of Health's Rapid Response Teams (RRT) in Prey SleK village revealed that the girl came into direct contact with sick and dead chickens in her village	yes	yes					
Child went to her neighbour's house, with her mother, to 'watch' villagers prepare a meal from chickens that had died earlier. The villagers also shared the meal with the girl's family. Pending further investigations by Ministry of Health's Rapid Response Teams (RRT)	yes		yes				
Ministry of Health's Rapid Response Teams (RRT) in O-Raing village revealed that the girl had come into direct contact with dead poultry when she helped prepare a meal from a chicken that had died earlier	yes			yes			
Ministry of Health's Rapid Response Teams (RRT) in ROI-S&DP-chickens and ducks at neighbours' house and nearby villages, pending investigations for direct contact/handling of sick and dead poultry and ducks,	yes	pending	yes				
Ministry of Health's Rapid Response Teams (RRT) pending further investigation , query environmental as chickens died 2 month before onset at grandfathers house where the child often stayed	pending						



The End

Pending further slides r/t interim
2013