AMERICAN LUNG ASSOCIATION®
Fighting for Air

Multi-city studies show harm well below the 1997 annual standard for $PM_{2.5}$.

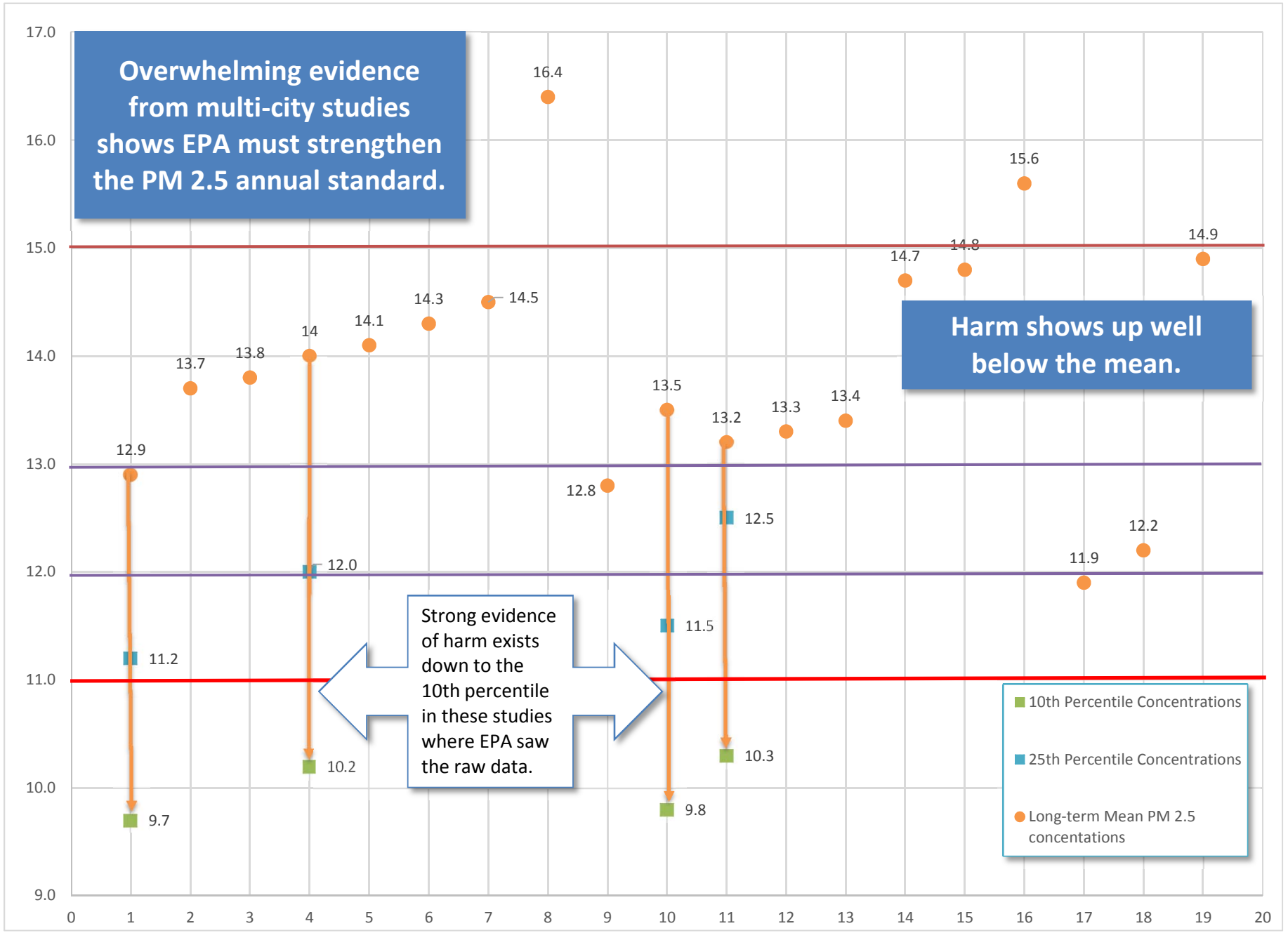
They also show strong, repeated evidence for an annual standard no greater than 11 $\mu g/m^3$.

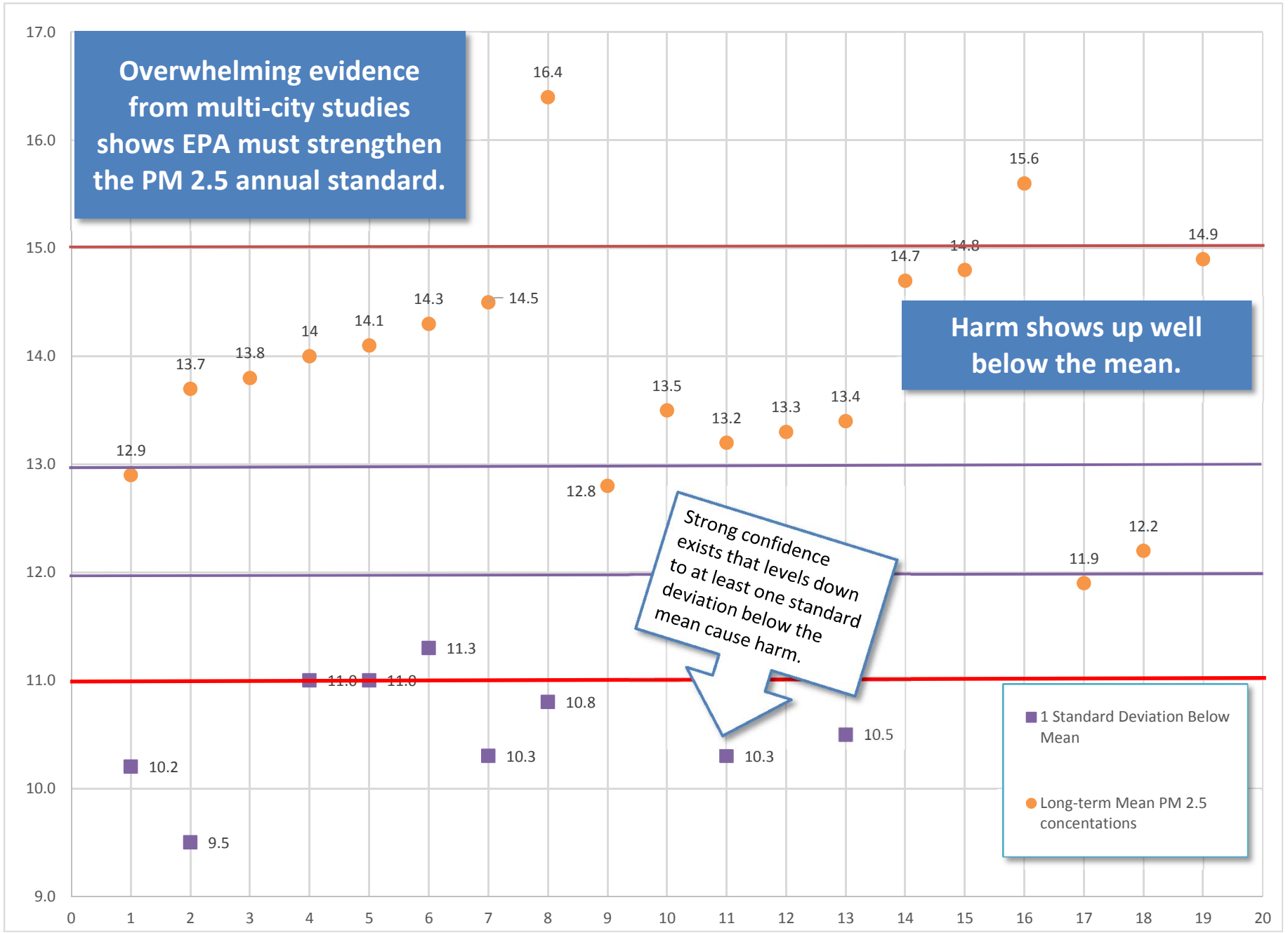
Overwhelming evidence from Multi-city Exposure Studies Show EPA Must Strengthen the PM 2.5 Annual Standard

	Multi-City Exposure Studies	10th Percentile Concentrations	1 Standard Deviation Below Mean	25th Percentile Concentrations	Long-term Mean PM 2.5 concentations
1	**Miller et al., 2007 (WHI 36 cities) (Cardiovascular events in women)**	**9.7**	10.2	**11.2**	12.9
2	Goss et al., 2004 (Pulmonary inflammation & lung function in Cystic Fibrosis patients)		9.5		13.7
3	McConnell et al., 2003; Gauderman et al., 2004 (12 CA communities) (Bronchitic symptoms in children)		6.1		13.8
4	**Krewski et al., 2009 (ACS-Reanalysis II, 116 MSAs) (Deaths)**	**10.2**	11.0	**12.0**	14.0
5	Eftim et al., 2008 (Medicare- Harvard Six Cities sites) (Deaths)		11.0		14.1
6	Lipfert et al., 2006 (Veterans Study) (Deaths)		11.3		14.3
7	Dockery et al., Raizenne et al., 1996 (24-Cities Study) (Bronchitis in children)		10.3		14.5
8	Laden et al., 2006 (Harvard Six Cities) (Deaths)		10.8		16.4
9	Burnett et al., 2004 (12 Canadian cities) (Deaths)				12.8
10	**Bell et al., 2008 (Medicare, 202 counties) (Cardiovacular hospitalizations)**	**9.8**		**11.5**	13.5
11	**Zanobetti & Schwartz, 2009 (112 cities) (Deaths)**	**10.3**	10.3	**12.5**	13.2
12	Burnett & Goldberg, 2003 (8 Canadian cities) (Deaths)		3.9		13.3
13	Dominici et al., 2006 (Medicare, 204 counties) (Cardiovascular & respiratory hospitalizations)		10.5		13.4
14	Klemm & Mason, 2003 (Harvard Six Cities) (Deaths)				14.7
15	Franklin et al., 2008 (25 US cities) (Deaths)				14.8
16	Franklin et al., 2007 (27 US cities) (Deaths)				15.6
17	Bell et al., 2007 (Low birth weight)		10.3		11.9
18	Liu et al., 2007 (Intrauterine growth reduction)				12.2
19	Woodruff et al., 2008 (Infant mortality)				14.9

Causal / Likely Causal ˍ Long Term Exposure Studies
Causal / Likely Causal ˍ Short Term Exposure Studies
Suggestive - Long-Term Exposure Studies

Source: Figures 2-4, 2-3, 2-6, 2-8 in EPA Policy Assessment
Distributional Statistiacs from Rajan Memo


Overwhelming evidence from multi-city studies shows EPA must strengthen the PM 2.5 annual standard.
Harm shows up well below the mean.
Strong evidence of harm exists down to the 10th percentile in these studies where EPA saw the raw data.
10th Percentile Concentrations
25th Percentile Concentrations
Long-term Mean PM 2.5 concentations
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
16.4
15.6
14.9
14.8
14.7
14.5
14.3
14.1
14
13.8
13.7
13.5
13.4
13.3
13.2
12.9
12.8
12.5
12.2
12.0
11.9
11.5
11.2
10.3
10.2
9.8
9.7


Overwhelming evidence from multi-city studies shows EPA must strengthen the PM 2.5 annual standard.
Harm shows up well below the mean.
Strong confidence exists that levels down to at least one standard deviation below the mean cause harm.
1 Standard Deviation Below Mean
Long-term Mean PM 2.5 concentations
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
12.9
13.7
13.8
14
14.1
14.3
14.5
16.4
12.8
13.5
13.2
13.3
13.4
14.7
14.8
15.6
14.9
11.9
12.2
10.2
9.5
11.0
11.0
11.3
10.3
10.8
10.3
10.5