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# Barriers and Facilitators to Agency Participation in the 2010 Statewide Medical and Health Exercise in California

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Following a multi-agency, multi-level statewide functional exercise in California, we distributed a web-based survey to exercise participants to identify factors that promoted organizational participation in the exercise. To our knowledge, this is the first systematic attempt to understand which factors influence organizational participation in statewide exercises. Awareness of these factors will be useful for promoting participation in future exercises and enable state officials to prioritize resources for the design and conduct of statewide exercises. This paper focuses on factors that encouraged participation, particularly that of local health departments.

## 1. BACKGROUND

As proxies for large-scale public health emergencies, exercise programs featuring simulated emergency scenarios provide valuable opportunities to practice, evaluate, and improve preparedness.<sup>1-3</sup> Participation in exercises (particularly operations-based exercises) improves preparedness at both the individual and organizational level; the hands-on experience familiarizes personnel with how to carry out emergency plans, and the mobilization of the complex network of organizations coordinating a disaster response strengthens relationships among

## Key Findings

- Across different agency types, common facilitators to participation in statewide exercises include grant and regulatory requirements, internal organizational support, and coordination across jurisdictions.
- Local health departments' participation is promoted by grant requirements, funding for exercise activities, and internal organizational support.
- Common barriers to exercise participation include timeliness of exercise documents, staffing availability, and the timing or frequency of the exercise.

stakeholders and pinpoints areas for improvement in incident management and interagency coordination.<sup>2,4</sup> Moreover, given that the success of a multi-agency response requires the involvement and coordination of all affected organizations, broad participation in exercises enables more realistic testing of the preparedness and response system.

### 1.1. Statewide Medical & Health Exercise

As part of California's emergency preparedness efforts, state agencies sponsor two annual disaster exercises, one of which is the Statewide Medical and Health Exercise

(hereafter referred to as the “Statewide Exercise”). Through this program, medical, public health, emergency management, and emergency medical service agencies in each of the 58 operational areas\* collaborate with those at the state and regional level to design and conduct a functional exercise using a common scenario. In 2010, the exercise scenario involved the detonations of an improvised explosive device (IED). This scenario is one of the fifteen National Planning Scenarios<sup>5</sup> developed by the Department of Homeland Security (DHS) in effort to establish a standard range of capabilities and resources necessary to respond to all potential high-impact events facing U.S. communities, states, and the nation. Participating agencies were asked to test three capabilities<sup>†</sup> in particular: (1) communications, (2) intelligence and information sharing and dissemination, and (3) medical surge.

## **1.2. Study Objectives**

This paper is divided into two sections to reflect its two primary research aims. In the first section, we characterize the types of exercises conducted during the 2010 Statewide Exercise by participating agencies—local health departments (LHDs), local emergency medical service (EMS) agencies, hospitals, and regional disaster medical and health coordinators (RDMHCs). We also describe the characteristics of participating agencies themselves. In the second section, we describe the effect of various factors on agencies’ decision to participate in the 2010 Statewide Exercise—whether the factors increased or decreased the likelihood of agencies’ participation. This paper focuses on factors that encouraged participation, particularly that of LHDs.

## **2. METHODS**

### **2.1. Survey Instrument and Measures**

In consultation with a practice-based steering committee<sup>‡</sup>, we developed a web-based survey that evaluated four domains related to the Statewide Exercise: (1) agency participation, (2) transmission of hospital bed availability data, (3) organizational roles and functions, and (4) communications challenges. Following the Statewide Exercise, survey invitations were emailed to representatives of each organization within the target population, which consisted of all LHDs, local EMS agencies and RDMHCs in the state, and all general acute care hospitals recruited through the California Hospital Association (CHA). Survey data collection took place over the course of four weeks, beginning on November 19, 2010 (the day following the Statewide Exercise) and ending on December 17, 2010. In an effort to promote higher response rates, we followed-up with non-respondents by sending three email reminders.

#### ***Factors Influencing Exercise Participation***

All survey recipients were asked about factors that influenced their agency’s decision to participate in the 2010 Statewide Exercise, including: funding for exercise activities; availability of staffing; exercise scenario; training of staff in exercise design, conduct, and evaluation; internal organizational support; timing and frequency of exercise; regulatory requirement; accreditation requirement; grant requirement; timeliness of exercise documents; and coordination with operational or regional areas. Survey respondents were asked to indicate whether the factor decreased or increased the likelihood of their agency’s participation, whether the factor played a neutral role, or “Don’t know”.

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\* Operational areas consist of counties and their corresponding political subdivisions

<sup>†</sup> Based on the DHS’ Target Capabilities List (2007)<sup>6</sup>

<sup>‡</sup> A Research Steering Committee, an advisory group composed of decision-makers in state and local public health and medical agencies (i.e., public health, emergency medical services, emergency management, and hospitals), was convened to guide study priorities, design, and implementation. This helped to ensure research findings would be relevant to practice.

## 2.2. Data Management and Analysis

Survey data were restricted by date range before being downloaded from the web survey provider and analyzed using Stata 11 (StataCorp LP, College Station, TX). Prior to analysis, all identifying information was replaced with unique numeric codes.

The response rate was calculated after limiting the dataset to respondents who partially or fully completed the survey, and removing duplicate responses—the result of having multiple respondents from the same organization or from the same region, in the case of respondents who were RDMHCs. Analysis of the factors that influenced agencies' likelihood of participation in the exercise was restricted to data from respondents who at least partially completed the survey; exercise participation was not a criterion for inclusion.

### Agency Classification

Survey respondents were asked to self-designate the type of agency they represented. Five types of respondents emerged—those who declared an affiliation with: (1) LHDs, (2) local EMS agencies, (3) LHDs and local EMS agencies, (4) hospitals, and (5) RDMHCs. In follow-up interviews, respondents who identified an affiliation with both LHDs and EMS agencies affirmed their responses reflected both agencies' experiences during the exercise. Since these respondents were affiliated with agencies legally recognized as local EMS agencies that operate within a LHD (California Health and Safety Code Section 1797.200), this category is hereafter referred to as “local EMS agency within a LHD.”<sup>§</sup> This research was approved by the Committee for Protection of Human Subjects at the University of California, Berkeley.

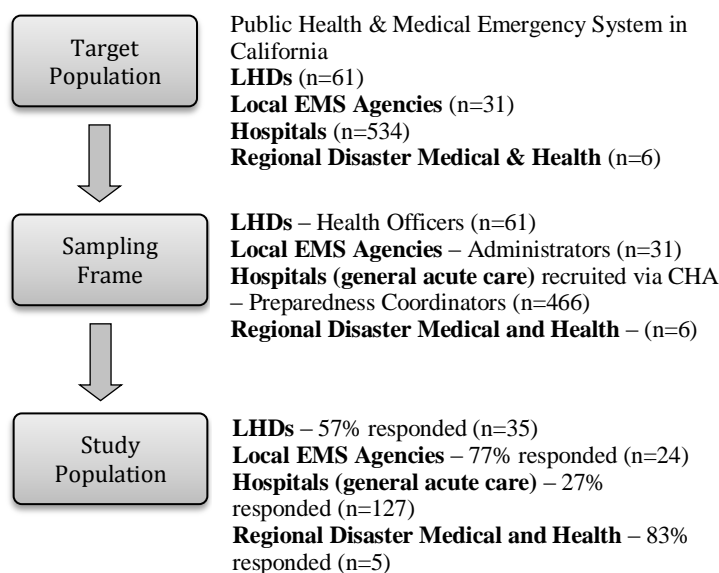
## 3. RESULTS

### 3.1. Response Rates

Sixty-one LHDs, 31 local EMS agencies, 466 general acute care hospitals, and 6 RDMHC were invited to participate in the study. Our study sample includes participants who represent 35 LHDs, 24 local EMS agencies, 127 hospitals, and 5 RDMHC, giving response rates of 57%, 77%, 27% and 83%, respectively.\*\*

**Figure 1** (right) summarizes the process in which the study population was obtained.

**Fig. 1. Flow Diagram of the Study Population**



<sup>§</sup> Respondents who indicated their agency was a local EMS agency represent a mixture of the four legally-recognized types of agencies (i.e., local EMS agencies that: operate within a LHD, have joint powers authority, use county contractors, and operate within another department). However, we deferred to respondents' agency classification.

\*\* Of 180 participating agencies meeting the inclusion criteria for analysis, 23 were LHDs, 24 were local EMS agencies, 127 were hospitals, 4 were state agencies, and 2 indicated “Other”. Twelve of 24 local EMS agencies indicated their response represents both EMS and LHD for their jurisdiction; therefore, they were double-counted and contributed to the response rate for both agencies. The 5 RDMHC were not included in the overall study response rate because they were from local EMS agencies already accounted for.

### 3.2. Exercise Characteristics by Agency Type

Characteristics of the 2010 Statewide Exercise, broken down by agency type, are shown in **Table 1**. The vast majority of responding agencies participated in the Statewide Exercise, and conducted exercises that were operations-based, multi-agency, and featured an IED scenario.

**Table 1. Characteristics of the 2010 Statewide Medical and Health Exercise**

	LHDs		Local EMS Agencies		Local EMS Agencies within a LHD		Hospitals		RDMHC	
	n	%	n	%	n	%	n	%	n	%
Partially or fully completed survey	23	---	12	---	12	---	127	---	5	---
Participated in 2010 Statewide Exercise ††	22	96	10	83	12	100	122	96	5	100
Exercise featured an IED scenario ††	21	95	9	90	12	100	116	95	5	100
Conducted exercise on Nov 18, 2010 ††	21	95	10	100	12	100	114	93	5	100
Conducted operations-based exercise ††	19	86	10	100	12	100	109	89	5	100
Exercise involved ≥2 agencies ††	21	95	10	100	12	100	107	88	5	100
Participated in ≥1 previous statewide exercise ††	19	86	10	100	12	100	112	92	4	80
Agency played leading role in 2010 Exercise §§	8	38	6	67	8	67	22	19	2	40
Agency played supporting role in 2010 Exercise §§	13	62	3	33	4	33	84	72	3	60

†† The denominator used for these calculations was the number of respondents who partially or fully completed the survey.

†† The denominator used for these calculations was the number of respondents who indicated they participated in the 2010 Statewide Exercise.

§§ The denominator used for these calculations was the number of respondents who answered the question about the type of role played in the exercise (21 LHDs, 9 local EMS agencies, 12 local EMS agencies within a LHD, 115 hospitals, and 5 RDMHC).

### 3.3. Characteristics of Participating Agencies, by Agency Type

The average number and range of participating staff from each agency type are shown in **Table 2**, and their locations during the Statewide Exercise are shown in **Table 3**. **Table 4** summarizes how participating agencies distributed various disciplines in their operations/command centers during the exercise.

As shown in **Table 3**, the vast majority of staff from LHDs, local EMS agencies, and local EMS agencies within a LHD were located in the Health/Medical Departmental Operations Center (DOC). Hospital staff was predominantly located in the hospital command center/field.

**Table 2. Average number and range of participating staff in the 2010 Statewide Medical and Health Exercise, by agency type**

Agency Type	Mean	Std. Dev.	Range
LHDs (n=19)	8.1	6.5	2-20
Local EMS agencies (n=10)	11.6	18.2	2-60
Local EMS agencies within a LHD (n=12)	17.3	7.9	6-30
Hospitals (n=104)	70	84.2	3-650

**Table 3. Locations of participating staff during the 2010 Statewide Medical and Health Exercise, by agency type††**

Staff Location	LHDs (n=22)	Local EMS Agencies (n=10)	Local EMS Agencies within a LHD (n=12)	Hospitals (n=122)	RDMHC (n=5)
Health/Medical DOC ††	68%	70%	83%	1%	40%
Operational Area EOC §§	32%	40%	50%	5%	20%
Hospital/Field	14%	10%	25%	65%	20%
Other	14%	20%	8%	4%	20%
Hospital Command Center	9%	0%	8%	90%	0%
Joint EOC (JEOC)	5%	0%	0%	1%	0%
Field Unified Command Post	0%	0%	17%	7%	0%
Deployable Field Team	0%	0%	17%	17%	0%
Regional EOC §§	0%	0%	0%	1%	40%
State Operations Center (SOC)	0%	0%	0%	0%	20%

†† Respondents were permitted multiple responses to the question; thus percentages do not add to 100%. Only 5% of LHD staff and 1% of hospital staff were located in the joint Emergency Operations Center. LHDs and local EMS agency staff were also located in agency offices (data not shown).

†† DOC = Departmental Operations Center

§§ EOC = Emergency Operations Center

Public health and emergency medical services were the two disciplines most commonly represented in the operations/command centers of LHDs, local EMS agencies, local EMS agencies within a LHD, and RDMHCs (**Table 4**). LHDs' command centers had an approximately 2:1 ratio of public health to EMS representation, whereas local EMS agencies' command centers had an approximately 2:1 ratio of EMS to public health representation. In contrast, the command centers of RDMHCs and of local EMS agencies within a LHD had equal representation of public health and EMS.

**Table 4. Disciplines represented in operations/command centers during the 2010 Statewide Medical and Health Exercise, by agency type††**

Disciplines	LHDs (n=22)	Local EMS Agencies (n=10)	Local EMS Agencies within a LHD (n=12)	Hospitals (n=122)	RDMHC (n=5)
Public Health	86%	50%	100%	12%	60%
Emergency Medical Services	41%	90%	100%	23%	60%
Emergency Management	32%	40%	50%	50%	40%
Other	23%	30%	17%	13%	20%
Law Enforcement	18%	30%	42%	25%	0%
Environmental Protections	18%	20%	42%	6%	0%
Hospital	14%	30%	25%	87%	20%
Care and Shelter	14%	20%	8%	6%	0%
Fire	9%	40%	33%	19%	0%
Transportation	9%	20%	25%	7%	20%
Public Works	0%	10%	0%	2%	0%
Legal Support	0%	0%	0%	2%	0%
Military/Intelligence support	0%	10%	17%	1%	0%
Critical Infrastructure	0%	0%	0%	10%	0%
Community Based Organizations	0%	20%	8%	11%	0%

†† Respondents were permitted multiple responses to the question; thus percentages do not add to 100%.

### 3.4. Factors that promoted agency participation in the Statewide Exercise

Among the 21 LHDs that responded to the question, the top three factors that increased the likelihood of participation were (1) a grant requirement, (2) funding for exercise activities, and (3) internal organizational support (**Table 5**). More than half of LHDs also indicated that the likelihood of their participation was increased by some sort of regulatory requirement, and coordination with an operational or regional area.

**Table 5** shows that overall, across all agency types, common factors that increased the likelihood of participation in the Statewide Exercise included: (1) grant requirement, (2) internal organization support, (3) regulatory requirement, and (4) coordination with an operational or regional area. The majority of local EMS agencies, local EMS agencies within a LHD, and hospitals reported that staff training in exercise design, conduct and evaluation also facilitated their participation. Availability of staffing and the exercise scenario were other key factors that promoted participation by local EMS agencies within a LHD. For hospitals, the top three factors facilitating participation were accreditation, regulatory, and grant requirements. Finally, at a regional level, the primary factor influencing participation of RDMHCs was coordination with an operational or regional area.

**Table 5. Factors that increased participation in the 2010 Statewide Medical and Health Exercise, by agency type**

Factor	LHDs (n=21)		LEMSAs (n=12)		LEMSAs within a LHD (n=12)		Hospitals (n=122)		RDMHC (n=5)	
	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%
Grant Requirement	1	81	1	67	1	100	3	75	2	40
Funding for Exercise Activities	2	76	10	25	4	50	7	43	3	20
Internal Organizational Support	3	62	3	50	2	92	4	68	3	20
Regulatory Requirement	4	52	3	50	4	50	2	84	6	0
Coordination with Operational or Regional Area	4	52	5	42	4	50	5	63	1	60
Training of Staff in Exercise Design, Conduct, Evaluation	6	48	2	58	3	75	6	62	6	0
Availability of Staffing	7	43	6	33	4	50	10	39	3	20
Timing and Frequency of Exercise	8	38	6	33	9	42	8	41	6	0
Accreditation Requirement	9	24	6	33	10	33	1	86	6	0
Timeliness of Exercise Documents	10	19	11	17	10	33	11	30	6	0
Exercise Scenario	11	14	6	33	4	50	8	41	6	0

*Note: Factors reported by ≥50% of an agency type are highlighted in a lighter shade.*

### 3.5. Barriers to agency participation in the Statewide Exercise

Among the 21 LHDs that responded to the question about the factors that influenced their agency’s decision to participate in the 2010 Statewide Exercise, the top three factors that reduced the likelihood of participation were (1) timeliness of exercise documents, (2) availability of staffing, and (3) timing/frequency of the exercise (**Table 6**). More than 20 percent of LHDs indicated that the likelihood of their participation was also decreased by the exercise scenario.

As shown in **Table 6**, the same factors that served as barriers to LHD participation in the Statewide Exercise were reported across all agency types.



**Table 6. Factors that decreased 2010 Exercise participation, by agency type**

Factor	LHDs (n=21)		LEMSAs (n=12)		LEMSAs within a LHD (n=12)		Hospitals (n=122)		RDMHC (n=5)	
	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%
Timeliness of Exercise Documents	1	43	1	42	1	17	2	17	1	20
Availability of Staffing	2	29	2	25	2	8	1	21	4	0
Timing and Frequency of Exercise	2	29	3	17	2	8	3	14	1	20
Exercise Scenario	4	24	4	8	2	8	7	4	4	0
Coordination with Operational or Regional Area	5	10	4	8	5	0	6	6	4	0
Funding for Exercise Activities	6	5	4	8	5	0	4	9	4	0
Training of Staff in Exercise Design, Conduct, Evaluation	6	5	6	0	5	0	8	2	4	0
Internal Organizational Support	6	5	6	0	5	0	5	8	1	20
Regulatory Requirement	6	5	6	0	5	0	9	1	4	0
Accreditation Requirement	10	0	6	0	5	0	9	1	4	0
Grant Requirement	10	0	6	0	5	0	11	0	4	0

*Note: Factors reported by  $\geq 20\%$  of an agency type are highlighted in a lighter shade*

#### 4. DISCUSSION

A notable strength of this study is that it captures a large population of organizations that participated in the 2010 Statewide Exercise and conducted exercises with similar characteristics. Across all agency types, more than 80% of respondents indicated their agency participated in the Statewide Exercise (**Table 1**). Furthermore, the vast majority of agencies conducted exercises that shared important characteristics: they were operations-based, multi-agency exercises that were based on a common IED scenario (**Table 1**). Although not all variation in the exercise design was controlled for (e.g., the size, scope, and location of the emergency scenario, and level of exercise participation), the relatively standardized exercise characteristics suggest that the findings regarding factors that promoted exercise participation are quite generalizable.

There are several limitations to this study, however. First, the high levels of agency participation in the 2010 Statewide Exercise reported by respondents may reflect survey response bias; participating agencies may have been more likely than non-participating agencies to respond to the survey. Indeed, only 6 agencies in the entire study sample indicated they did not participate in the exercise.<sup>††</sup> Responses from these 6 agencies regarding factors influencing their participation were pooled with the responses of participating agencies. With so few non-participants in the current study, it is possible that the factors this study found to discourage participation do not reflect the actual experience of non-participating agencies. We therefore cannot generalize the findings regarding factors that discouraged exercise participation.

Second, although responses to the survey question about factors influencing participation provide a general sense of the impact of each factor on agency participation, the level of importance of each factor in determining agency participation was not assessed. Because the survey did not ask respondents to rank the importance of the listed factors in increasing agency participation, we were not able to understand which factors, if any, are crucial determinants of exercise

<sup>††</sup> Out of 182 respondents in the study sample, only 6 agencies (2 local EMS agencies, 3 hospitals, and 1 state agency) indicated they did not participate.



participation across all agency types. Moreover, knowledge of how each factor affected an agency's ability or willingness to participate, and why the factor was important, would benefit state officials planning future exercises, enabling them to provide better assistance to local and regional medical and public health agencies.

## **5. CONCLUSION**

This study found that common facilitators to participation in statewide exercises include grant and regulatory requirements, internal organizational support, and coordination across jurisdictions. For certain agency types, some factors are more likely to encourage exercise participation. Local health departments' exercise participation, for instance, is promoted by grant requirements, funding for exercise activities, and internal organizational support. Common barriers to exercise participation include timeliness of exercise documents, staffing availability, and the timing or frequency of the exercise. Future research should attempt to evaluate the importance of these factors to agencies' willingness or ability to participate in statewide exercises.

## **COMPETING INTERESTS**

The author(s) declare that they have no competing interests.

## **AUTHORS' CONTRIBUTIONS**

JH, MP and TA conceived of the study and collaborated in the study design. JH and MP coordinated and implemented study recruitment and data collection. JH, MP and TA developed the data collection tools. JY, JH, and TA contributed to data analysis, data interpretation, and manuscript development. All authors read and approved the final manuscript.

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