

Bacterial Food Poisoning (BFP) Forecasting and Early Warning System Based on Meteorological Factors of Shanghai

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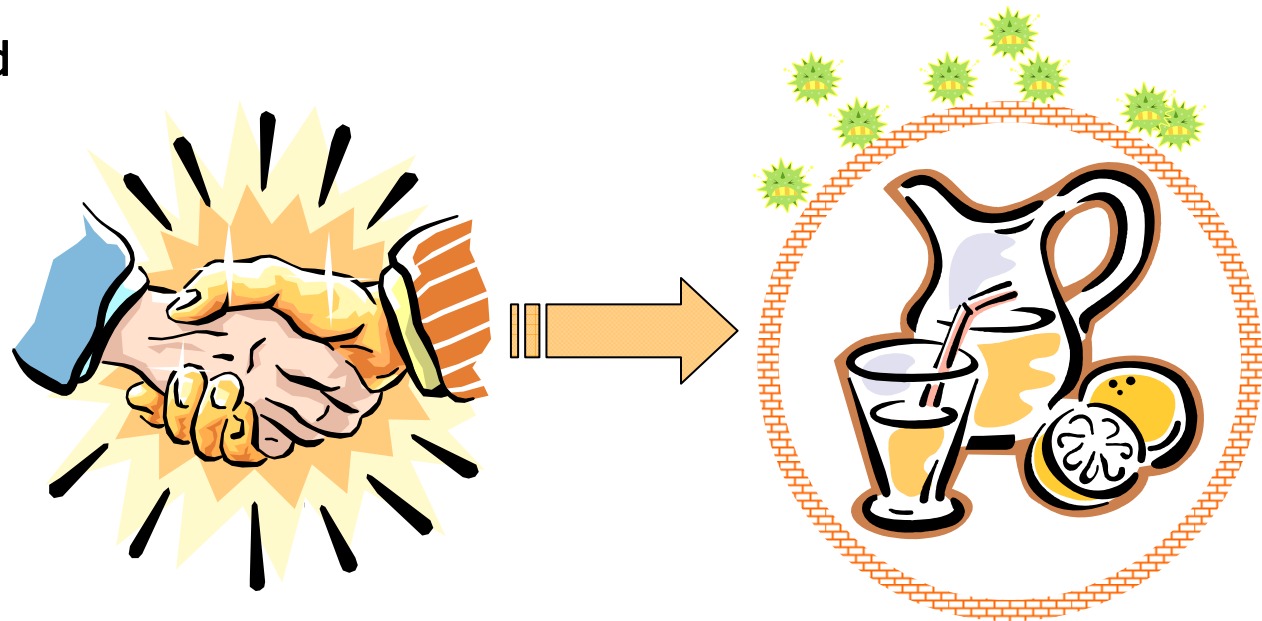
Shanghai 200233, China

22-25 March 2010, Costa Rica

BFP Forecasting and Early Warning System

Shanghai Food and
Drug
Administration

Shanghai
Meteorologica
l Bureau



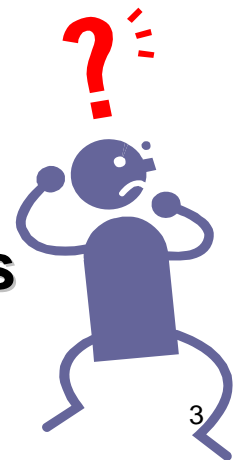
Most of Foodborne Disease Caused by Pathogen

□ WHO

- ▲ Every year, billions of cases of foodborne illness (food poisoning is most important kind of this disease) occurred. 70% caused by pathogen
- ▲ In developing countries, every year approximately 1.8 million children died from diarrhea, which caused by pathogen from food and water

□ Shanghai

- ▲ During 1992~2006, food safety authorities received 608 outbreaks, 19433 cases of food poisoning
- ▲ 75% of the outbreaks (458) and 78% of the cases (15225) were BFP, which caused by pathogen



Significance of Developing Forecasting and Early Warning System

- ❑ **Food Safety Law of China:** If indicate high degree of food safety risk, food authorities shall give warning of these risk in a timely manner
- ❑ **In the high-risk days of BFP,** reminding food industry and consumers to take appropriate measures to eliminate the hazards and prevent the occurrence of food poisoning
- ❑ **Providing quantitative basis to the food safety authorities to strengthen the supervision and take further measures in the high-risk days**
- ❑ **World EXPO will be held in Shanghai from May to Oct 2010, jist high-risk days of BFP. Warning ahead is very important to ensure the food safety**



Feasibility of Developing the Forecasting and Early Warning System

- **Food science has clarified that BFP has closely relationship with factors that influence the fate of pathogens in food:**
 - ▲ **Meteorological factors**
 - ▲ **Pathogen in the foods**
 - ▲ **Sanitation of food industry**
 - ▲ **Practice of consumers, etc**
- **Experience indicates there should be some regularity between BFP and the above-mentioned factors**
- **The forecasting model of epidemic trend of infective disease has been developed, BFP is very similar to the infective disease**

Objective

Outbreak data of BFP in past 15 year

Meteorology, pathogen in food & sanitation of food industry at the same time

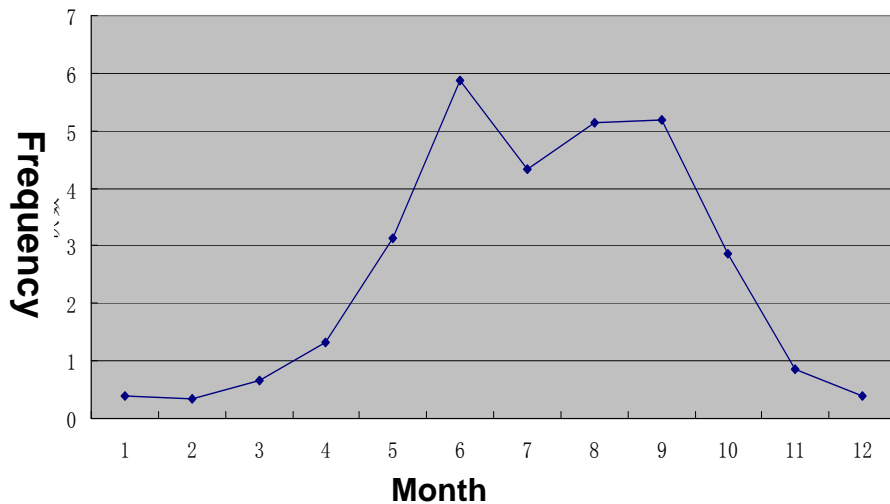
Researching the relationship between occurrence of BFP and relevant factors

Analysing the regularity of BFP in the near future

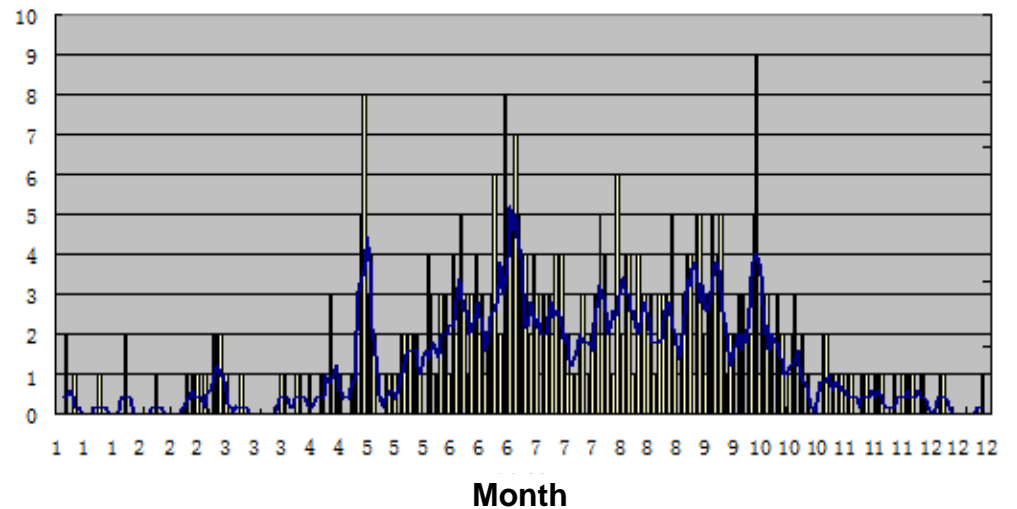
Establishing the forecasting model & warning in high-risk days
First Step: based on meteorological factors

Monthly & Daily Distribution of BFP

Averaged monthly amount of BFP



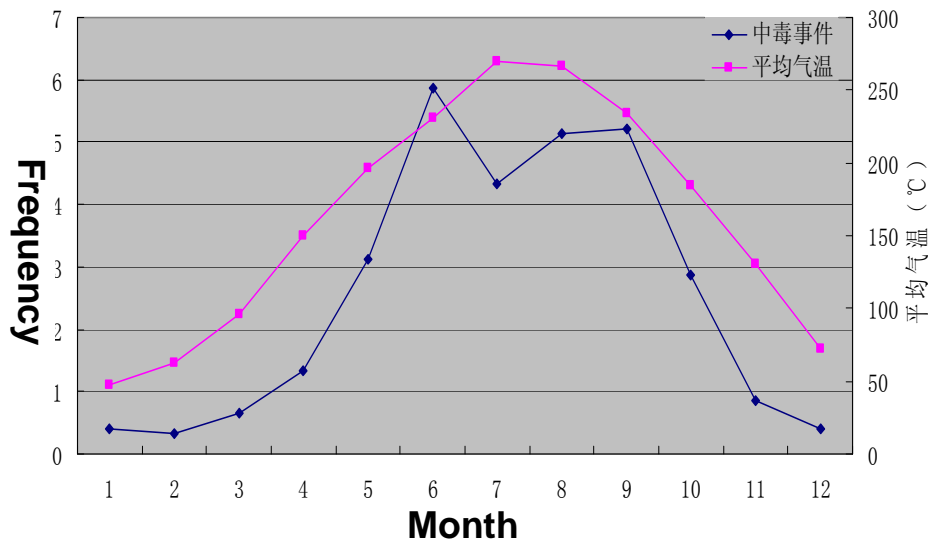
Averaged daily amount of BFP



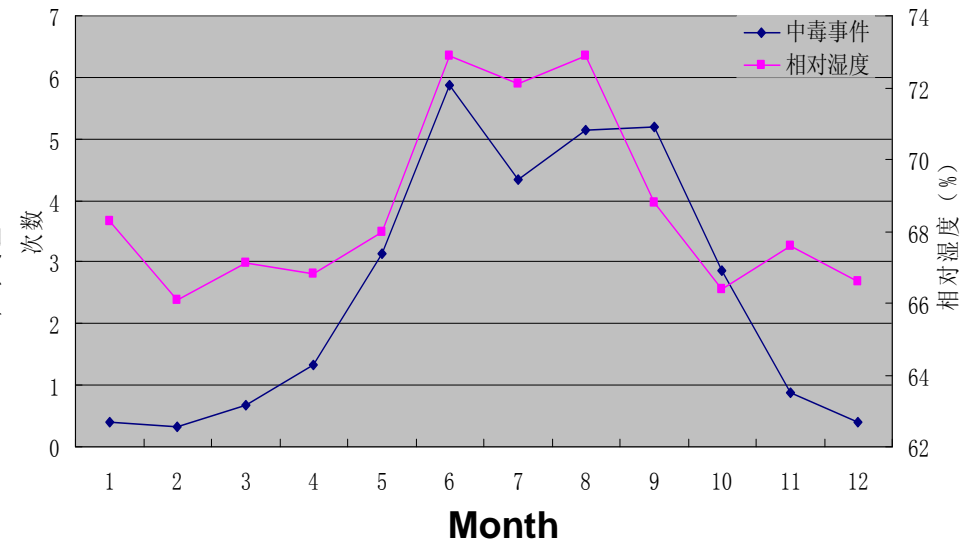
Remarkable regularity was showed in averaged monthly and daily distribution

Relationship between BFP and temperature & humidity

Relationship between BFP and averaged temperature



Relationship between BFP and relative humidity



Positive relationship was showed between BFP and averaged temperature, as well as relative humidity



Forecasting Model

Averaged temperature

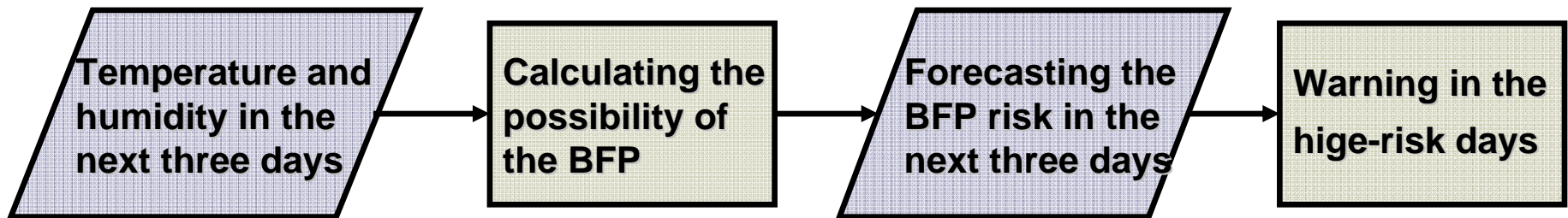
		Averaged temperature																										
		13	-10	-8	-6	-4	-2	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	
Relative humidity	40																											
	44					0	2	0	0	0	0	0	0	0	0	5	5	9	5	0								
	48				0	2	2	2	0	0	2	0	1	0	1	8	10	10	10	8						0		
	52				0	0	2	1	0	2	2	4	2	2	7	10	10	8	9									
	56				0	0	2	1	1	0	2	1	4	2	3	12	10	10	12	20			27	13				
	60				2	1	3	1	1	0	1	3	4	2	5	8	11	13	25	34	23	19	33					
	64				0	0	1	0	2	2	1	1	2	5	4	4	8	10	12	18	29	25	31	39				
	68				0	0	1	2	2	1	2	4	3	4	5	9	13	16	21	22	21	19						
	72				0	0	0	1	1	2	3	4	5	2	5	8	16	17	24	21	18	18						
	76					12	0	1	1	1	3	5	5	5	5	9	12	21	22	19	12							
	80					12	11	1	1	1	1	4	4	5	9	7	12	14	21	13	11							
	84					12	0	1	0	1	2	2	3	12	9	10	13	18	16	13								
	88					0	0	0	2	1	1	2	8	9	16	12	18	22	13	8								
	92						0	2	3	3	1	1	0	13	11	13	21	25	13									
	96							0	2	1	0	0	4	8	12	9	15	18	11									

Probability distribution of BFP occurrence

BFP Early Warning Category

Category	Meanings	Measures	Guideline (to Industry)	Guideline (to Consumer)
<p>RED</p> 	<p>High-risk weather conditions, can easily cause BFP</p>	<p>1) Strengthen the supervision and the examination of high-risk food business units</p> <p>2) Disseminate the early warnings to high-risk food business units and demand them to focus on food safety management</p>	<p>On the basis of yellow, it adds: Not to provide high-risk food such as raw food, uncooked fish and sea food.</p>	<p>On the basis of yellow, it adds: No eating of high-risk food such as raw food, uncooked fish and sea food.</p>
<p>YELLOW</p> 	<p>Mid-risk weather conditions, BFP is possible</p>	<p>3) Strengthen the education of consumers, particularly the health in food processing operations</p>	<p>Strictly limit the time between cooking and eating to 2 hours. Separate raw food from cooked food. Only touch cooked food with disinfected hands.</p>	<p>Determine if food stored in the refrigerator has gone bad; If not, re-cook the food completely. Before processing raw food, disinfect your hands first. Separate raw and cooked food in the refrigerator. Dishes for raw food should be disinfected before processing. Fast food should be consumed in time.</p>

Procedure of Forecasting and Warning



BFP Early Warning Platform

细菌性食物中毒预警平台 - 傲游(Maxt... 文件(F) 查看(V) 收藏(A) 快捷组(G) 工具(T) 帮助(H) | - | | x

Google

房产· 工作· 近期· 生活· 实用· 英语· 游戏· 综合· 常用· 中国疾病预防控制中心

http://test4.mingcong.com/InfoShow.aspx

上海市细菌性食物中... 细菌性食物中毒预警... x

向上一级· 字体大小· 编码· 内容控制 | 傲游网址· 智能填表· 屏幕截图· 清除记录

查找 | 统计 | 下一个· 上一个· 高亮显示 | 多词查找 | 区分大小写 | 全字匹配




细菌性食物中毒预警平台

今天是：2009年6月21日 星期日

公共页面 | 进入管理模式 | 退出



2009年06月21日 (星期日)	2009年06月22日 (星期一)	2009年06月23日 (星期二)
<p>平均温度：26℃</p> <p>平均湿度：93%</p> <p>细菌性食物中毒预测发生概率：0%</p> <p>预警等级：三级</p> <p>细菌性食物中毒风险等级：低，但仍应注意食品安全</p>	<p>平均温度：27℃</p> <p>平均湿度：87%</p> <p>细菌性食物中毒预测发生概率：10%</p> <p>预警等级：三级</p> <p>细菌性食物中毒风险等级：低，但仍应注意食品安全</p>	<p>平均温度：27℃</p> <p>平均湿度：74%</p> <p>细菌性食物中毒预测发生概率：32%</p> <p>预警等级：一级</p> <p>细菌性食物中毒风险等级：高，请特别注意食品安全</p>

(发布日期) 2009年06月19日 (星期五)

<p>2009年06月19日 (星期五)</p> <p>针对集体用餐配送单位： 食品要彻底烧熟煮透，避免交叉污染，食品从业人员必须保持时间等关键实消毒措施</p>	<p>2009年06月20日 (星期六)</p> <p>针对集体用餐配送单位： 食品要彻底烧熟煮透，避免交叉污染，食品从业人员</p>	<p>2009年06月21日 (星期日)</p> <p>针对集体用餐配送单位： 做好食品安全自身管理工作，落实各项预防措施。</p>
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The system and platform has been put into operation since June 2009

全屏截图(F) | 132M | 缩放:100%

开始 | 3 Windows ... | 食品安全与... | 细菌性食物...

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BFP Early Warning Platform

上海市细菌性食物中毒预警信息 - 傲游... 文件(F) 查看(V) 收藏(A) 快捷组(G) 工具(T) 帮助(H)

http://foodsafe.climate.sh.cn/index.aspx

上海市细菌性食物中... 细菌性食物中毒预警平台

发布日期: 2009年06月21日 (星期日)

防护指引

细菌性食物中毒风险等级	细菌性食物中毒风险等级	细菌性食物中毒风险等级
一级预警 请特别注意食品安全 高	二级预警 请注意食品安全 中	但仍应注意食品安全 低
餐饮单位和盒饭桶饭生产单位 落实食品安全管理措施、按照规范要求操作, 尤其应注意: ★ 建议不供应生拌菜、生食水产品 and 隔顿饭菜 ★ 冷菜改刀后及时食用, 操作不要过于复杂 ★ 食物原料尽可能减少在常温下的放置时间 ★ 避免过早制作食物, 尽可能缩短食品加工至食用时间 ★ 生熟食品及使用的工用具严格分开 ★ 盒饭桶饭严格按照冷藏、加热保温等工艺要求, 控制温度、时间、保质期 注: 中小学校食堂、盒饭桶饭生产单位不得供应改刀冷菜、生拌菜、生食水产品 and 隔顿饭菜	餐饮单位和盒饭桶饭生产单位 落实食品安全管理措施、按照规范要求操作, 尤其应注意: ★ 宴席和重大活动建议不供应凉拌菜、生食水产品 ★ 冷菜改刀操作不要过于复杂 ★ 食物原料应尽可能减少常温下放置时间 ★ 常温条件下饭菜(包括冷菜)加工后应在2小时内食用 ★ 生熟食品及使用的工用具严格分开 ★ 盒饭桶饭严格按照冷藏、加热保温等工艺要求, 控制温度、时间、保质期 注: 中小学校食堂、盒饭桶饭生产单位不得供应改刀冷菜、生拌菜、生食水产品 and 隔顿饭菜	餐饮单位和盒饭桶饭生产单位 落实食品安全管理措施、按照规范要求操作 市民 注意饮食卫生, 尤其是饭菜不应在常温下时间存放, 不食用腐败变质或不洁食品

全屏截图(F)

开始 3 Windows ... 食品安全与... 上海市细菌...

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Provide guideline to the consumer & industry to prevent the BFP

Releasing Warning Information



□ Short message

- Food safety authorities in district & county level
- Managers of high-risk food enterprises

□ Media & internet

- Consumers
- Food industries

As a result, the BFP reported in 2009 reached a lowest level in the past 17 years!

Further Work

- ❑ **Amending and improving forecasting model**
- ❑ **Considering the other factors (pathogen in food & sanitation of food industry, etc)**
- ❑ **Using diarrhea monitoring data (initiative) instead of BFP reporting data (passive)**

Thanks for your attention!



Any question?