

Temporary Fertility Decline after a Large Rubella Outbreak, Japan

Appendix

Appendix Table 1. Cross-correlation coefficients between rubella cases, Google Trends, and elevated fertility rates, 2012–2018, Tokyo, Japan*

Lag time, mo	Rubella cases vs. fertility rates		Google Trends vs. fertility rates		Rubella cases vs. Google Trends	
	Correlation coefficient	Std. error	Correlation coefficient	Std. error	Correlation coefficient	Std. error
-12	-0.014	0.33	-0.022	0.33	-0.023	0.33
-11	0.004	0.33	-0.004	0.33	0.006	0.33
-10	0.013	0.32	0.031	0.32	0.013	0.32
-9	0.042	0.32	0.006	0.32	0.026	0.32
-8	0.095	0.32	0.070	0.32	0.011	0.32
-7	0.093	0.31	0.148	0.31	0.013	0.31
-6	0.153	0.31	0.161	0.31	0.029	0.31
-5	0.168	0.30	0.186	0.30	0.100	0.30
-4	0.105	0.30	0.055	0.30	0.271	0.30
-3	0.079	0.30	0.022	0.30	0.506	0.30
-2	0.006	0.29	-0.018	0.29	0.787	0.29
-1	-0.001	0.29	-0.019	0.29	0.926	0.29
0	-0.048	0.29	-0.105	0.29	0.931	0.29
1	-0.044	0.29	-0.102	0.29	0.749	0.29
2	-0.066	0.29	-0.059	0.29	0.482	0.29
3	0.009	0.30	0.037	0.30	0.224	0.30
4	0.102	0.30	0.144	0.30	0.019	0.30
5	0.150	0.30	0.186	0.30	-0.083	0.30
6	0.154	0.31	0.189	0.31	-0.122	0.31
7	0.053	0.31	0.023	0.31	-0.111	0.31
8	-0.081	0.32	-0.160	0.32	-0.084	0.32
9	-0.280	0.32	-0.382	0.32	-0.055	0.32
10	-0.390	0.32	-0.468	0.32	-0.040	0.32
11	-0.408	0.33	-0.397	0.33	-0.036	0.33
12	-0.284	0.33	-0.170	0.33	-0.037	0.33

*Bold text indicates statistical significance. Data on Google searches for the term “rubella” collected from Google Trends (<https://trends.google.com>).

Appendix Table 2. Cross-correlation coefficients between rubella cases, Google Trends, and elevated fertility rates, 2012–2018, Kanagawa, Japan*

Lag time, mo	Rubella cases vs. fertility rates		Google Trends vs. fertility rates		Rubella cases vs. Google Trends	
	Correlation coefficient	Std. error	Correlation coefficient	Std. error	Correlation coefficient	Std. error
-12	-0.015	0.33	-0.012	0.33	-0.002	0.33
-11	0.026	0.33	0.003	0.33	0.020	0.33
-10	0.082	0.32	0.112	0.32	0.026	0.32
-9	0.129	0.32	0.138	0.32	0.027	0.32
-8	0.221	0.32	0.222	0.32	0.011	0.32
-7	0.204	0.31	0.213	0.31	0.004	0.31
-6	0.162	0.31	0.148	0.31	0.021	0.31
-5	0.115	0.30	0.090	0.30	0.077	0.30
-4	0.006	0.30	-0.047	0.30	0.210	0.30
-3	-0.067	0.30	-0.086	0.30	0.434	0.30
-2	-0.100	0.29	-0.153	0.29	0.717	0.29
-1	-0.114	0.29	-0.132	0.29	0.917	0.29
0	-0.164	0.29	-0.187	0.29	0.979	0.29
1	-0.129	0.29	-0.119	0.29	0.806	0.29
2	-0.076	0.29	-0.032	0.29	0.530	0.29
3	0.051	0.30	0.080	0.30	0.236	0.30
4	0.189	0.30	0.232	0.30	0.018	0.30
5	0.214	0.30	0.199	0.30	-0.092	0.30
6	0.189	0.31	0.198	0.31	-0.127	0.31
7	0.078	0.31	0.029	0.31	-0.109	0.31
8	-0.082	0.32	-0.123	0.32	-0.063	0.32
9	-0.320	0.32	-0.385	0.32	-0.021	0.32
10	-0.428	0.32	-0.461	0.32	-0.006	0.32
11	-0.446	0.33	-0.432	0.33	-0.009	0.33
12	-0.272	0.33	-0.238	0.33	-0.022	0.33

*Bold text indicates statistical significance. Data on Google searches for the term “rubella” collected from Google Trends (<https://trends.google.com>).

Appendix Table 3. Cross-correlation coefficients between rubella cases, Google Trends, and elevated fertility rates, 2012–2018, Osaka, Japan*

Lag time, mo	Rubella cases vs. fertility rates		Google Trends vs. fertility rates		Rubella cases vs. Google Trends	
	Correlation coefficient	Std. error	Correlation coefficient	Std. error	Correlation coefficient	Std. error
-12	-0.020	0.33	-0.048	0.33	-0.028	0.33
-11	-0.046	0.33	-0.052	0.33	-0.014	0.33
-10	-0.083	0.32	-0.081	0.32	-0.014	0.32
-9	-0.108	0.32	-0.115	0.32	-0.008	0.32
-8	-0.090	0.32	-0.049	0.32	-0.029	0.32
-7	-0.016	0.31	0.034	0.31	-0.056	0.31
-6	0.167	0.31	0.136	0.31	-0.068	0.31
-5	0.266	0.30	0.238	0.30	-0.047	0.30
-4	0.178	0.30	0.207	0.30	0.030	0.30
-3	0.042	0.30	0.050	0.30	0.215	0.30
-2	-0.122	0.29	-0.130	0.29	0.509	0.29
-1	-0.278	0.29	-0.242	0.29	0.800	0.29
0	-0.263	0.29	-0.259	0.29	0.952	0.29
1	-0.099	0.29	-0.175	0.29	0.870	0.29
2	0.027	0.29	0.007	0.29	0.573	0.29
3	0.163	0.30	0.169	0.30	0.231	0.30
4	0.271	0.30	0.286	0.30	0.000	0.30
5	0.296	0.30	0.316	0.30	-0.113	0.30
6	0.240	0.31	0.263	0.31	-0.142	0.31
7	0.062	0.31	0.065	0.31	-0.109	0.31
8	-0.153	0.32	-0.156	0.32	-0.057	0.32
9	-0.365	0.32	-0.356	0.32	-0.027	0.32
10	-0.424	0.32	-0.437	0.32	-0.021	0.32
11	-0.319	0.33	-0.361	0.33	-0.025	0.33
12	-0.149	0.33	-0.202	0.33	-0.030	0.33

*Bold text indicates statistical significance. Data on Google searches for the term “rubella” collected from Google Trends (<https://trends.google.com>).

Appendix Table 4. Cross-correlation coefficients between rubella cases, Google Trends, and elevated fertility rates, 2012–2018, Hyogo, Japan*

Lag time, mo	Rubella cases vs. fertility rates		Google Trends vs. fertility rates		Rubella cases vs. Google Trends	
	Correlation coefficient	Std. error	Correlation coefficient	Std. error	Correlation coefficient	Std. error
-12	-0.041	0.33	-0.043	0.33	0.004	0.33
-11	-0.056	0.33	-0.077	0.33	0.038	0.33
-10	-0.103	0.32	-0.087	0.32	0.059	0.32
-9	-0.089	0.32	-0.094	0.32	0.053	0.32
-8	-0.016	0.32	-0.012	0.32	0.012	0.32
-7	0.064	0.31	0.103	0.31	-0.024	0.31
-6	0.175	0.31	0.181	0.31	-0.040	0.31
-5	0.188	0.30	0.198	0.30	-0.014	0.30
-4	0.143	0.30	0.129	0.30	0.083	0.30
-3	0.075	0.30	0.087	0.30	0.285	0.30
-2	-0.005	0.29	-0.033	0.29	0.593	0.29
-1	-0.156	0.29	-0.169	0.29	0.879	0.29
0	-0.257	0.29	-0.298	0.29	0.981	0.29
1	-0.268	0.29	-0.246	0.29	0.843	0.29
2	-0.103	0.29	-0.107	0.29	0.538	0.29
3	0.121	0.30	0.101	0.30	0.240	0.30
4	0.258	0.30	0.274	0.30	0.009	0.30
5	0.347	0.30	0.346	0.30	-0.092	0.30
6	0.265	0.31	0.269	0.31	-0.126	0.31
7	0.086	0.31	0.067	0.31	-0.115	0.31
8	-0.118	0.32	-0.116	0.32	-0.086	0.32
9	-0.309	0.32	-0.310	0.32	-0.060	0.32
10	-0.410	0.32	-0.398	0.32	-0.039	0.32
11	-0.402	0.33	-0.393	0.33	-0.038	0.33
12	-0.254	0.33	-0.263	0.33	-0.037	0.33

*Bold text indicates statistical significance. Data on Google searches for the term “rubella” collected from Google Trends (<https://trends.google.com>).

Appendix Table 5. Cross-correlation coefficients between influenza cases, Google Trends, and elevated fertility rates, 2012–2018, Tokyo, Japan*

Lag time, mo	Influenza cases vs. fertility rates		Google Trends vs. fertility rates		Influenza cases vs. Google Trends	
	Correlation coefficient	Std. error	Correlation coefficient	Std. error	Correlation coefficient	Std. error
-12	-0.093	0.33	-0.098	0.33	0.354	0.33
-11	-0.168	0.33	-0.227	0.33	0.376	0.33
-10	-0.053	0.32	-0.157	0.32	0.329	0.32
-9	-0.094	0.32	-0.187	0.32	0.079	0.32
-8	-0.099	0.32	-0.156	0.32	-0.144	0.32
-7	-0.039	0.31	-0.015	0.31	-0.271	0.31
-6	0.012	0.31	0.067	0.31	-0.335	0.31
-5	0.001	0.3	0.051	0.3	-0.354	0.3
-4	0.069	0.3	0.129	0.3	-0.384	0.3
-3	0.155	0.3	0.157	0.3	-0.308	0.3
-2	0.073	0.29	-0.004	0.29	-0.089	0.29
-1	-0.112	0.29	-0.059	0.29	0.467	0.29
0	0.043	0.29	0.065	0.29	0.914	0.29
1	-0.143	0.29	-0.117	0.29	0.528	0.29
2	-0.222	0.29	-0.183	0.29	0.19	0.29
3	-0.062	0.3	-0.043	0.3	-0.001	0.3
4	0.123	0.3	0.093	0.3	-0.18	0.3
5	0.077	0.3	0.103	0.3	-0.323	0.3
6	0.117	0.31	0.097	0.31	-0.391	0.31
7	0.117	0.31	0.082	0.31	-0.346	0.31
8	-0.062	0.32	-0.056	0.32	-0.277	0.32
9	-0.114	0.32	-0.097	0.32	-0.161	0.32
10	-0.004	0.32	-0.021	0.32	0.006	0.32
11	0.061	0.33	0.006	0.33	0.183	0.33
12	-0.083	0.33	-0.137	0.33	0.377	0.33

*Bold text indicates statistical significance. Data on Google searches for the term “influenza” collected from Google Trends (<https://trends.google.com>).

Appendix Table 6. Cross-correlation coefficients between influenza cases, Google Trends, and elevated fertility rates, 2012–2018, Kanagawa, Japan*

Lag time, mo	Influenza cases vs. fertility rates		Google Trends vs. fertility rates		Influenza cases vs. Google Trend	
	Correlation coefficient	Std. error	Correlation coefficient	Std. error	Correlation coefficient	Std. error
-12	-0.089	0.33	-0.076	0.33	0.358	0.33
-11	-0.156	0.33	-0.163	0.33	0.362	0.33
-10	-0.073	0.32	-0.155	0.32	0.304	0.32
-9	-0.196	0.32	-0.265	0.32	0.079	0.32
-8	-0.133	0.32	-0.144	0.32	-0.137	0.32
-7	0.005	0.31	-0.032	0.31	-0.258	0.31
-6	0.015	0.31	0.054	0.31	-0.316	0.31
-5	0.148	0.3	0.125	0.3	-0.332	0.3
-4	0.092	0.3	0.081	0.3	-0.371	0.3
-3	0.079	0.3	0.062	0.3	-0.299	0.3
-2	0.09	0.29	0.029	0.29	-0.099	0.29
-1	-0.039	0.29	0.006	0.29	0.431	0.29
0	-0.074	0.29	0.007	0.29	0.916	0.29
1	-0.153	0.29	-0.071	0.29	0.507	0.29
2	-0.204	0.29	-0.157	0.29	0.163	0.29
3	-0.078	0.3	-0.015	0.3	0.016	0.3
4	0.208	0.3	0.184	0.3	-0.139	0.3
5	0.109	0.3	0.098	0.3	-0.286	0.3
6	0.084	0.31	0.089	0.31	-0.35	0.31
7	0.037	0.31	0.007	0.31	-0.313	0.31
8	-0.101	0.32	-0.061	0.32	-0.255	0.32
9	-0.034	0.32	-0.043	0.32	-0.153	0.32
10	0.014	0.32	-0.031	0.32	-0.015	0.32
11	0.065	0.33	0.024	0.33	0.143	0.33
12	-0.055	0.33	-0.057	0.33	0.334	0.33

*Bold text indicates statistical significance. Data on Google searches for the term "influenza" collected from Google Trends (<https://trends.google.com>).

Appendix Table 7. Cross-correlation coefficients between influenza cases, Google Trends, and elevated fertility rates, 2012–2018, Osaka, Japan*

Lag time, mo	Influenza cases vs. fertility rates		Google Trends vs. fertility rates		Influenza cases vs. Google Trends	
	Correlation coefficient	Std. error	Correlation coefficient	Std. error	Correlation coefficient	Std. error
-12	-0.016	0.33	0.028	0.33	0.329	0.33
-11	-0.073	0.33	-0.1	0.33	0.338	0.33
-10	-0.035	0.32	-0.157	0.32	0.273	0.32
-9	-0.225	0.32	-0.299	0.32	0.06	0.32
-8	-0.079	0.32	-0.11	0.32	-0.131	0.32
-7	0.036	0.31	-0.016	0.31	-0.25	0.31
-6	0.049	0.31	0.091	0.31	-0.306	0.31
-5	0.096	0.3	0.108	0.3	-0.323	0.3
-4	0.01	0.3	0.09	0.3	-0.375	0.3
-3	0.128	0.3	0.184	0.3	-0.313	0.3
-2	0	0.29	0.016	0.29	-0.092	0.29
-1	-0.154	0.29	-0.106	0.29	0.48	0.29
0	0.022	0.29	-0.057	0.29	0.927	0.29
1	-0.172	0.29	-0.208	0.29	0.506	0.29
2	-0.101	0.29	-0.15	0.29	0.158	0.29
3	0.097	0.3	0.09	0.3	-0.007	0.3
4	0.142	0.3	0.084	0.3	-0.16	0.3
5	0.046	0.3	0.064	0.3	-0.294	0.3
6	0.146	0.31	0.18	0.31	-0.361	0.31
7	0.15	0.31	0.173	0.31	-0.343	0.31
8	0.064	0.32	0.125	0.32	-0.267	0.32
9	-0.088	0.32	-0.069	0.32	-0.146	0.32
10	-0.2	0.32	-0.181	0.32	0.027	0.32
11	-0.181	0.33	-0.205	0.33	0.214	0.33
12	-0.172	0.33	-0.243	0.33	0.344	0.33

*Bold text indicates statistical significance. Data on Google searches for the term "influenza" collected from Google Trends (<https://trends.google.com>).

Appendix Table 8. Cross-correlation coefficients between influenza cases, Google Trends, and elevated fertility rates, 2012–2018, Hyogo, Japan*

Lag time, mo	Influenza cases vs. fertility rates		Google Trends vs. fertility rates		Influenza cases vs. Google Trends	
	Correlation coefficient	Std. error	Correlation coefficient	Std. error	Correlation coefficient	Std. error
-12	-0.057	0.33	-0.006	0.33	0.327	0.33
-11	-0.054	0.33	-0.024	0.33	0.297	0.33
-10	-0.208	0.32	-0.169	0.32	0.253	0.32
-9	-0.295	0.32	-0.263	0.32	0.077	0.32
-8	-0.099	0.32	-0.13	0.32	-0.115	0.32
-7	-0.077	0.31	-0.137	0.31	-0.248	0.31
-6	0.055	0.31	-0.013	0.31	-0.308	0.31
-5	0.172	0.3	0.108	0.3	-0.327	0.3
-4	0.095	0.3	0.071	0.3	-0.377	0.3
-3	-0.003	0.3	-0.003	0.3	-0.312	0.3
-2	-0.045	0.29	-0.034	0.29	-0.126	0.29
-1	-0.059	0.29	-0.018	0.29	0.413	0.29
0	0.102	0.29	0.064	0.29	0.932	0.29
1	-0.042	0.29	-0.019	0.29	0.545	0.29
2	0.052	0.29	0.068	0.29	0.184	0.29
3	-0.075	0.3	-0.035	0.3	0.015	0.3
4	-0.048	0.3	-0.03	0.3	-0.12	0.3
5	0.117	0.3	0.133	0.3	-0.257	0.3
6	0.177	0.31	0.159	0.31	-0.337	0.31
7	0.062	0.31	0.084	0.31	-0.32	0.31
8	0.058	0.32	0.117	0.32	-0.25	0.32
9	-0.044	0.32	-0.035	0.32	-0.148	0.32
10	-0.153	0.32	-0.129	0.32	-0.005	0.32
11	-0.085	0.33	-0.103	0.33	0.169	0.33
12	-0.117	0.33	-0.185	0.33	0.293	0.33

*Bold text indicates statistical significance. Data on Google searches for the term "influenza" collected from Google Trends (<https://trends.google.com>).

Appendix Table 9. Wavelet cross-correlation coefficients between rubella cases and fertility rates, 2012–2018, Japan*

Lag time, mo	Tokyo, level			Kanagawa, level			Osaka, level			Hyogo, level		
	1	2	3	1	2	3	1	2	3	1	2	3
-12	0.031	0.006	0.013	0.192	0.004	-0.03	-0.052	-0.013	0.014	-0.066	-0.002	0.009
-11	-0.150	0.013	-0.002	-0.234	0.012	-0.052	0.061	-0.007	0.002	-0.068	-0.001	0.001
-10	0.236	0.039	-0.021	0.212	0.033	-0.064	0.077	0.023	-0.015	0.12	0.01	-0.011
-9	-0.226	0.061	-0.033	-0.132	0.059	-0.064	-0.184	0.074	-0.034	-0.17	0.029	-0.025
-8	0.100	0.020	-0.025	-0.044	0.030	-0.047	0.034	0.102	-0.040	0.092	0.030	-0.026
-7	0.043	-0.085	0.013	0.127	-0.081	-0.007	0.103	0.027	-0.001	0.041	-0.013	0.013
-6	-0.167	-0.176	0.094	-0.115	-0.185	0.074	0.019	-0.168	0.105	-0.108	-0.074	0.116
-5	0.209	-0.181	0.217	0.090	-0.178	0.197	-0.059	-0.303	0.269	0.145	-0.102	0.275
-4	-0.145	-0.081	0.357	-0.029	-0.049	0.344	-0.15	-0.167	0.444	-0.180	-0.068	0.441
-3	0.026	0.113	0.477	-0.084	0.130	0.480	0.196	0.128	0.559	0.144	-0.01	0.556
-2	0.013	0.288	0.534	0.140	0.236	0.563	0.009	0.279	0.568	-0.022	0.025	0.576
-1	0.042	0.269	0.459	-0.062	0.206	0.532	-0.132	0.241	0.442	-0.013	0.102	0.460
0	0.063	0.085	0.192	0.043	0.121	0.320	0.091	0.161	0.138	-0.12	0.265	0.169
1	-0.293	-0.048	-0.125	-0.174	0.060	0.005	-0.036	0.052	-0.185	0.184	0.308	-0.153
2	0.355	-0.033	-0.391	0.263	-0.023	-0.296	0.078	-0.117	-0.430	0.019	0.059	-0.405
3	-0.262	0.000	-0.536	-0.165	-0.141	-0.498	-0.11	-0.227	-0.532	-0.218	-0.269	-0.530
4	0.165	-0.084	-0.529	-0.002	-0.211	-0.551	0.017	-0.179	-0.470	0.212	-0.383	-0.500
5	0.008	-0.264	-0.379	0.076	-0.21	-0.454	0.037	-0.095	-0.272	-0.144	-0.271	-0.335
6	-0.280	-0.363	-0.146	-0.138	-0.207	-0.246	0.036	-0.131	-0.011	0.014	-0.095	-0.101
7	0.415	-0.275	0.103	0.242	-0.204	0.003	-0.002	-0.159	0.223	0.158	0.009	0.129
8	-0.294	-0.050	0.305	-0.215	-0.079	0.228	-0.213	0.062	0.368	-0.208	0.063	0.299
9	0.074	0.252	0.407	-0.017	0.231	0.374	0.207	0.369	0.388	0.104	0.162	0.363
10	-0.025	0.509	0.387	0.111	0.522	0.409	0.109	0.359	0.281	-0.001	0.269	0.310
11	0.093	0.507	0.264	0.036	0.497	0.333	-0.201	0.089	0.101	0.018	0.290	0.174
12	0.026	0.221	0.073	0.001	0.163	0.171	-0.005	-0.037	-0.099	-0.109	0.221	-0.010

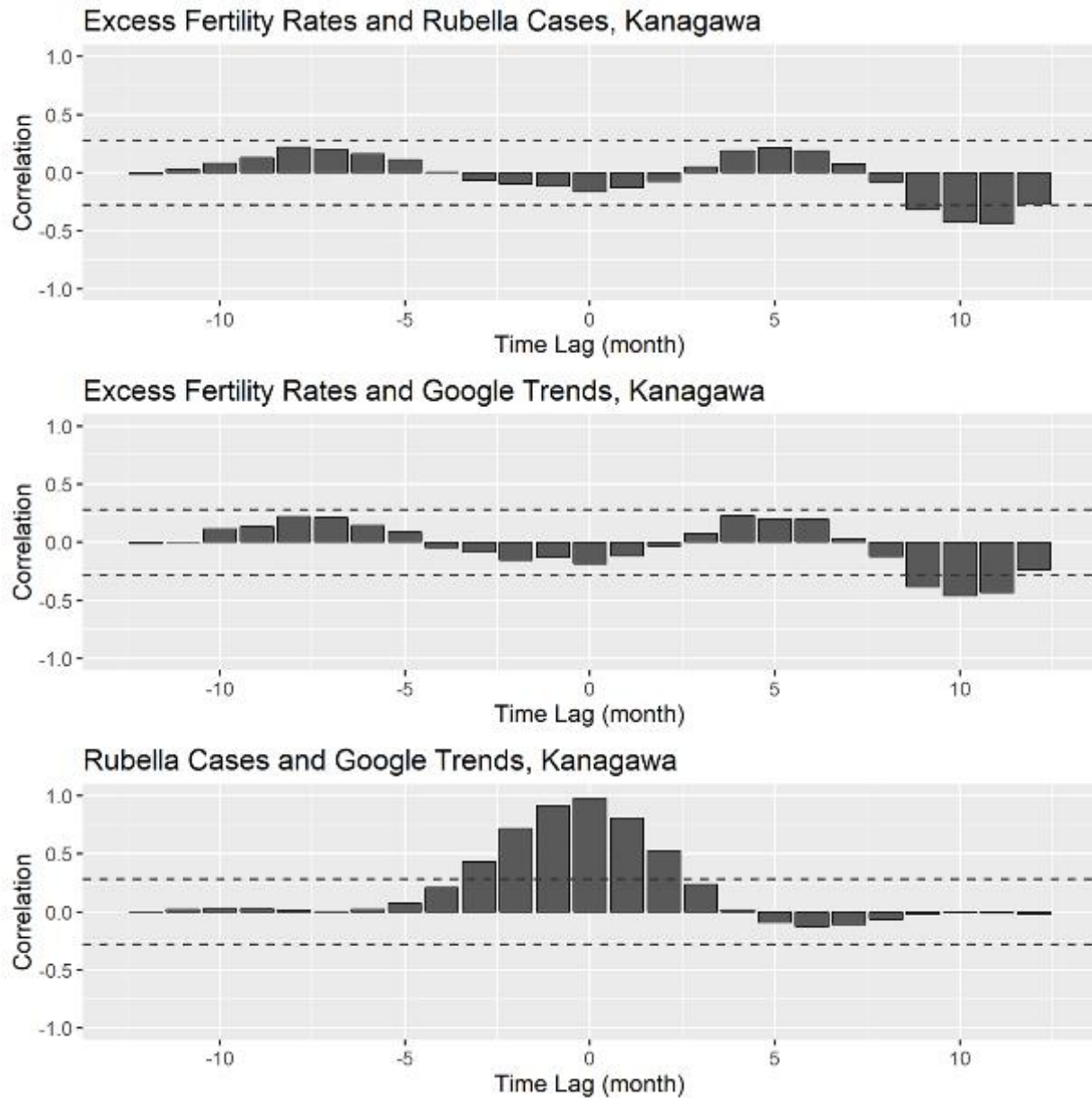
Appendix Table 10. Wavelet cross-correlation coefficients between Google Trends and fertility rates, 2012–2018, Japan*

Lag time, mo	Tokyo, level			Kanagawa, level			Osaka, level			Hyogo, level		
	1	2	3	1	2	3	1	2	3	1	2	3
-12	0.317	0.015	0.053	0.280	0.023	0.119	0.027	-0.027	0.114	0.148	0.000	0.037
-11	-0.262	0.008	0.190	-0.236	0.026	0.168	-0.011	0.053	0.111	-0.185	0.035	0.097
-10	0.117	0.021	0.264	0.143	0.03	0.149	0.031	0.078	0.049	0.174	0.035	0.102
-9	-0.046	0.08	0.244	-0.085	0.052	0.074	0.010	0.069	-0.024	-0.187	0.029	0.058
-8	-0.082	0.081	0.143	-0.065	0.028	-0.026	-0.170	0.074	-0.072	0.044	0.034	-0.011
-7	0.234	-0.084	0.020	0.183	-0.094	-0.107	0.213	0.012	-0.070	0.125	-0.011	-0.051
-6	-0.154	-0.279	-0.055	-0.136	-0.211	-0.112	-0.069	-0.173	0.007	-0.101	-0.109	-0.012
-5	-0.110	-0.219	-0.027	-0.02	-0.168	-0.014	0.038	-0.316	0.138	-0.012	-0.119	0.107
-4	0.162	0.088	0.098	0.121	0.014	0.164	-0.155	-0.217	0.296	-0.026	-0.021	0.282
-3	-0.048	0.293	0.264	-0.149	0.169	0.380	0.110	0.082	0.457	0.142	0.008	0.458
-2	0.115	0.213	0.405	0.205	0.206	0.555	0.017	0.319	0.561	-0.016	-0.028	0.568
-1	-0.24	0.039	0.443	-0.257	0.177	0.597	0.040	0.327	0.542	-0.274	0.090	0.556
0	0.239	-0.019	0.287	0.262	0.14	0.415	-0.150	0.218	0.292	0.308	0.321	0.335
1	-0.197	0.000	0.028	-0.218	0.055	0.095	0.102	0.100	-0.045	-0.114	0.324	0.001
2	0.171	-0.002	-0.239	0.158	-0.083	-0.242	0.074	-0.078	-0.341	0.081	0.019	-0.318
3	-0.080	-0.013	-0.433	-0.062	-0.176	-0.491	-0.069	-0.245	-0.521	-0.111	-0.286	-0.529
4	-0.127	-0.048	-0.497	-0.129	-0.175	-0.581	-0.235	-0.273	-0.527	-0.030	-0.361	-0.572
5	0.318	-0.206	-0.412	0.285	-0.185	-0.496	0.451	-0.236	-0.363	0.137	-0.267	-0.44
6	-0.282	-0.378	-0.212	-0.274	-0.25	-0.279	-0.303	-0.218	-0.105	-0.122	-0.133	-0.192
7	0.095	-0.285	0.032	0.184	-0.229	-0.010	0.052	-0.128	0.159	0.129	-0.003	0.078
8	-0.042	0.085	0.253	-0.125	-0.008	0.236	-0.045	0.105	0.348	-0.211	0.110	0.293
9	0.008	0.429	0.384	-0.01	0.323	0.394	0.110	0.364	0.399	0.227	0.191	0.396
10	0.131	0.483	0.385	0.165	0.529	0.425	-0.061	0.433	0.318	-0.058	0.239	0.363
11	-0.141	0.265	0.276	-0.183	0.441	0.338	0.125	0.263	0.158	-0.146	0.277	0.233
12	0.065	0.000	0.092	0.218	0.122	0.162	-0.233	0.061	-0.032	0.167	0.254	0.044

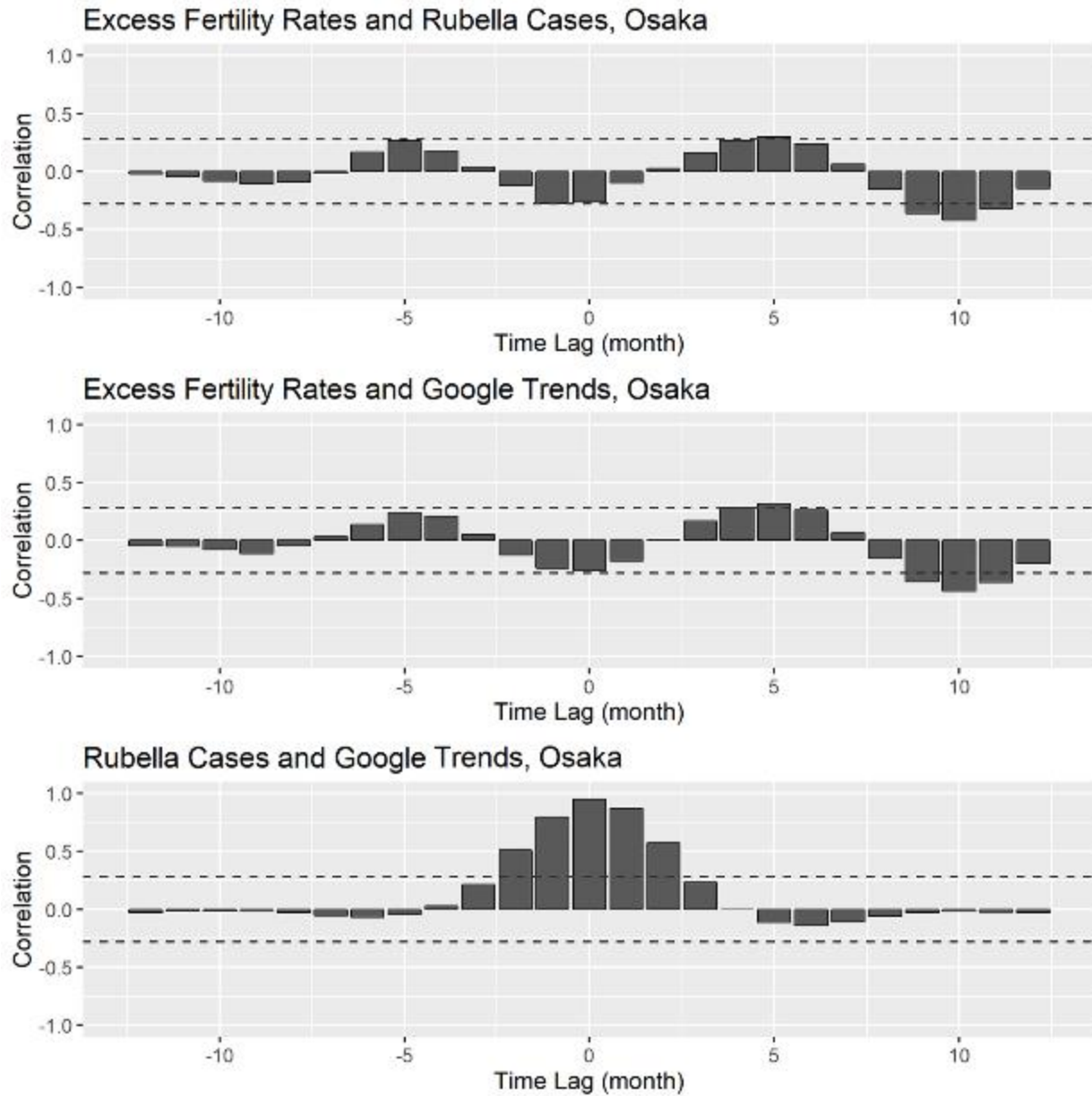
*Data on Google searches for the term "rubella" collected from Google Trends (<https://trends.google.com>).**Appendix Table 11.** Wavelet cross-correlation coefficients between rubella cases and Google Trends, 2012–2018, Japan

Lag time, mo	Tokyo			Kanagawa			Osaka			Hyogo		
	1	2	3	1	2	3	1	2	3	1	2	3
12	0.165	0.018	0.104	0.094	0.019	-0.025	-0.132	0.030	-0.019	0.029	0.021	0.038
-11	-0.233	0.035	0.022	-0.137	0.021	-0.008	-0.059	0.006	-0.062	-0.050	0.031	-0.003
-10	0.216	-0.001	-0.062	0.154	-0.006	-0.098	0.189	-0.006	-0.069	-0.062	0.013	-0.033
-9	-0.269	-0.144	-0.116	-0.219	-0.099	-0.069	-0.169	-0.059	-0.023	-0.008	-0.054	-0.029
-8	0.253	-0.300	-0.116	0.151	-0.224	-0.008	0.021	-0.145	0.037	0.097	-0.166	0.011
-7	-0.161	-0.256	-0.075	0.036	-0.255	0.050	0.122	-0.204	0.071	0.056	-0.242	0.065
-6	-0.117	0.104	-0.036	-0.182	-0.044	0.065	-0.055	-0.138	0.063	-0.086	-0.138	0.089
-5	0.140	0.589	-0.055	-0.067	0.387	-0.006	-0.216	0.136	-0.017	-0.224	0.217	0.037
-4	-0.074	0.767	-0.174	0.107	0.720	-0.169	0.033	0.504	-0.155	-0.032	0.625	-0.104
-3	0.569	0.373	-0.375	0.355	0.575	-0.399	0.277	0.618	-0.332	0.447	0.662	-0.322
-2	-0.624	-0.355	-0.604	-0.226	-0.068	-0.650	0.063	0.240	-0.547	0.236	0.113	-0.571
-1	0.302	-0.876	-0.805	0.283	-0.766	-0.858	0.010	-0.436	-0.762	-0.301	-0.657	-0.797
0	-0.375	-0.834	-0.909	-0.754	-0.970	-0.928	-0.166	-0.885	-0.921	-0.373	-0.980	-0.941
1	0.073	-0.306	-0.825	0.262	-0.524	-0.819	-0.412	-0.702	-0.879	-0.175	-0.582	-0.890
2	0.213	0.306	-0.640	0.058	0.196	-0.617	0.126	-0.023	-0.745	0.465	0.158	-0.729
3	-0.115	0.621	-0.434	0.157	0.659	-0.396	0.464	0.567	-0.539	-0.054	0.643	-0.516
4	0.200	0.530	-0.249	0.115	0.625	-0.201	-0.043	0.639	-0.304	0.256	0.606	-0.298
5	-0.171	0.201	-0.110	-0.197	0.259	-0.058	-0.211	0.293	-0.108	-0.252	0.229	-0.120
6	0.066	-0.102	-0.030	-0.050	-0.101	0.022	0.053	-0.086	0.003	-0.038	-0.132	-0.020
7	-0.065	-0.224	0.001	0.094	-0.250	0.050	0.014	-0.245	0.028	-0.002	-0.262	0.010
8	0.042	-0.188	0.004	0.031	-0.208	0.049	-0.091	-0.191	0.006	0.016	-0.186	0.004
9	-0.063	-0.094	-0.008	-0.085	-0.098	0.035	0.059	-0.068	-0.018	0.092	-0.053	-0.011
10	0.013	-0.012	-0.022	-0.043	-0.010	0.013	0.132	0.013	-0.028	-0.099	0.030	-0.021
11	0.044	0.028	-0.029	0.061	0.029	-0.012	-0.242	0.033	-0.027	0.018	0.043	-0.022
12	-0.025	0.033	-0.030	-0.039	0.035	-0.038	0.010	0.023	-0.023	-0.060	0.020	-0.023

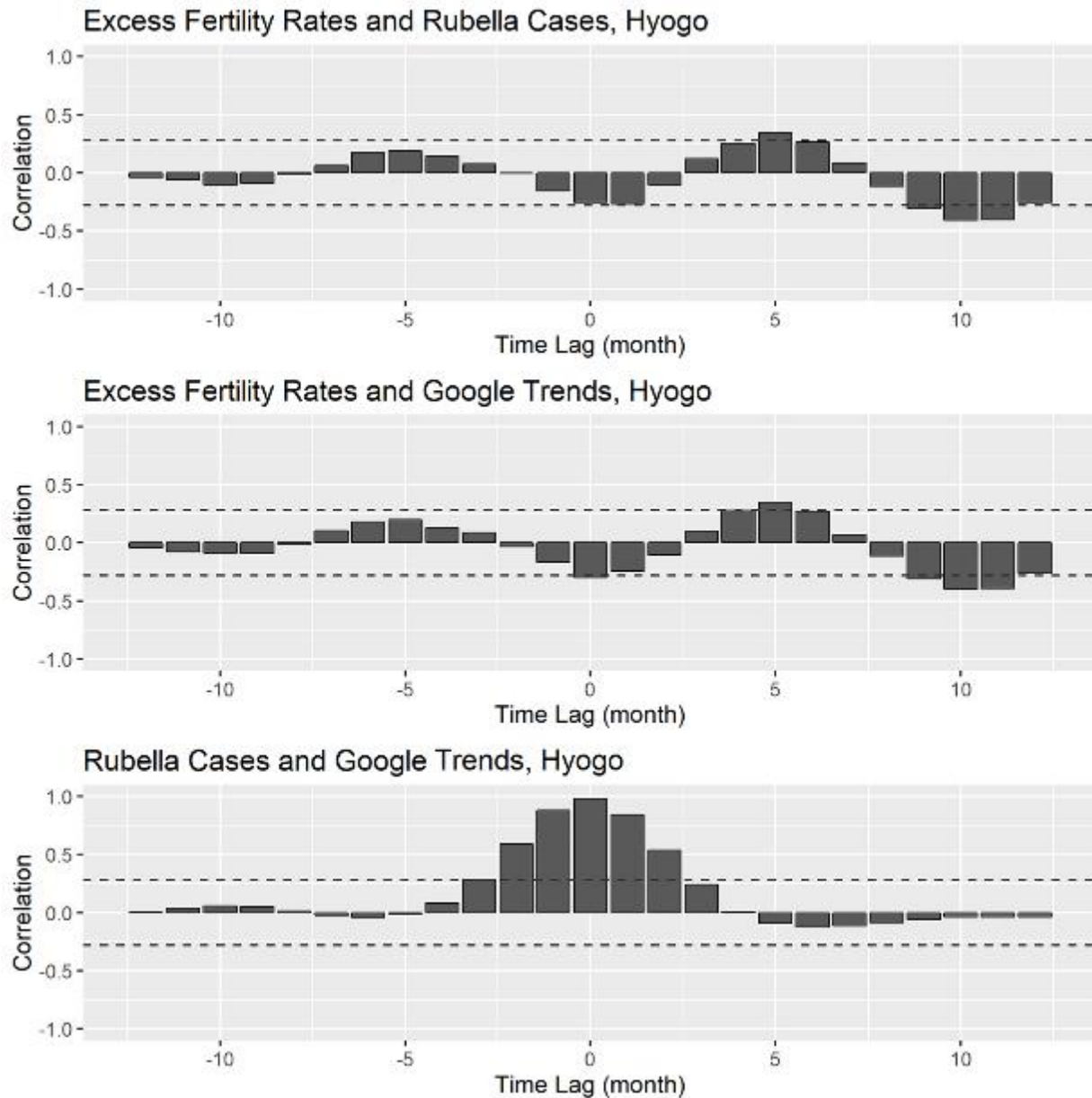
*Data on Google searches for the term "rubella" collected from Google Trends (<https://trends.google.com>).



Appendix Figure 1. Cross-correlation between rubella cases, Google Trends, and elevated fertility rates, 2012–2018, Kanagawa, Japan. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Upper limit, 0.28; lower limit, –0.28. Bars represent the cross-correlation coefficients in time series between (top panel) fertility rates and rubella cases; (middle panel) fertility rate and Google searches for the term “rubella”; and (bottom panel) rubella cases and Google searches for “rubella.” Horizontal dashed lines represent confidence limits for the null hypothesis of 0 true cross-correlation coefficients between the 2 time-series. Data on Google searches aggregated from Google Trends (<https://trends.google.com>).

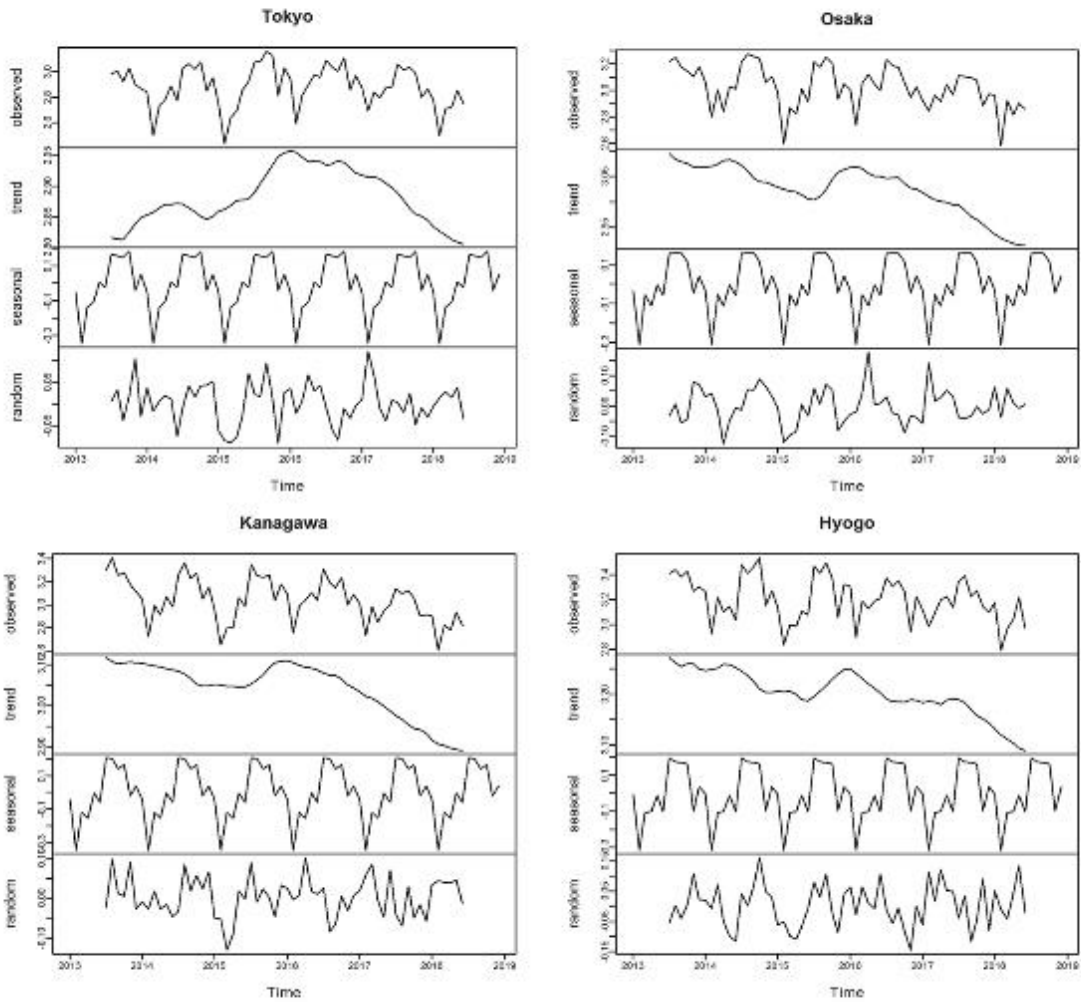


Appendix Figure 2. Cross-correlation between rubella cases, Google Trends, and elevated fertility rates, 2012–2018, Osaka, Japan. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Upper limit, 0.28; lower limit, –0.28. Bars represent the cross-correlation coefficients in time series between (top panel) fertility rates and rubella cases; (middle panel) fertility rate and Google searches for the term “rubella”; and (bottom panel) rubella cases and Google searches for “rubella.” Horizontal dashed lines represent confidence limits for the null hypothesis of 0 true cross-correlation coefficients between the 2 time-series. Data on Google searches aggregated from Google Trends (<https://trends.google.com>).

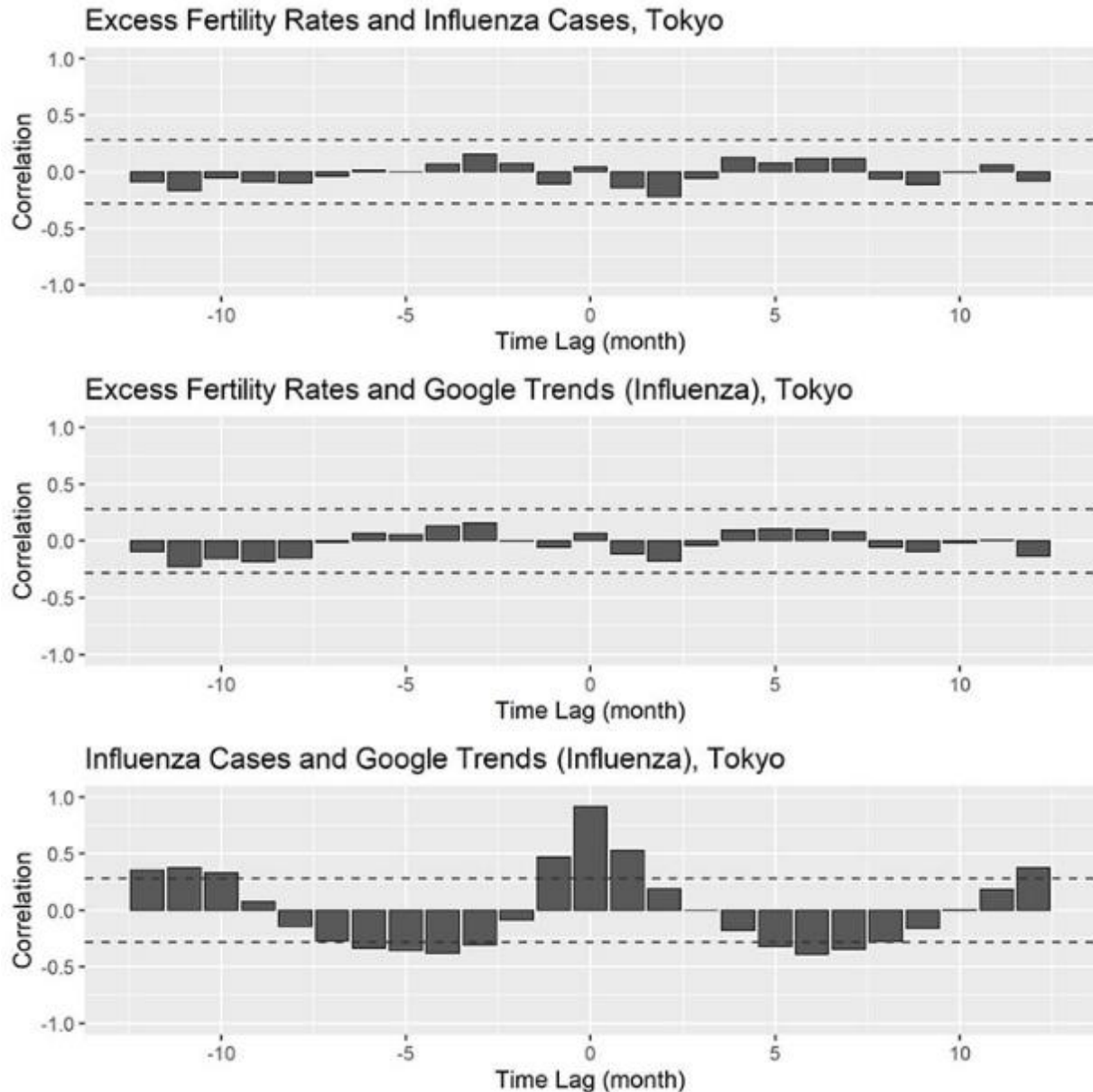


Appendix Figure 3. Cross-correlation between rubella cases, Google Trends, and elevated fertility rates, 2012–2018, Hyogo, Japan. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Upper limit, 0.28; lower limit, –0.28. Bars represent the cross-correlation coefficients in time series between (top panel) fertility rates and rubella cases; (middle panel) fertility rate and Google searches for the term “rubella”; and (bottom panel) rubella cases and Google searches for “rubella.” Horizontal dashed lines represent confidence limits for the null hypothesis of 0 true cross-correlation coefficients between the 2 time-series. Data on Google searches aggregated from Google Trends (<https://trends.google.com>).

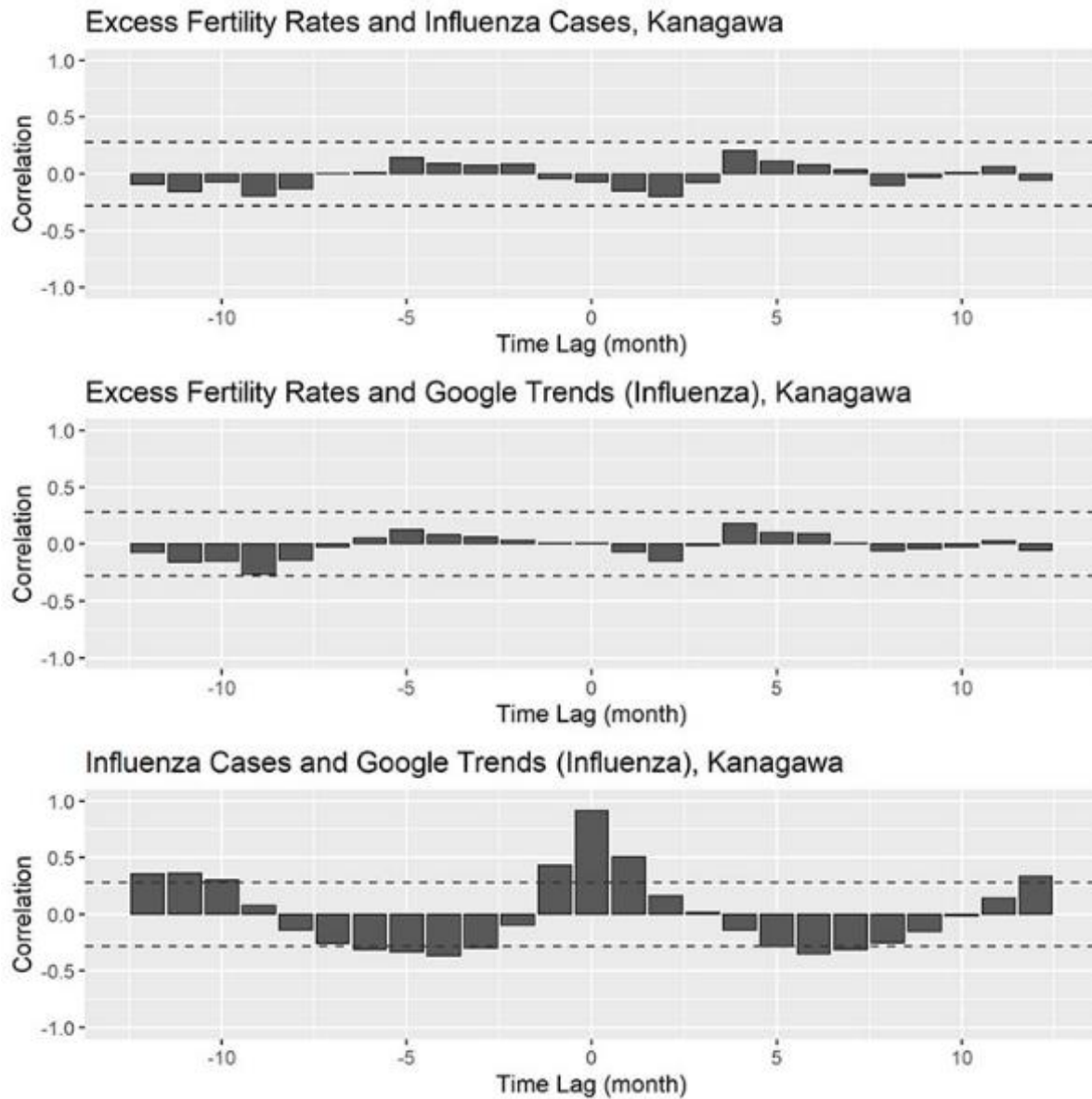
Seasonal Decomposition of Fertility Rate by Prefecture, 2013–2018, Japan



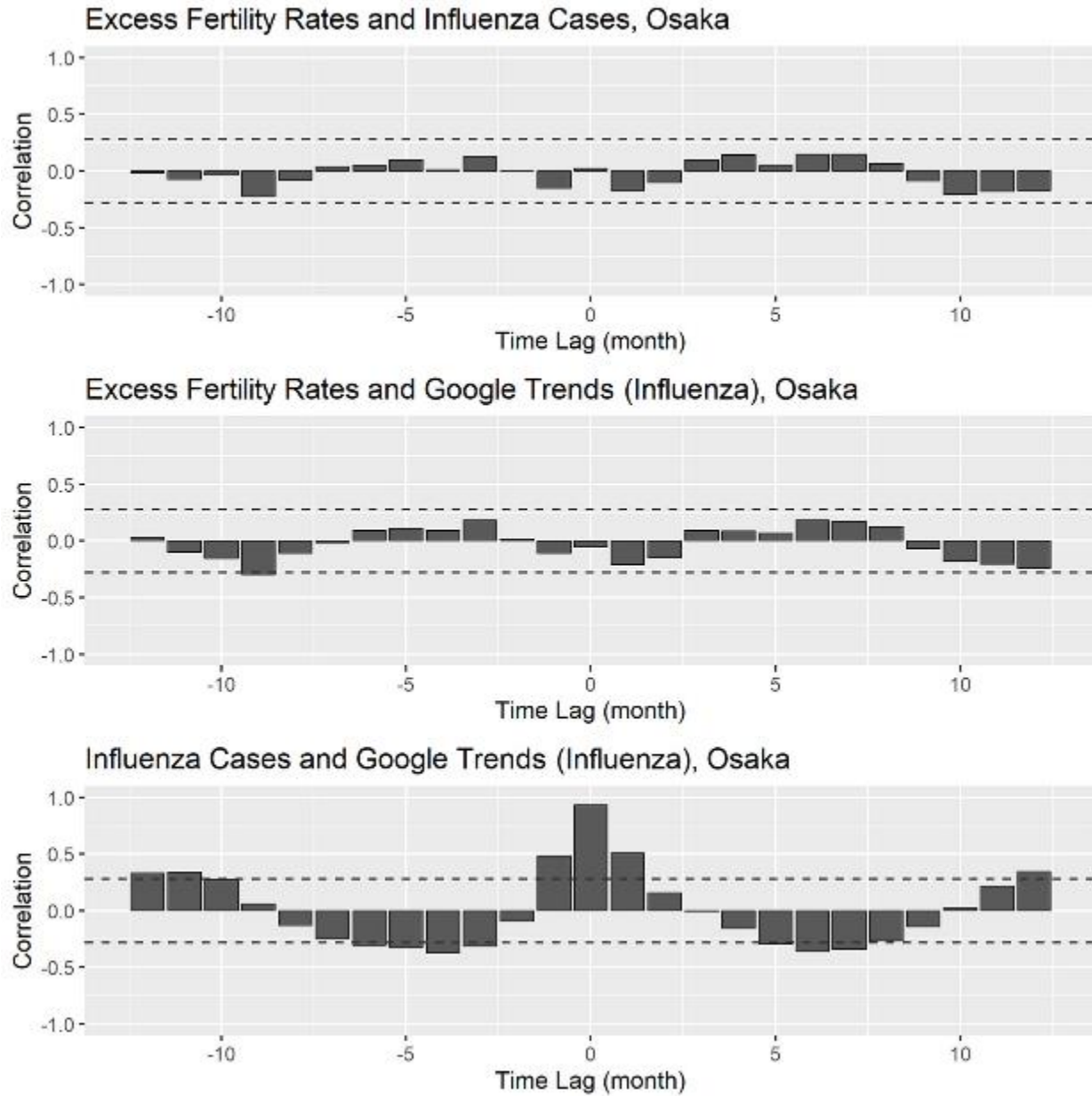
Appendix Figure 4. Decomposition of additive time series for fertility rates by prefecture, 2013–2018, Japan. A) Tokyo; B) Kanagawa; C) Osaka; and D) Hyogo. Observed data, trend component, seasonal component and random component are displayed.



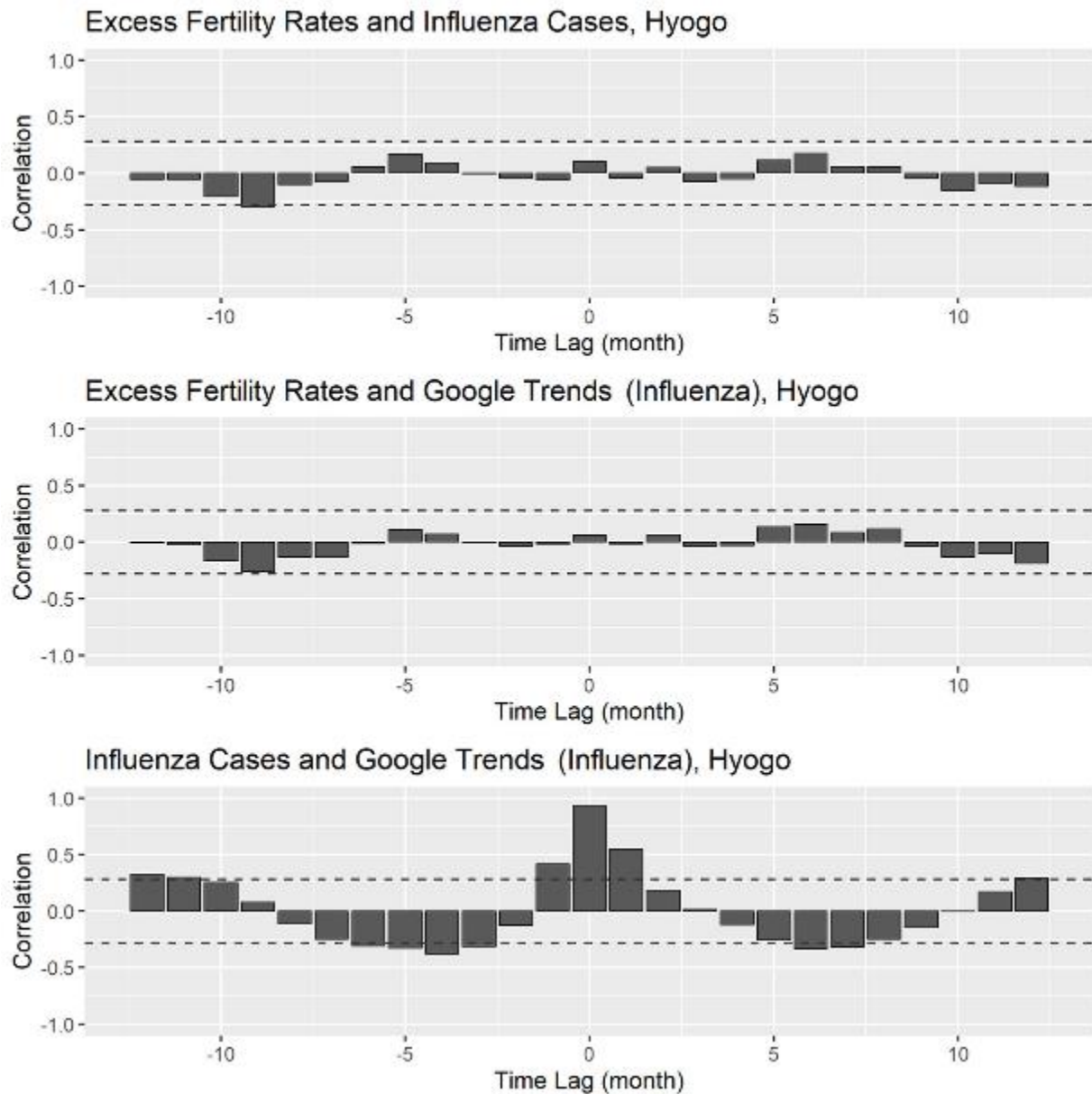
Appendix Figure 5. Cross-correlation between influenza cases, Google Trends, and elevated fertility rates, 2012–2018, Tokyo, Japan. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Upper limit, 0.28; lower limit, –0.28. Bars represent the cross-correlation coefficients in time series between (top panel) fertility rates and influenza cases; (middle panel) fertility rate and Google searches for the term “influenza”; and (bottom panel) influenza cases and Google searches for “influenza.” Horizontal dashed lines represent confidence limits for the null hypothesis of 0 true cross-correlation coefficients between the 2 time-series. Data on Google searches aggregated from Google Trends (<https://trends.google.com>).



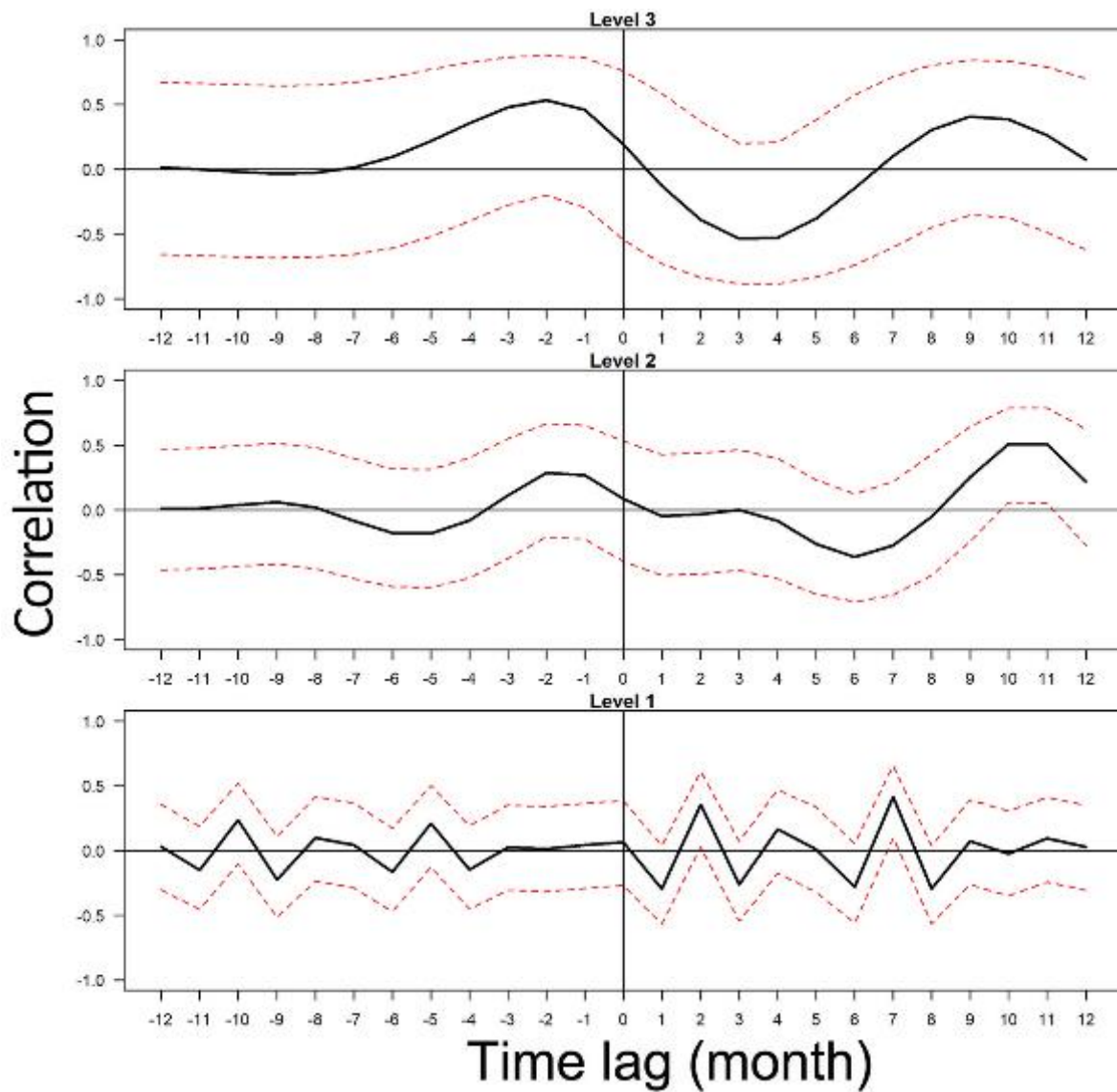
Appendix Figure 6. Cross-correlation between influenza cases, Google Trends, and elevated fertility rates, 2012–2018, Kanagawa, Japan. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Upper limit, 0.28; lower limit, –0.28. Bars represent the cross-correlation coefficients in time series between (top panel) fertility rates and influenza cases; (middle panel) fertility rate and Google searches for the term “influenza”; and (bottom panel) influenza cases and Google searches for “influenza.” Horizontal dashed lines represent confidence limits for the null hypothesis of 0 true cross-correlation coefficients between the 2 time-series. Data on Google searches aggregated from Google Trends (<https://trends.google.com>).



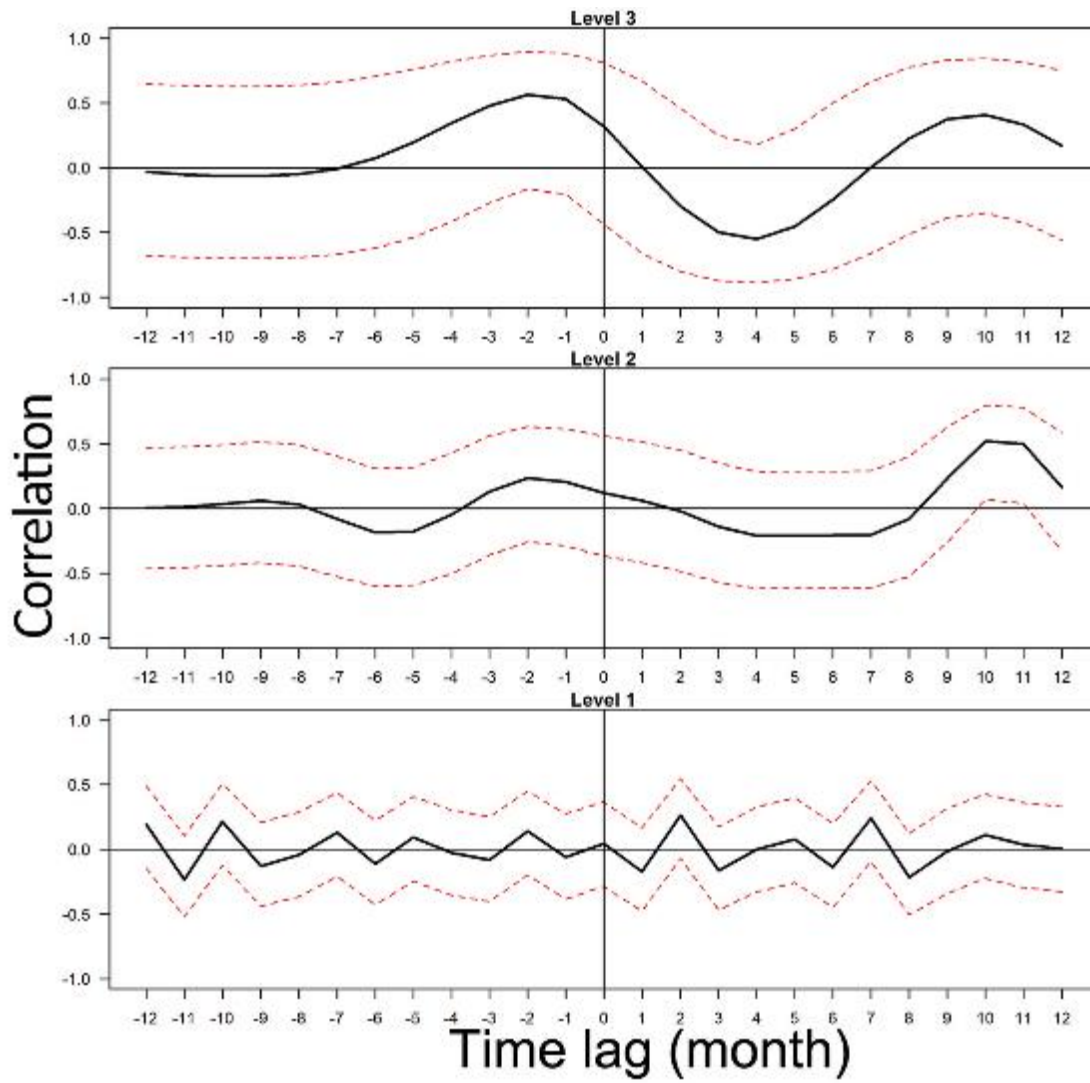
Appendix Figure 7. Cross-correlation between influenza cases, Google Trends, and elevated fertility rates, 2012–2018, Osaka, Japan. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Upper limit, 0.28; lower limit, –0.28. Bars represent the cross-correlation coefficients in time series between (top panel) fertility rates and influenza cases; (middle panel) fertility rate and Google searches for the term “influenza”; and (bottom panel) influenza cases and Google searches for “influenza.” Horizontal dashed lines represent confidence limits for the null hypothesis of 0 true cross-correlation coefficients between the 2 time-series. Data on Google searches aggregated from Google Trends (<https://trends.google.com>).



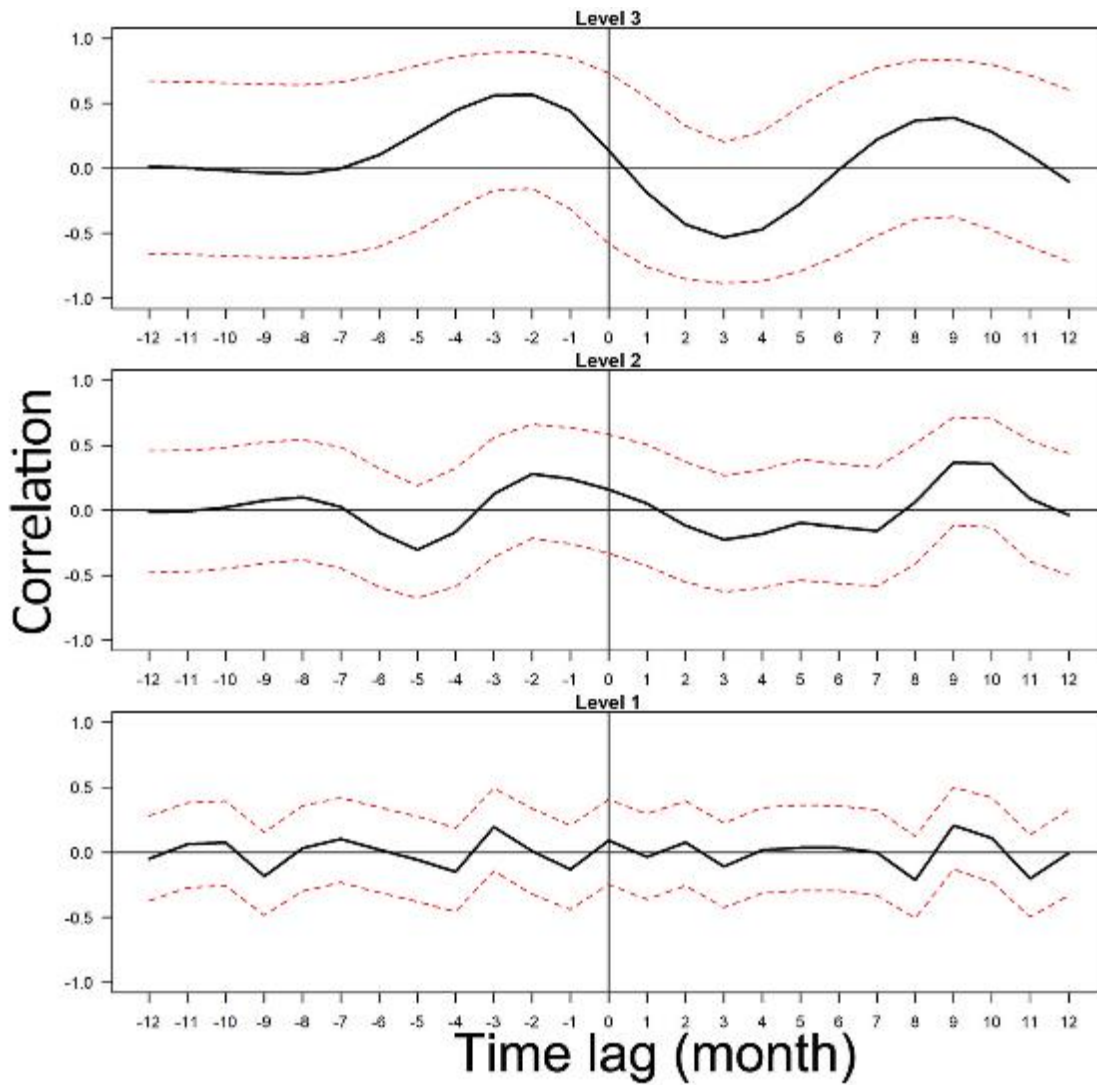
Appendix Figure 8. Cross-correlation between influenza cases, Google searches for the term “influenza,” and elevated fertility rates, 2012–2018, Hyogo, Japan. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Cross-correlation coefficients were calculated in each lag (–12 months) and lead period (+12 months) including 0. Upper limit, 0.28; lower limit, –0.28. Bars represent the cross-correlation coefficients in time series between (top panel) fertility rates and influenza cases; (middle panel) fertility rate and Google searches for the term “influenza”; and (bottom panel) influenza cases and Google searches for “influenza.” Horizontal dashed lines represent confidence limits for the null hypothesis of 0 true cross-correlation coefficients between the 2 time-series. Data on Google searches aggregated from Google Trends (<https://trends.google.com>).



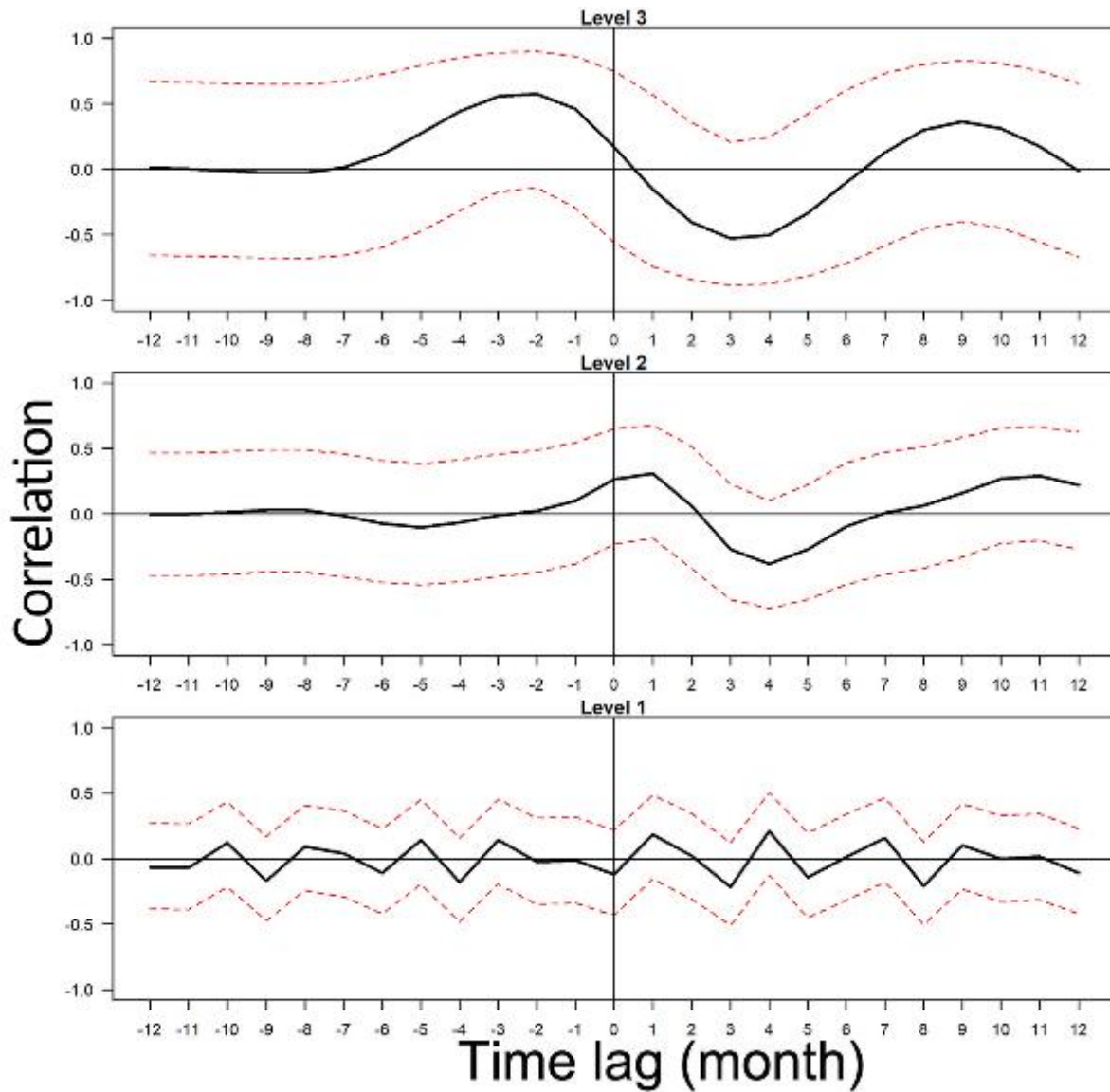
Appendix Figure 9. Wavelet cross-correlation between rubella cases and fertility rates, 2012–2018, Tokyo, Japan. Dotted line represents 95% confidence interval.



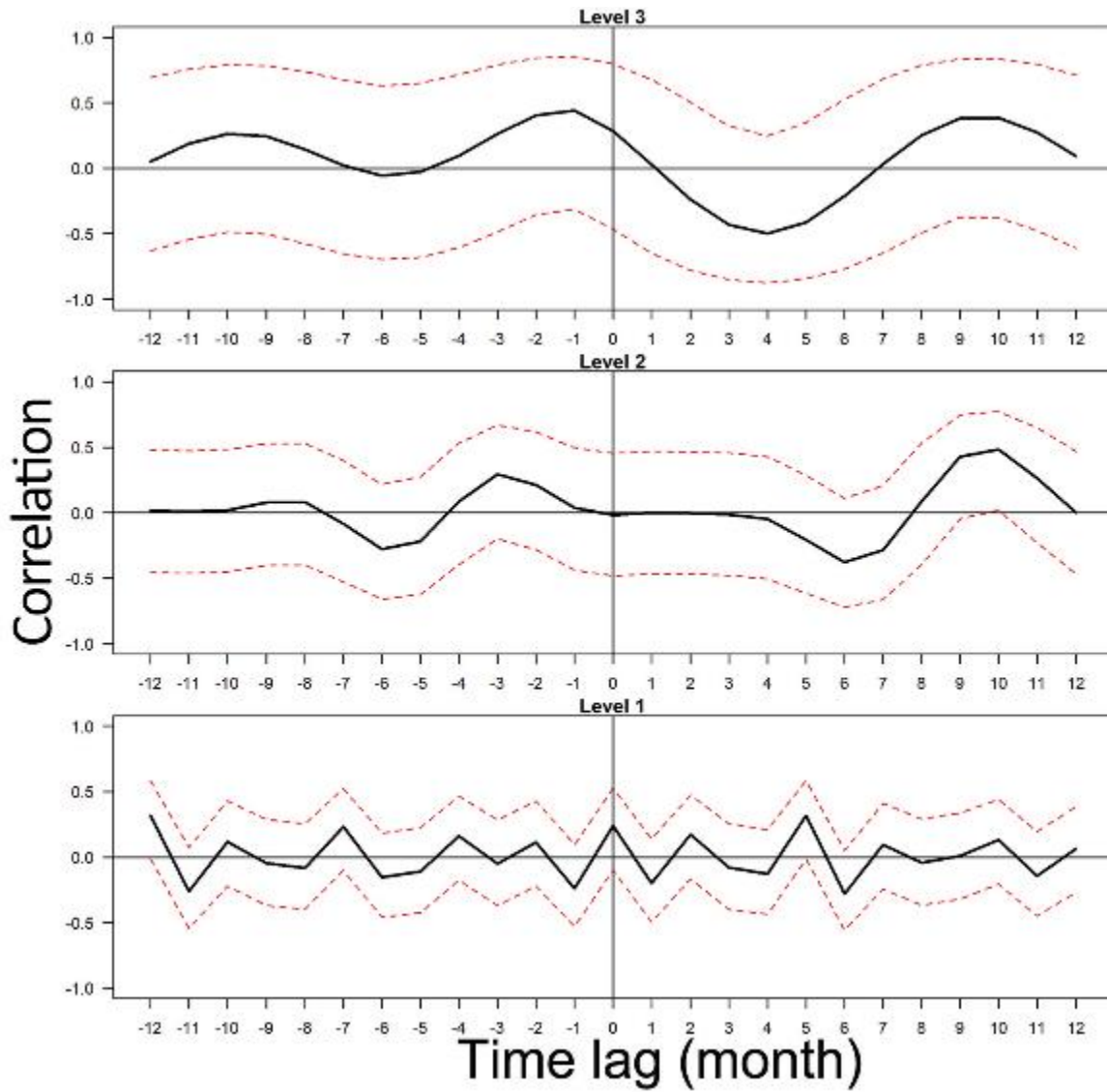
Appendix Figure 10. Wavelet cross-correlation between rubella cases and fertility rates, 2012–2018, Kanagawa, Japan. Dotted line represents 95% confidence interval.



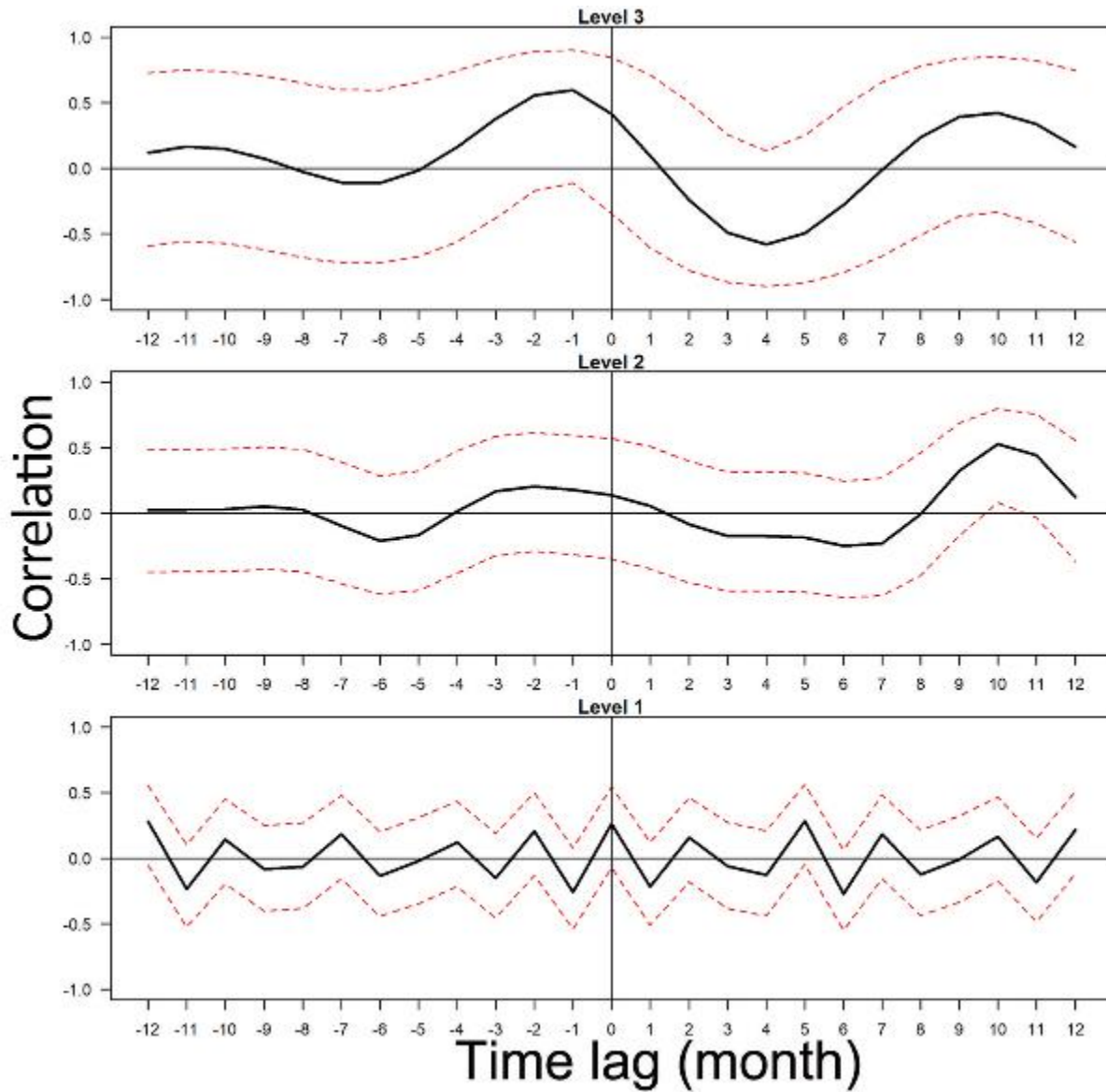
Appendix Figure 11. Wavelet cross-correlation between rubella cases and fertility rates, 2012–2018, Osaka, Japan. Dotted line represents 95% confidence interval.



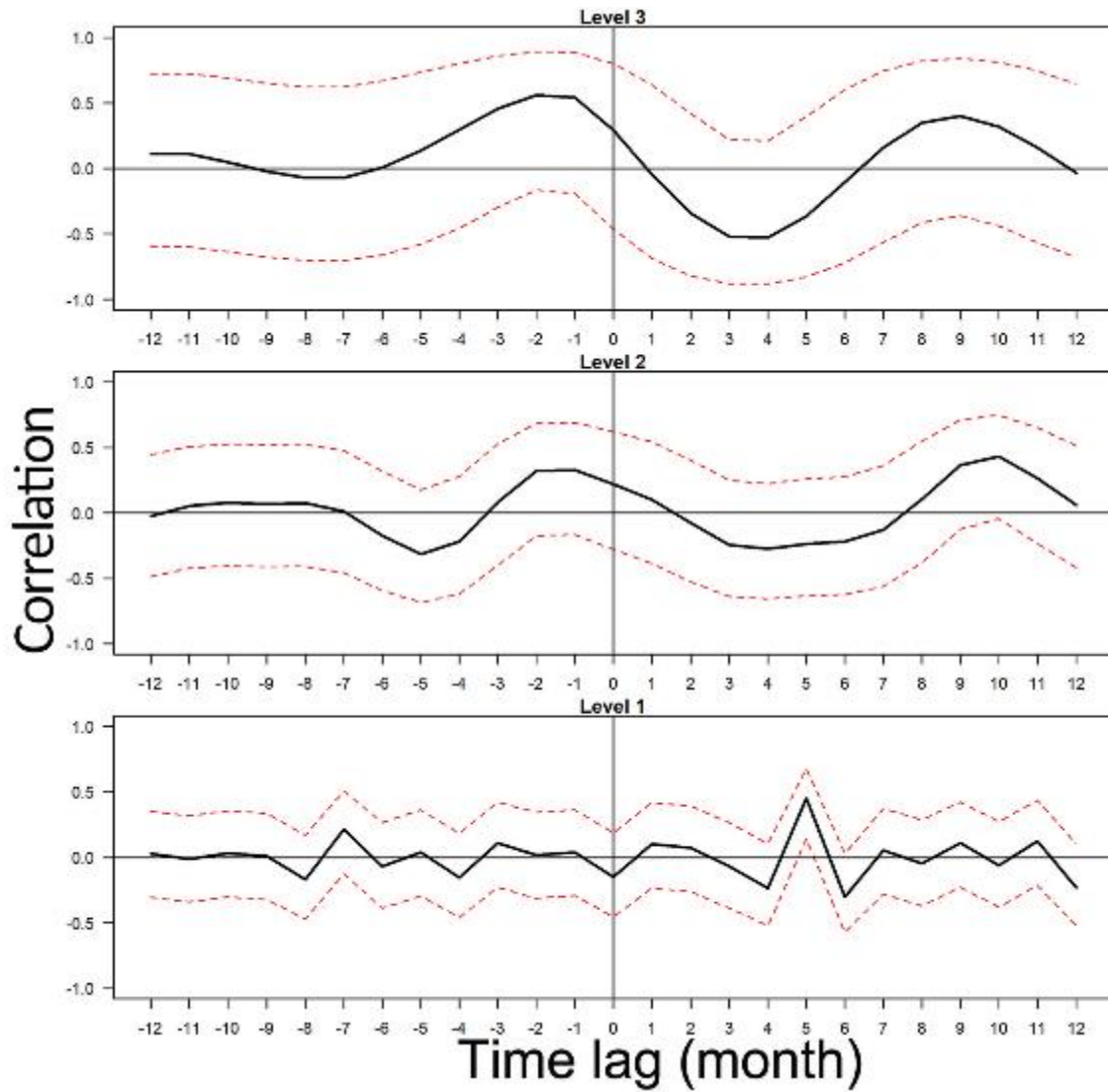
Appendix Figure 12. Wavelet cross-correlation between rubella cases and fertility rates, 2012–2018, Hyogo, Japan. Dotted line represents 95% confidence interval.



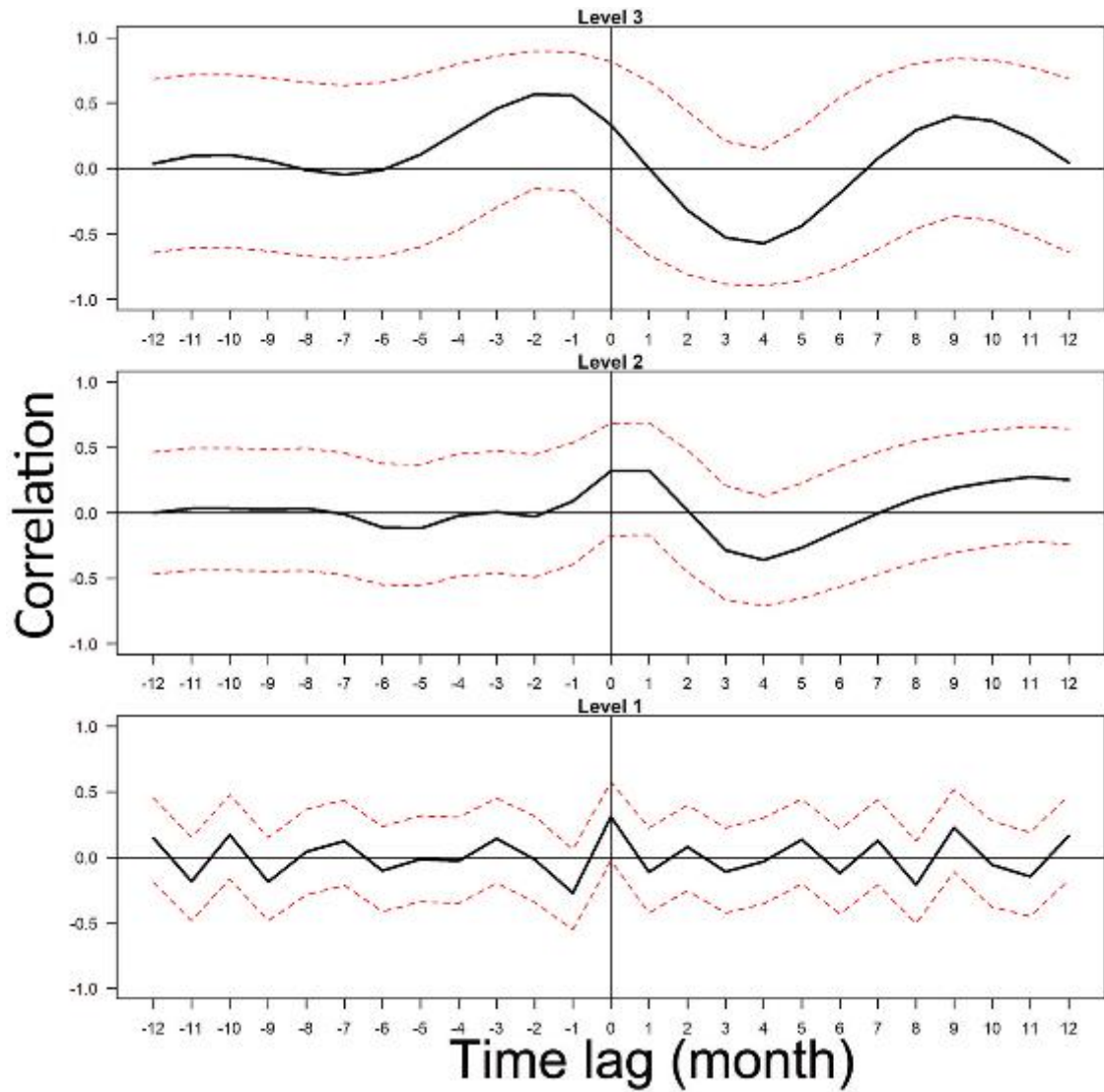
Appendix Figure 13. Wavelet cross-correlation between Google Trends and fertility rates, 2012–2018, Tokyo, Japan. Dotted line represents 95% confidence interval.



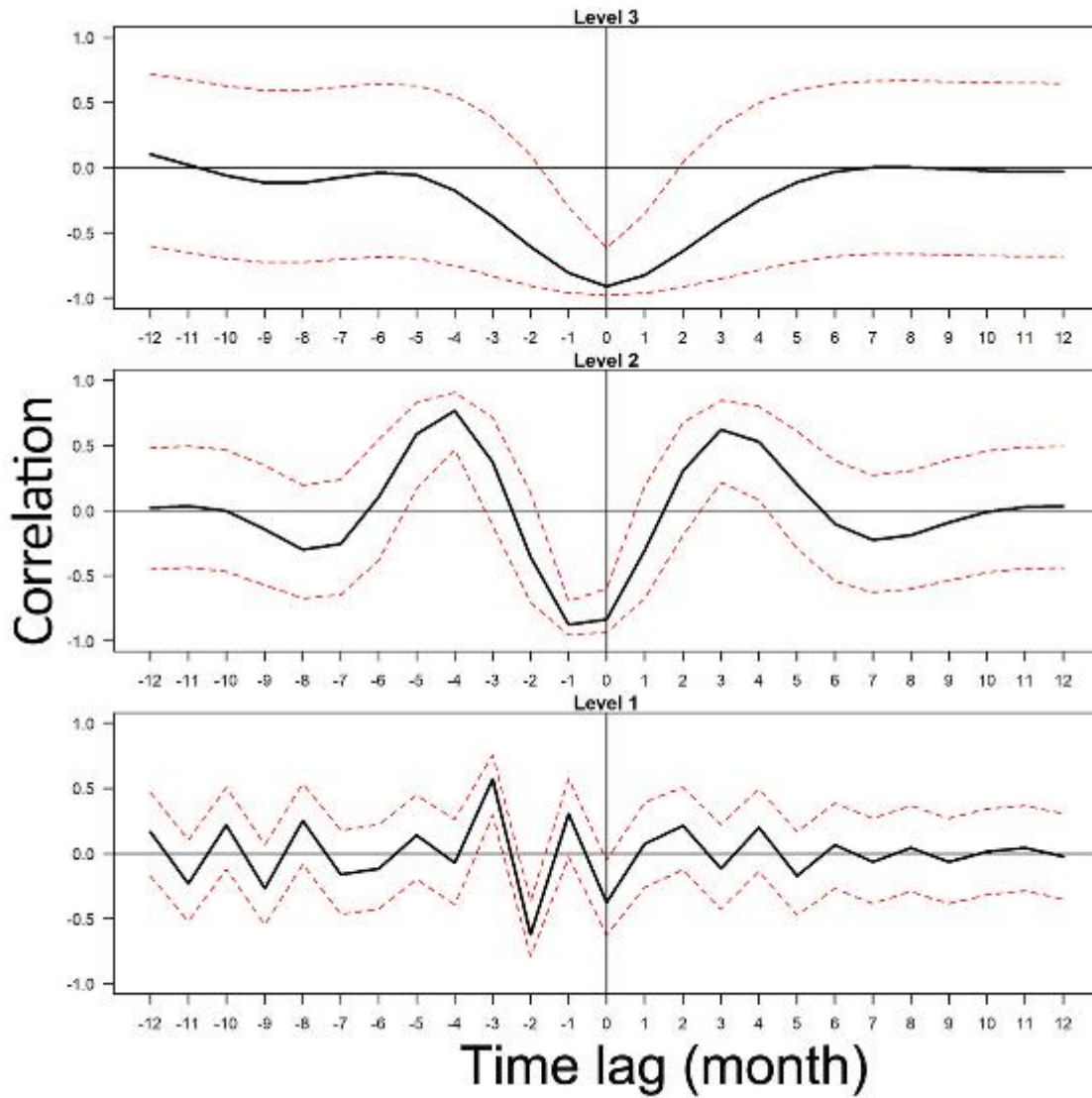
Appendix Figure 14. Wavelet cross-correlation between Google searches for “rubella” and fertility rates, 2012–2018, Kanagawa, Japan. Dotted line represents 95% confidence interval.



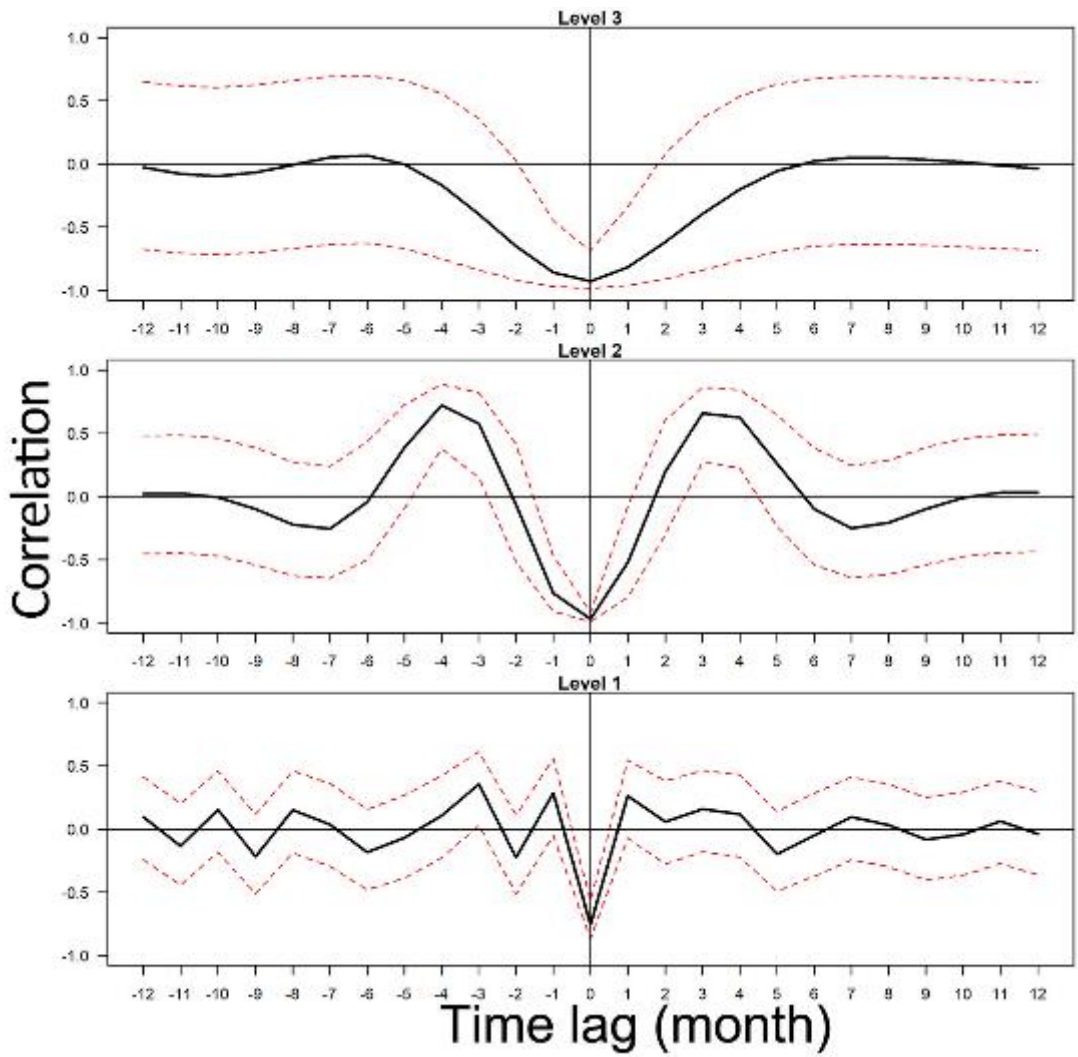
Appendix Figure 15. Wavelet cross-correlation between Google searches for “rubella” and fertility rates, 2012–2018, Osaka, Japan. Dotted line represents 95% confidence interval.



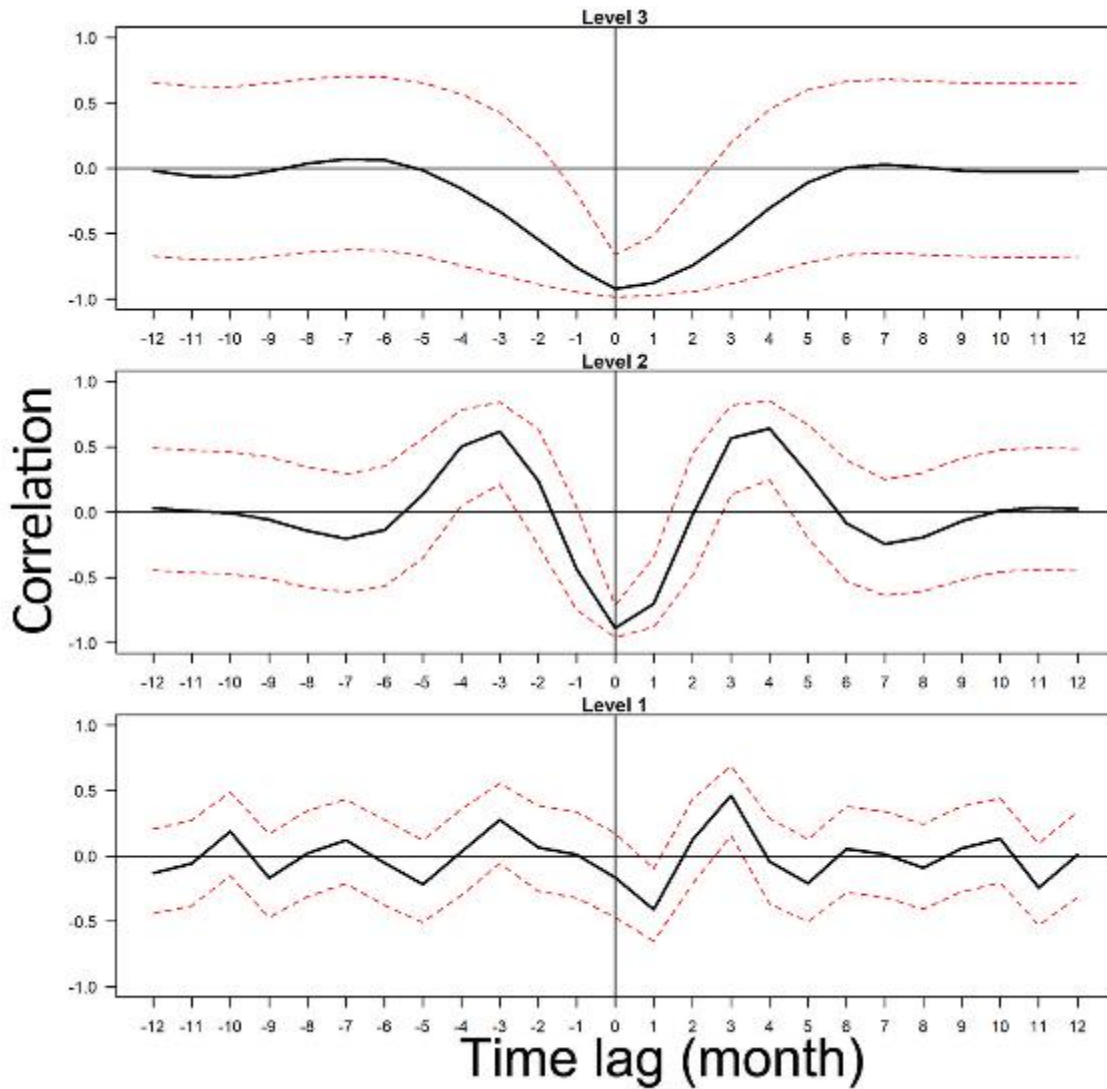
Appendix Figure 16. Wavelet cross-correlation between Google Trends and fertility rates, 2012–2018, Hyogo, Japan. Dotted line represents 95% confidence interval.



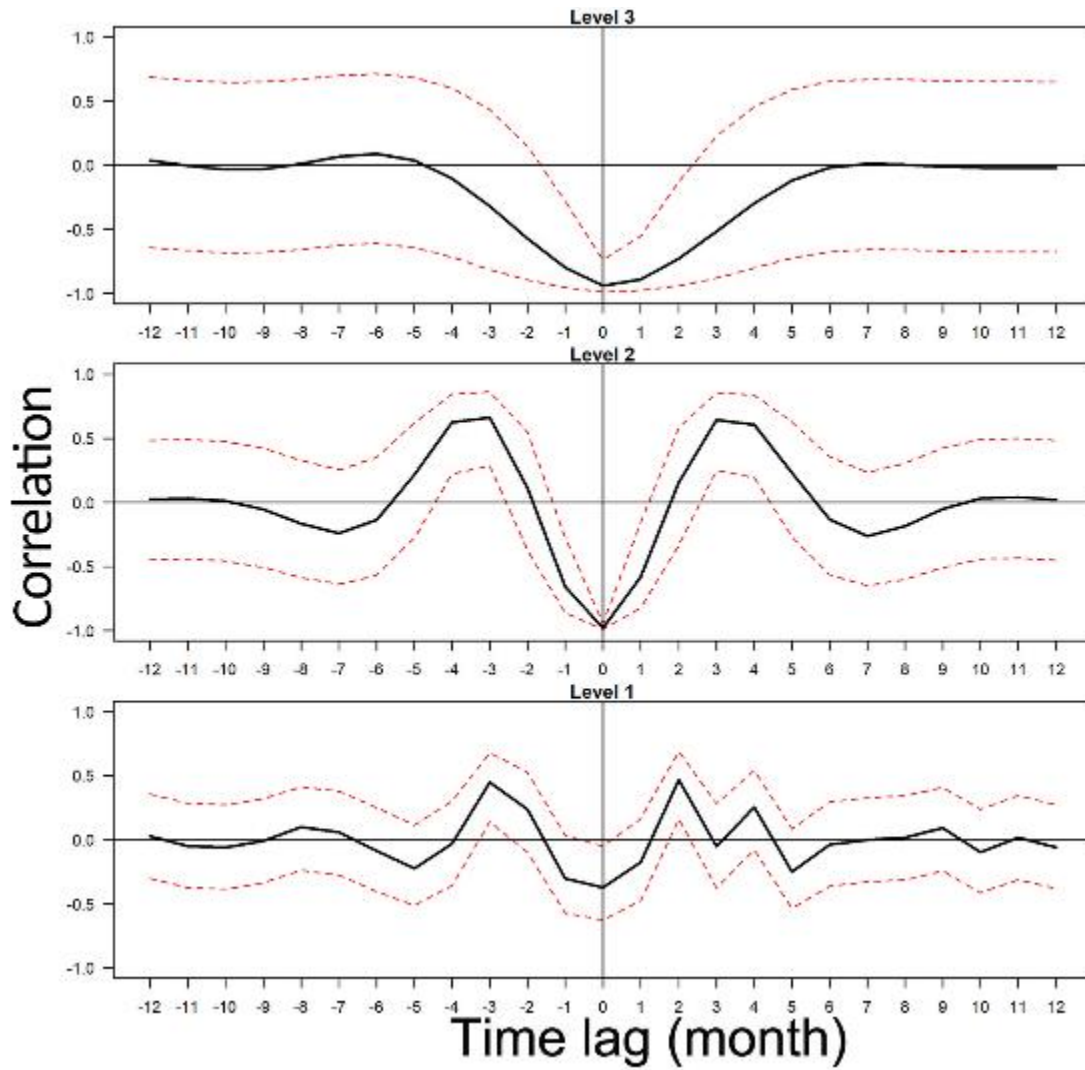
Appendix Figure 17. Wavelet cross-correlation between rubella cases and Google searches for “rubella,” 2012–2018, Tokyo, Japan. Dotted line represents 95% confidence interval.



Appendix Figure 18. Wavelet cross-correlation between rubella cases and Google searches for “rubella,” 2012–2018, Kanagawa, Japan. Dotted line represents 95% confidence interval.



Appendix Figure 19. Wavelet cross-correlation between rubella cases and Google searches for “rubella,” 2012–2018, Osaka, Japan. Dotted line represents 95% confidence interval.



Appendix Figure 20. Wavelet cross-correlation between rubella cases and Google searches for “rubella,” 2012–2018, Hyogo, Japan. Dotted line represents 95% confidence interval.