Epidemiology of EMS/AHPNS based on September 2012 cross sectional studies

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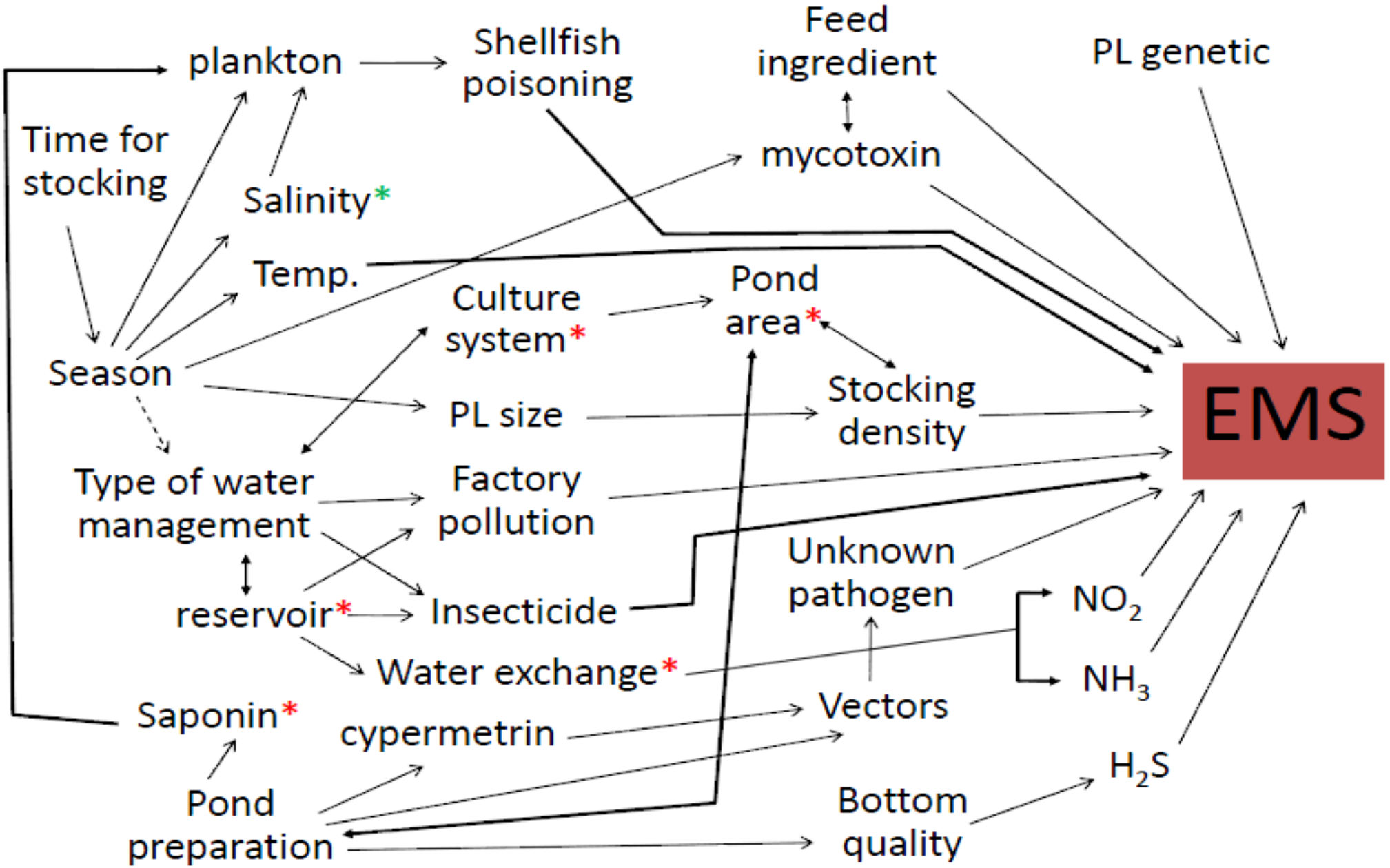
Topic of the presentation

- Set up the list of candidate risk factors
- Study design and survey
- Data analysis
  - Farm level information
  - Pond level information
  - Water quality and environmental parameter
- Compare the results to the other study
- Renew the causal web
- Conclusion and future study

Possible risk factors of AHPNS (EMS)



Boonyawiwat, V. Aug, 2012, TCP/VIE/3304 (E) Emergency assistance to control the spread of an unknown disease affecting shrimps

Study design and survey

Case definition (EMS)

- Pond level
  - Accumulative mortality: >40% within 5-7 days
  - Ages: <35 days DOC
  - Gross sign: significant atrophy (shrinkage) of the HP
- Farm level
  - At least a pond (any crop) in that farm affected by EMS (since 1 January 2012 to the date of doing the questionnaire)

Survey data

- Questionnaire
  - Part 1: General respondent (farmer) information
  - Part 2. General farm information*
  - Part 3. General pond information*
  - Part 4. Water quality parameters*
  - Part 5. Health history and health status
  - Part 6. Other information

Sample size required and Questionnaires complete

province	district	Total farm	Total pond	Total farm	Total pond
Soc Trang	Vinh Chau	309	618	289 (93.5%)	466 (75.4%)
Soc Trang	Tran De	316	632	323 (102%)	387 (61.2%)
Bac Lieu	Hoa Binh	332	664	305 (91.9%)	586 (88.3%)
Ca Mau	Dam Doi	297	594	278 (93.6%)	481 (81%)
Grand total		1254	2508	1195 (95.3%)	1920 (76.6%)

Calculate by survey toolbox software program

Farm level data

- Descriptive data analysis

Factors	N	missing	mean	SD	range
totpond	1195	22	3.35	5.06	1, 134
totarea	1195	24	1.47	3.79	0.1, 120
researea	1195	25	0.19	0.40	0, 7
resVScul	1195	27	0.19	0.48	0, 7.8125
dryperoid	1195	440	26.02	19.23	0, 150
holdlong	1195	96	10.90	10.05	0, 60
fstorlong	1195	135	7.31	3.38	1, 30
nearfmdis	1195	486	0.29	0. 83	0, 10

Factors	N	missing	0 (absent)	1 (present)
respond	1195	21	512	662
cleanond	1195	22	7	1166
flushsedi	1195	22	537	636
remosedi	1195	22	470	703
drysedi	1195	22	86	1087
plougsedi	1195	22	1098	75
limsedi	1195	22	0	1064
carritreat	1195	0	12	1183
filtcari	1195	27	77	1091
inseccari	1195	45	1073	77
sapocari	1195	45	607	543
chlocari	1195	45	607	543
othercari	1195	49	950	196
probiotic	1195	48	865	282
treawater	1195	81	150	964
treahold	1195	84	221	890
treachlo	1195	85	733	377
treaother	1195	87	978	130
emsfarm	1195	209	212	774 (78.5%)
nearfmaf	1195	155	268	772

Factors	N	missing	category	number	percent
bottomt	1195	29	1	1126	96.57
			2	33	2.83
			3	7	0.60
souwater	1195	21	1	5	0.43
			2	472	40.20
			3	622	52.98
			4	5	0.43
			5	24	2.04
			6	45	3.83
			7	1	0.09
manwater	1195	28	1	142	12.17
			2	616	52.78
			3	348	29.82
			4	16	1.37
			5	3	0.26
			6	1	0.09
			7	5	0.43
			8	13	1.11
			9	13	1.11
			10	10	0.86
supdrain	1195	57	1	828	72.76

monotype	**1195**	**133**	**1**	**389**	**36.63**
			2	536	50.47
			3	137	12.90
vanatype	1195	1009	1	170	91.40
			2	16	8.6
culspecie	1195	1	1	981	82.16
			2	103	8.63
			3	110	9.21
feedstore	1195	63	1	54	4.77
			2	31	2.74
			3	1047	92.49
feedmana	1195	36	1	522	45.04
			2	1	0.09
			3	10	0.86
			4	623	53.75
			5	0	0
			6	3	0.26
feedtype	1195	42	1	1153	100
			2	0	0

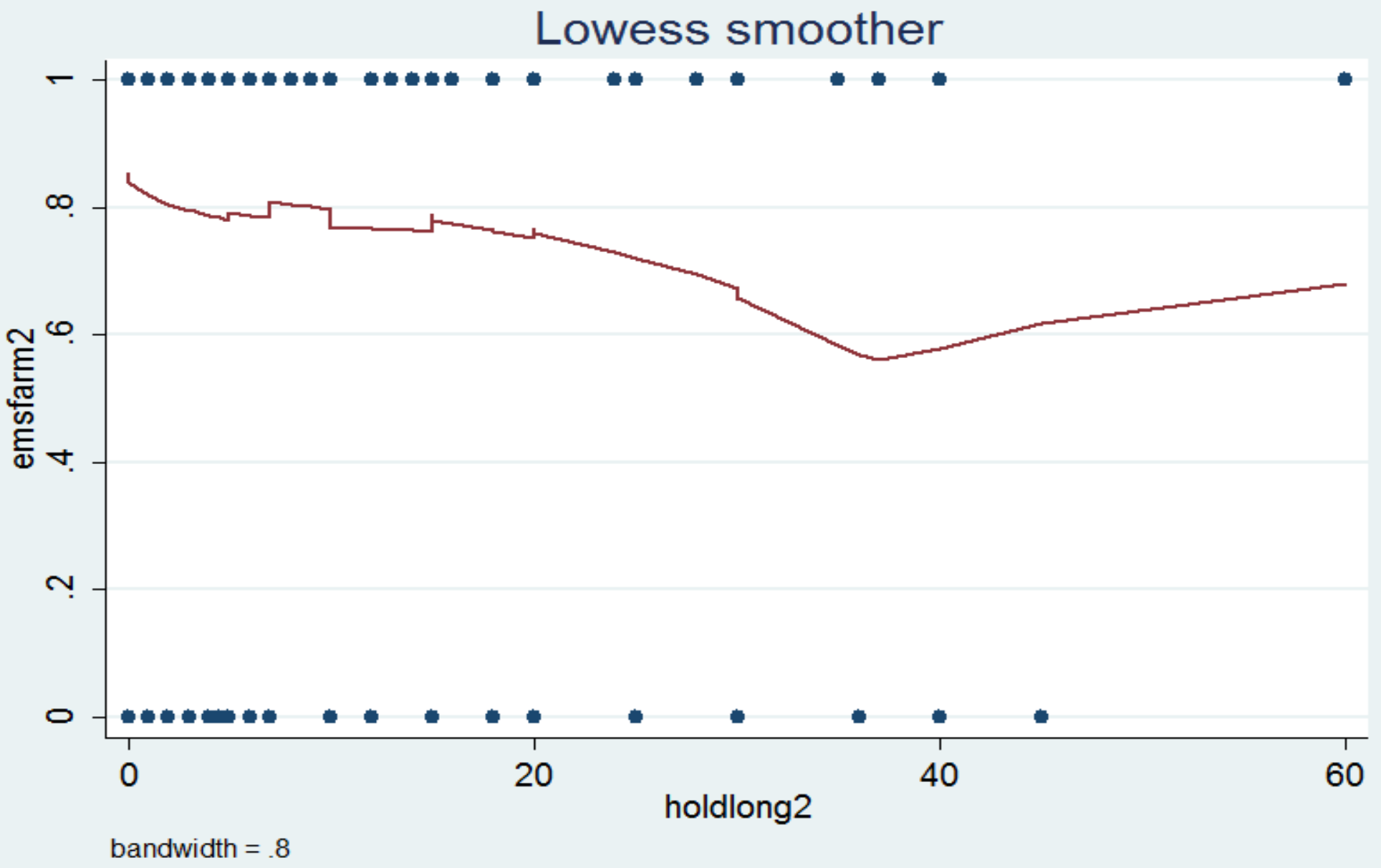
Logistic regression (Univariate analysis)

Factors	Odds ratio	P-value
totarea	1.222	0.004
resVScul	0.749	0.033
brackish	2.048	0.000
seawater	0.441	0.000
closesys	0.511	0.000
semisys	2.034	0.000
supdrain	1.641	0.011
remosedi	1.530	0.006
drysedi	2.339	0.002
chlocari	0.738	0.051
treawater	0.516	0.013
treahold	0.528	0.004
holdlong	0.983	0.026
feedmana	0.793	0.000
nearfmaf	4.537	0.000

Note: Odds ratio >1 = risk , <1 =protective

How is optimum reservoir to culture area ratio?

How long we should hold water before using?



How drying pond effect to EMS outbreak?

Pond level data

Factors	N	missing	mean	SD	range
pondsize	1920	25	0.44	0.35	0.05, 3.5
ponddept	1920	62	1.33	0.21	0.64, 2.5
plage	1920	122	12.93	1.95	2, 20
plstockd	1920	48	28.03	25.12	3, 220
totfeed	1920	208	104.79	107.81	6, 1080

Factors	N	missing	0 (absent)	1 (present)
fertiuse	1920	51	1232	637
wildani	1920	48	1373	499
crab	1920	54	1587	279
finfish	1920	58	1720	142
wildshrim	1920	57	1724	139
emspond	1920	44	672	1204
obsplank	1920	40	1590	290
chemiwater	1920	58	237	1625
mineral	1920	247	118	1555
disinfect	1920	289	647	984
algicide	1920	341	1188	391
pesticide	1920	359	1521	40
antibiotic	1920	342	1138	440
probiotic	1920	308	462	1150
otwaterman	1920	382	1460	78
watreat	1920	331	1553	36
aerator	1920	109	185	1626
abclima	1920	374	722	824

Factors	N	missing	category	number	percent
fertitype	1920	72	0	1233	66.70
			1	564	30.54
			2	37	2.00
			3	14	0.76
shspecie	1920	46	1	242	12.91
			2	1632	87.09
plprovin	1920	101	From 13 different province using at frequency of 2 – 1,054 ponds		
plhatch	1920	554	From 222 different hatchery using at frequency of 1 – 173 ponds		
otheranic	1920	70	0	1681	
			1	119	
			2	38	
			3	12	
waexch	1920	0	0	1828	
			1	41	
			2	51	

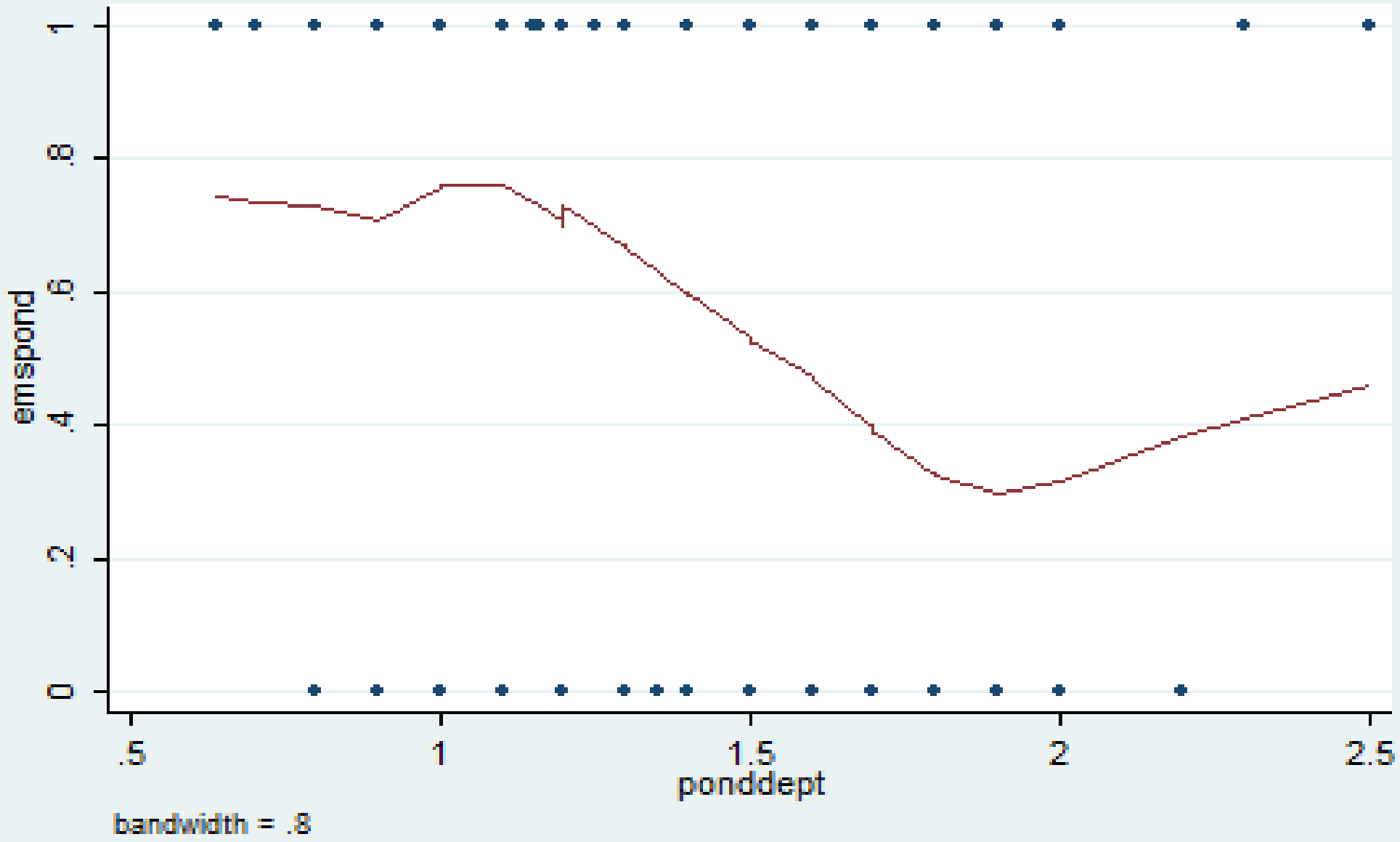
Logistic regression (Univariate analysis)

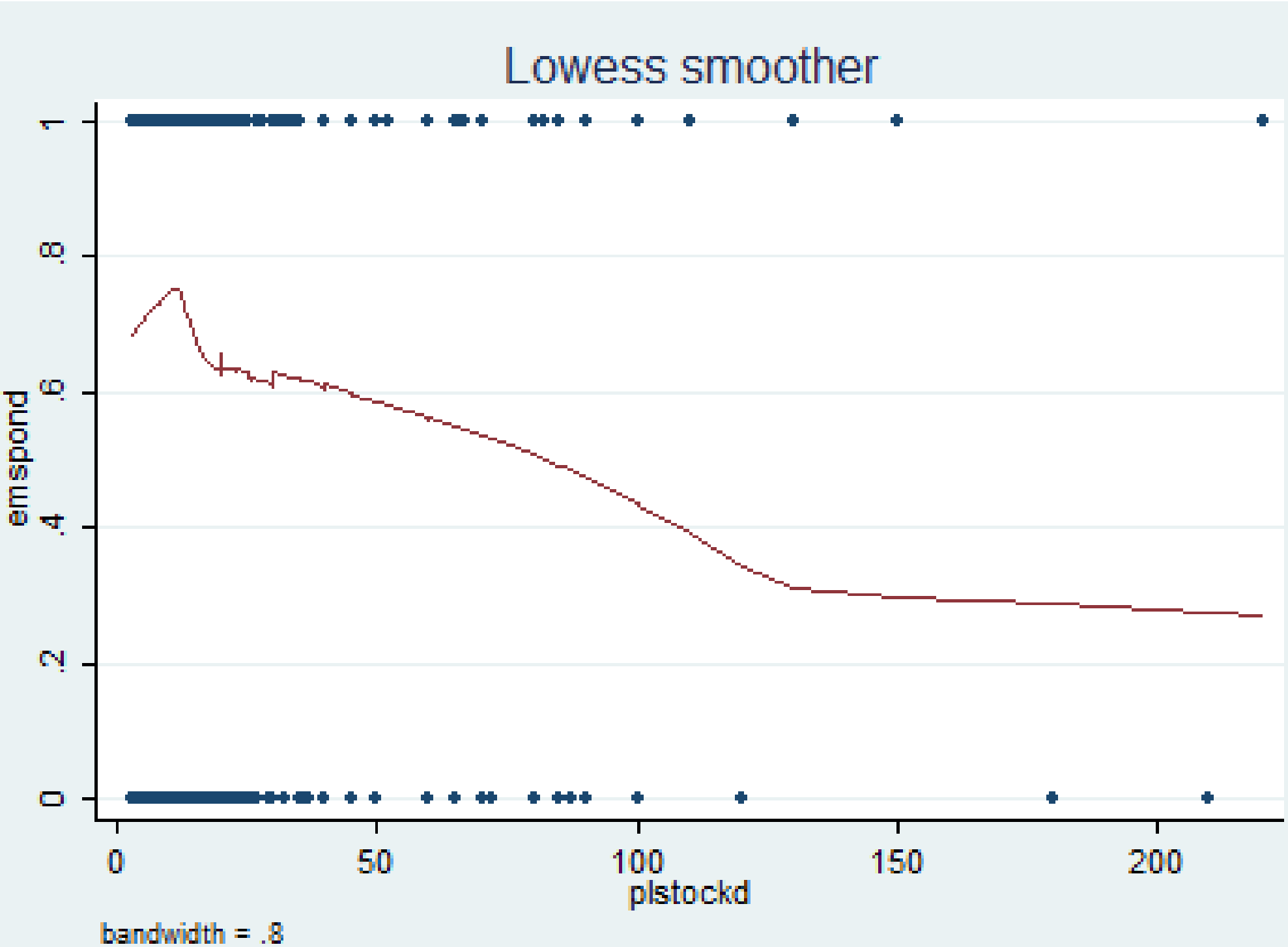
Factors	No. obs	Odds ratio	P-value
General pond background			
pondsize	1867	2.99	0.000
ponddept	1834	0.09	0.000
Shrimp species and postlarvae			
shspecie	1847	2.16	0.000
plprovin	1794	1.15	0.000
plhatch	1344	0.997	0.000
plstockd	1847	0.989	0.000
Carrier			
wildani	1854	0.91	0.393
Plankton			
obsplank	1856	0.814	0.123

Logistic regression (Univariate analysis)

Factors	No. obs	Odds ratio	P-value
chemical treatment water during culture			
chemiwater	1837	1.331104	0.045
mineral	1640	1.464043	0.048
algicide	1556	1.292	0.040
probiotic	1588	0.5071901	0.000
Water and feed management			
waexch	1876	0.7306535	0.019
totfeed	1697	0.9980876	0.000
aerator	1788	0.4109327	0.000
Environmental (weather)			
abclima	1534	2.098487	0.000

How is pond dept. effect to EMS outbreak?




Lowess smoother
emspond
0
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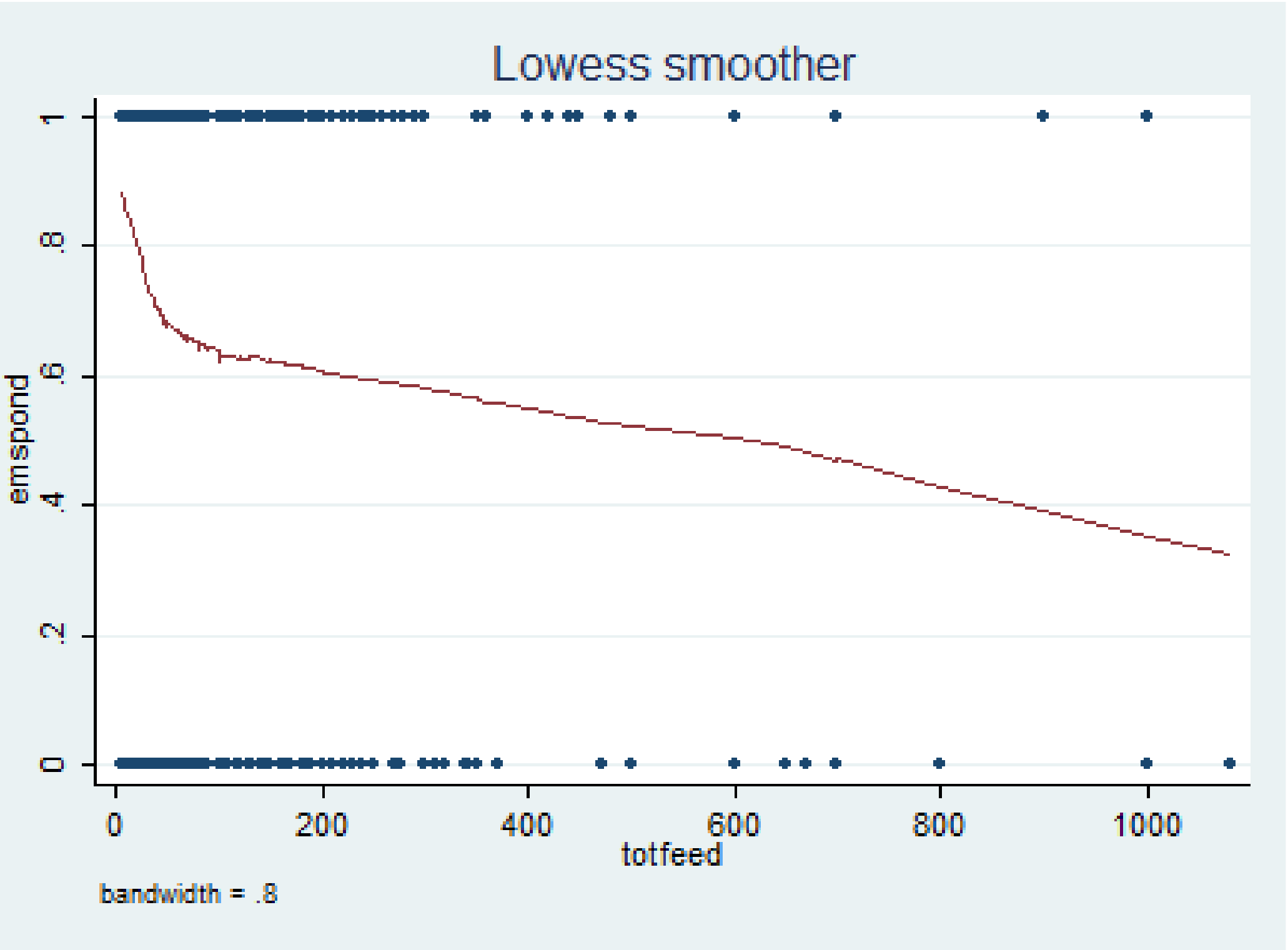
1
0
50
100
150
200
plstockd
bandwidth = .8


Lowess smoother
emspond
0
.2
.4
.6
.8
1
0
200
400
600
800
1000
totfeed
bandwidth = .8

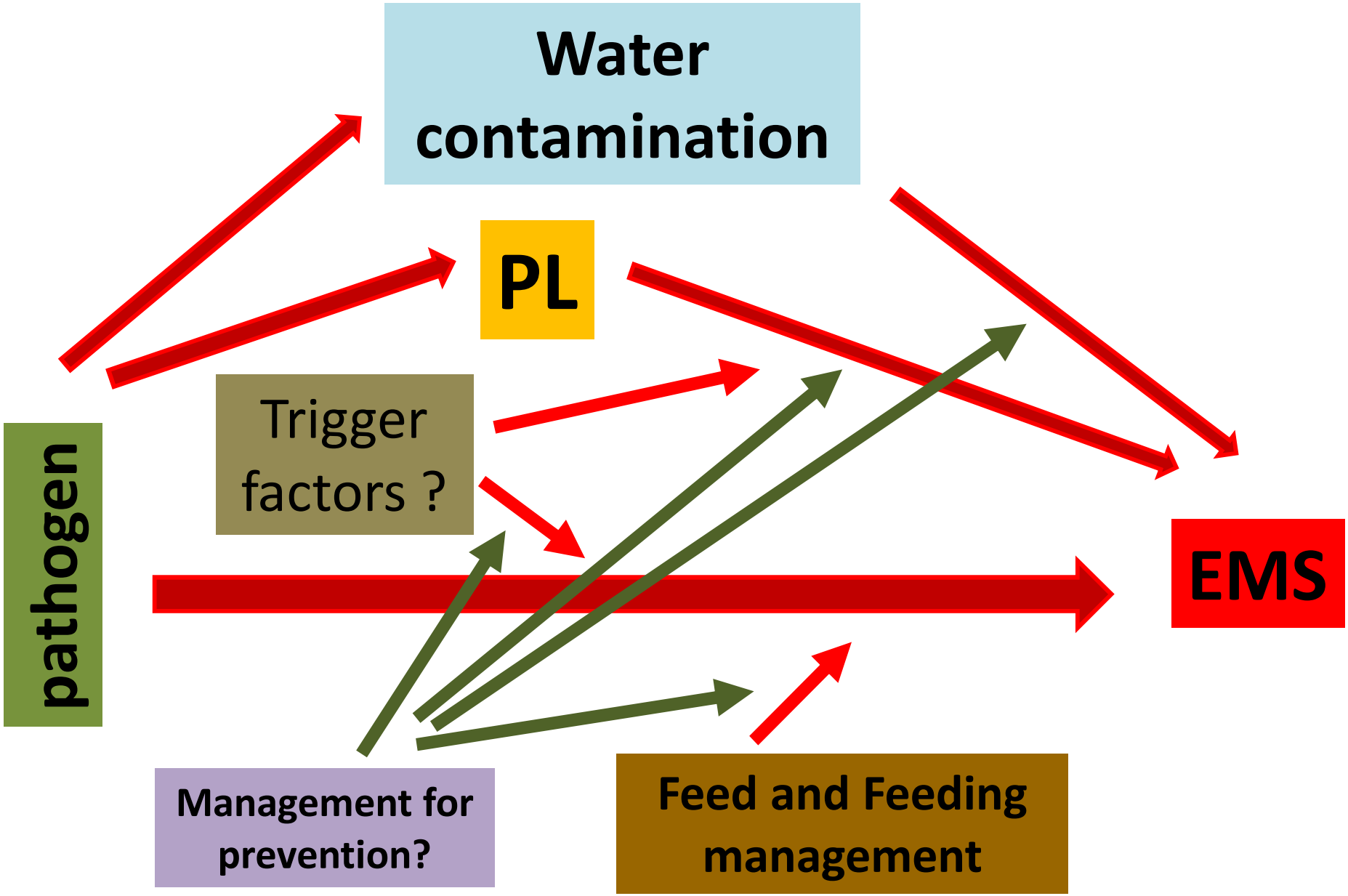
Water quality

Factors	N	missing	mean	SD	range
morntemp	1920	1847	27.51	2.21	20, 32
aftertemp	1920	1844	30.14	1.72	26, 35
mornph	1920	1113	7.68	0.34	6.5, 9
afterph	1920	1207	8.09	0.40	6.5, 9
morndo	1920	1902	4.01	2.65	0, 8
afterdo	1920	1905	4.9	3.10	0, 8
salinity	1920	1466	15.10	7.44	0, 35
ammonia	1920	1918	0.26	0.35	0.1, 0.5
nitrite	1920	1918	0.001	0	0.001
h2s	1920	1918	0.105	0.134	0.01, 0.2
alk	1920	1467	111.38	24.46	12, 400
turbid	1920	1713	30.75	8.49	10, 65

Compare with other study

Factors	FAO (TCDC)	CMC-AH 2011	DOF/KU (Thailand)
Use chlorine for pond preparation			
Nearby farm had EMS			
Farm and pondsize			
Source of PL			
PL stock density			
Total feed at 30 DOC or until EMS			

New causal web



Conclusion and future study

- no final conclusion on risk factors with the univariate analysis
  - Statistically significant by chance
  - Confounding bias
- Can not doing on multivariate analysis due to unavailable data and missing data
- A lot of missing data
  - Indicate low quality of information i.e. farmer forgot, no record, farmer do not want to participate, e.t.c

Conclusion and future study

- Can not study on water quality parameter due to not measurement and record by farmer
- Need systematic measure and record by study team (cohort study)
- simultaneously study with the biological scientists to figure out the disease triggers factors

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Thank you for your attention