Among different EMS systems in PAROS study sites classified by population density and economy what is the association between OHCA burden per ambulance and EMS characteristics on EMS performance & patient survival?

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Background

- Population density has been used to classify locales as urban & rural.
- GNI per capita has been used to classify economies
- EMS performance and OHCA survival may depend on locale as well as EMS system specific factors

Hypothesis

- The average annual performance of the EMS system may depend on:
  - the type of locale (populaiton density, economy) they are based in
  - average burden of OHCA per ambulance
  - other factors …

Research Aims

- **1a To classify locales of EMS system according to a standard:**
  - **Population density by Japanese Criteria > 3000/km2 :Higher**
  - **Economy by World Bank Criteria GNI per capita > $12,746 : high income**
- **1b To measure the annual OHCA burden per ambulance within similar locales and among different locales**

City	Population density (per KM2)	Higher Population Density	In a high-income country?	No. of ambulances	Operation of ambulance
Aichi	1439.46	No	Yes	249	Fire
Osaka	4659.82	Yes	Yes	285	Fire
Tokyo	6070.69	Yes	Yes	218	Fire
Seoul	16941.6	Yes	Yes	140	Fire
Klang Valley	6932.39	Yes	No	5	Hospital
Kota Bahru	1247	No	No	30	Hospital
Penang	1500	No	No	7	Hospital
Singapore	7252.43	Yes	Yes	46	Fire
Bangkok	19014.36	Yes	No	16	Hospital
Songkla	1326.53	No	No	4	Hospital
Taipei	9600	Yes	Yes	50	Fire
Dubai	474.79	No	Yes	68	Fire

http://data.worldbank.org/about/country-and-lending-groups#East_Asia_and_Pacific

Classify of Cities

Higher Population Density	C Klang Valley Bangkok	A Osaka Tokyo Seoul Singapore Taipei
Lower Population Density	D Kota Bahru Penang Songkla	B Aichi Dubai
	Middle Income	Higher Income

Research Aims

- 2a To measure the association of EMS system-specific features and EMS performance within similar locales
- 2b To compare this association among different locales
- 2c. To identify modifiable factors to improve EMS performance

RESEARCH AIM 1

Aim 1 / PO

- **P: Locale of the study city based on population density and economy**
- **O: Burden of OHCA/ambulance: Total no. of incident OHCA cases per year per ambulance**

Aim1 /Dummy Data table

City	locale	Total no. of incident OHCA cases per year	No. of ambulances	Burden of OHCA/Ambulance
Aichi	B		249	
Osaka	A		285	
Tokyo	A		218	
Seoul	A		140	
Klang Valley	C		5	
Kota Bahru	D		30	
Penang	D		7	
Singapore	A		46	
Bangkok	C		16	
Songkla	D		4	
Taipei	A		50	
Dubai	B		68	

Analysis of Aim 1

- Classify the locales of each sites according to population density and economy
- Collect the OHCA burden per ambulance for each cities
- Compare & summarize the OHCA burden across cities within the same locale
- Compare OHCA burden among locales

RESEARCH AIM 2 »

Aim2/PEO

- P : EMS systems in similar locales (i.e. similar pop density and economy) in the PAROS cities
- E : (i) site disease characteristics (slide 14)
- (ii) site EMS service characteristics (slide 15)
- O: total EMS time, survival to admission, survival to discharge or 30 days

E/Predictors of EMS performance

- site disease characteristics

Variable	Units
Witnessed	%
Bystander CPR	%
Shockable rhythm	%

E/Predictors of EMS performance

- site EMS characteristics

Variable	Units
Burden of OHCA per ambulance	No of cases per year per ambulance
Operation of ambulance	Fire Hospital
Ambulance station	Fixed Dynamic/mixed
Tiered Response	BLS BLS plus ALS ALS
Medical Direction	Direct Indirect Mixed

O/Outcome measurement

- For each site, and for each locale
  - (i) Mean annual Total EMS time-from call received to arrival at ED
  - (ii) % ROSC on arrival at ED
  - (iii) % Survival to admission of the patient
  - (iv) % Survival to hospital discharge or > 30 days

Analysis Aim 2

- The unit of observation is the PAROS study cities
- Perform separate multiple linear & logistic regression for locales of similar pop density and economy
- Exam the adjusted effect of modifiable EMS characteristics
- Explore any differences in relationship among locales of different categories or within categories