TRANSDEF
ATTACHMENT A

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AND COUNTY OF KINGS

COUNTY IS EXEMPT FROM FILING FEES PER GOV. CODE SECTION 6103

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SACRAMENTO

JOHN TOS, et al.,

Plaintiffs,

v.

CALIFORNIA HIGH SPEED RAIL AUTHORITY, et al.,

Defendants.

CASE NO. 34-2011-00113919

SUPPLEMENTAL DECLARATION OF KATHY A. HAMILTON

Trial Date: May 31, 2013

I, Kathy A. Hamilton, declare as follows:

1. I declare under penalty of perjury, that the following is true and correct, and that if called as a witness to testify to the following, I would be competent to so testify.

2. On March 1st, 2013, I signed the Declaration of Kathy A. Hamilton ("the Prior Declaration") for this lawsuit.

3. The following Supplemental Declaration is intended to capture the Public Records Act ("PRA") requests I have made of the California High-Speed Rail Authority ("Authority") since that date and their responses.

4. These requests were a continuation of my 2012 efforts (chronicled in the Prior

Declaration) seeking the documentation that supported the Authority's assertion that the April 2012 Business Plan, which introduces the concept of using existing infrastructure known as the Blended System, met the travel time requirements of Proposition 1A.

5. My February 17th request for more technical information (Exhibit I to the Prior Declaration) triggered a March 4th response. Mr. Tom Fellenz, counsel for the Authority wrote:

> Authority personnel needed for consultation regarding the records you have requested are not readily available; therefore under Government Code Section 62539(c) the Authority is invoking the fourteen day extension in order to make a determination. A determination letter will be sent to you no later than March 15, 2013. (Exhibit A, p. 2.)

6. They did indeed send a determination letter, without any of the requested information, and finally on April 12th I received three earlier draft versions of the publicly released Phase 1 Blended Travel Time Memo. (Exhibits D, E and G.) The Authority did not respond to all my requests, claiming there were no documents available . (Exhibit C.)

7. The original draft of that memo, which I had been seeking since June 2012, was withheld by the Authority under a claim of exemption:

> This report was converted into the final report entitled "Phase 1 Blended Travel Time" which you received on February 13, 2013. The draft form is not being released under Government Code section 6254(a). (Exhibit B, p. 2.)

This original draft memo was firmly established as being in existence as of May 23, 2012. Thierry Prate, a consultant for Parsons Brinckerhoff, wrote to the HSR Authority Records staff:

> As you know this is a very sensitive matter, Jeff Morales and Hans van Winkle have required from the team to produce a technical memo of how to achieve the IA journey time under the Phase 1 Blended system. This memo is currently being reviewed by Hans. You will receive the information directly today or tomorrow. (Exhibit C to the Prior Declaration.)

8. This memo was promised to me by the High-Speed Rail Authority in an email dated May 31st from Kyle Wunderli of the HSR Authority Records staff (Exhibit B to the Prior Declaration) but never delivered.

9. Also found in these new documents were train performance curves dated March

23, 2012 (pp. 3-4; Exhibits D, E, and G.) and curves dated April 27, 2012 (p. 5; Exhibits D and E.) These documents contradict the Authority's May 31, 2012 response to my PRA request:

> I have an answer on your request for some documented proof of the assertions the engineers made to Dan Richard. The answer is that no document exists. (Exhibit B to the Prior Declaration.)

10. The table below is intended to provide a convenient comparison of the travel times between San Francisco and San Jose cited in the four versions of the Phase 1 Blended Travel Time memo provided to me by the Authority. I have carefully checked and verified that each element of the table is an accurate representation of those materials.

11. The February 12, 2013 published memo (Exhibit I) shows a different travel time for the Blended System than the January 13, 2013 version (Exhibit D). The earlier version shows a 32 minutes travel time, while the final report asserts a 30 minutes travel time for the equivalent 110 mph trip.

12. This is significant because AB 3034 mandates that the travel time between certain cities "shall not exceed the following." The maximum travel time between the San Francisco and San Jose city pairs is 30 minutes. The editing of the memos changed a route that did not comply with Proposition 1A into one that did.

13. The bold findings in the shaded cells of the chart below are clearly inconsistent with earlier versions. As I had requested all communications pertaining to the travel time for the April 2012 Business Plan, the absence of any communications in the Public Records Act response indicating the discovery of mistakes is evidence that the changes in travel time were not the correction of an error. One is forced to conclude that these changes were a deliberate attempt to misrepresent the project's compliance with Proposition 1A.

Date Document	SF-SJ Travel Time Blended System	SF-SJ Travel Time Dedicated Tracks	Title of SF-SJ Model Run	Top Speed on SF-SJ Model Run	Attachment List Title
1/13/13 Memo	:32 at 110 mph :30 at 125 mph	NA :30 at 125 mph	SF to SJ - 110 mph SF to SJ - 125 mph	110 125	SF to SJ - 110 mph SF to SJ - 125 mph

Date Document	SF-SJ Travel Time Blended System	SF-SJ Travel Time Dedicated Tracks	Title of SF-SJ Model Run	Top Speed on SF-SJ Model Run	Attachment List Title
2/5/13 Memo	:30 at 125 mph	:30 at 125 mph	SF to SJ - 125 mph	125	SF to SJ - 125 mph
2/6/13 Vacca E-Mail	"We would prefer to use the 110…"				
2/7/13 Memo	**:30 at 110 mph**	:30 at 125 mph [inferred]	None	110	SF to SJ
2/8/13 Model Run	**:30 at 110 mph**		None	110	
2/12/13 Memo	**:30 at 110 mph**	None	**SF to SJ - 110 mph**	110	SF to SJ

14. Proposition 1A specifically selects the San Francisco Transbay Terminal as the northern terminus for the HSR system. The January 13 and February 5 versions include text mentioning the San Francisco Transbay Transit Center, the Terminal's new name. This information was deleted from the February 7 version and the published memo, making it impossible to verify that the travel time matched the statutory requirement.

15. One doesn't need to be an engineer to compare numbers. Tony Daniels, a very experienced engineer and top executive for Parsons Brinckerhoff, said in August 2009 that the train would just make the 2 hours and forty minute travel time requirement (See Exhibit A to the Prior Declaration), using aggressive speeds and a dedicated four-track system. Today using what is proposed in the April 2012 Business Plan Blended System with part of the segments sharing existing infrastructure, not four tracks, perhaps two or three, with lower speeds, it will take 8 minutes less. The final version of the memo says that the SF to LA run will take a theoretical 2 hours and 32 minutes. This is a pure run time, not a realistic operational train schedule that includes allowances for real-world problems. How likely is it that a real train will be able to make the trip in 2 hours 40 minutes?

16. Compliance of the Los Angeles-to-San Francisco travel time with Proposition 1A was mandatory for the approval of the April 2012 Business Plan. I do not believe the Authority's

assertion that there were no written or electronic communications--beyond the paltry few that were disclosed--between or among consultants, Board members, Authority personnel and the peer review group on this critical subject.

17. As I write this Supplemental Declaration on the one-year anniversary of my first PRA request, I can honestly say that the Authority's practice of hiding information has forced me to engage in constant struggle to meet my needs as a journalist.

I declare under penalty of perjury pursuant to the laws of the State of California that the foregoing is true and correct.

Executed on this __ day of April, 2013, at Menlo Park, California.

/s/
KATHY A. HAMILTON

Attachment B

[The following 2010 email references Sumitomo's successful bid document for the SMART vehicle purchase. SMART is a 70-mile route.]

Dear Ms. Allan,

We further internally discussed this matter. In a spirit of moving this project forward, we hereby accept to disclose a person described in your e-mail a part of data described below, which may be helpful for updating website information. The below data is a part of data in Sub-part A 2.2 page 25.

QUOTE
Running Simulation for A-car + B-car consist

North Bound (Larkspur – Cloverdale)
Running Time 1:26:02 (1:27:00 in Specification)
Train fuel consumption (gallons) 62.3 (31.2/car)

South Bound (Cloverdale – Larkspur)
Running Time 1:22:52 (1:25:00 in Specification)
Train fuel consumption (gallons) 60.4 (30.2/car)

New wheel & Fully Auxiliary Load
Deceleration: 1.5mphps
UNQUOTE

Please note that the rest of Sub-Part A – Section 2.2.8.2 thru 2.2.8.4 (pages 23-27) remain confidential.

Best regards,
Shinji Kobayashi
Sumitomo Corporation of America

Attachment C

Evaluation of Caltrain/HSR Initial Simulation

Anthony E. Waller, Railroad Operations Consultant

The initial simulation of joint operations of the Caltrain corridor carried out by LTK was deliberately couched in somewhat ambiguous language. It stated that blended operations were "conceptually" possible dependent on other factors that are yet to be determined. This will include more detailed engineering, the layout of the passing sidings and operating and scheduling tactics.

One factor that stands out is that at this phase of the blended operations study, a decision/recommendation/sketch plan/trial balloon has been put forth to eliminate, without actually saying so, the "Baby Bullet" schedules. The operations concepts put forth in the document tout the positive changes proposed for Caltrain service that are said to be byproducts of electrification and blended operations. These include six trains per peak hour in each direction instead of the present five; most (but not all) stations receiving more numerous train stops during the peak; and restoration of weekday service to Broadway and Atherton. It also includes a claim that is directly contradicted elsewhere in the text that overall SF-SJ travel time will be reduced by the more frequently stopping peak period trains.

There are sample peak period schedules for both peak directions: positive peak direction (toward San Francisco in the AM) and reverse (Silicon valley/San Jose oriented). All trains are proposed to stop more often than present Baby Bullet services. These new patterns were instigated directly by the need to slow down and bunch up Caltrain operations to keep HSR moving by allowing multiple overtakes in the passing sidings under planning. In addition, the only mentioned overtakes of trains at passing sidings is of Caltrain service by HSR. Baby Bullets presently overtake slower Caltrain schedules in these locations. Hence, if there are no Caltrain schedules overtaking others, there can be no Baby Bullets.

The following tables compare the different peak period schedules for both AM peak directions:

Present AM Peak Schedules

Train Class	# of Stops San Jose-San Francisco	Train #s	Runtime SJ-SF
Baby Bullet I	4	305, 313, 323	57 min.
Baby Bullet II	5 (also serves Tamien)	309, 319, 329	59 min.
"Skip Stop"express	9	215, 225	67 min.
Outer Zone trains	12 (some from Gilroy)	207, 217, 227	82 min.
Inner Zone trains	17 or 18 (one from Gilroy)	211, 221, 231	88 min.

Proposed AM Peak Schedules

Train Class	# of Stops San Jose-San Francisco	Runtime SJ-SF
A	11 (this type operates twice per hour)	64 min.
B	11 (also twice hourly, serves Tamien)	64 min.
C	11 or 12 (each subtype operating once per hour)	62 or 63 min.

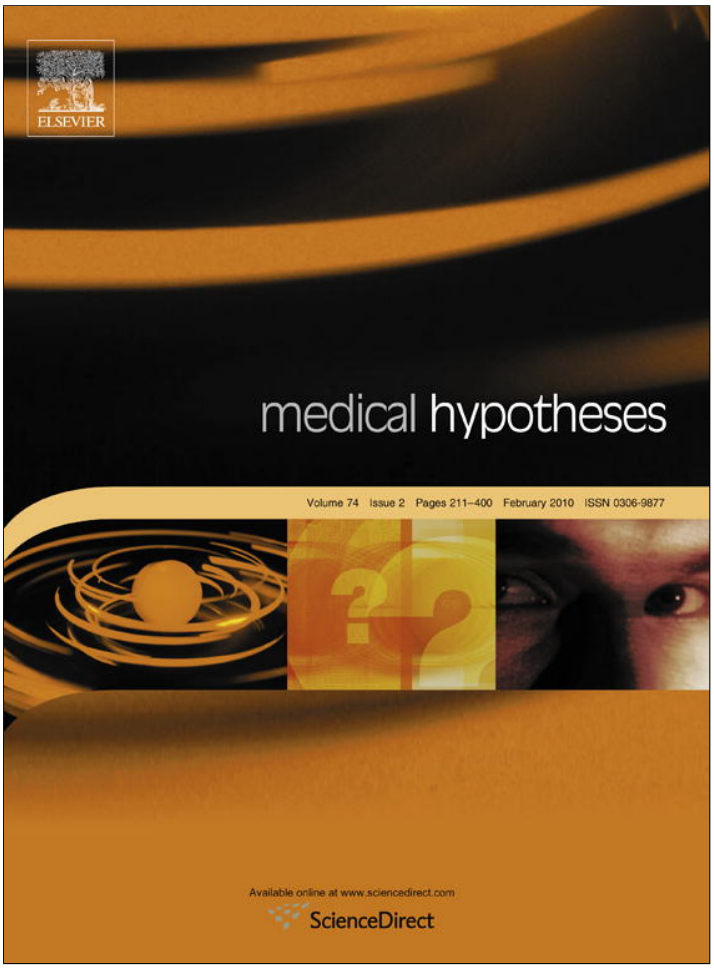
Present AM Peak Reverse Commute Schedules

Train Class	# of Stops San Jose-San Francisco	Train #s	Runtime SJ-SF
Baby Bullet I	5	314, 324	59 min.
Baby Bullet II	6	312, 322, 332	61 min.
"Skip Stop" express	9 or 11	206 (11 stops) 216, 226	83 (11)/ 69 min.
Outer Zone trains	13 (plus Tamien)	210, 220, 230	82 min.
Inner Zone trains	14 (plus Tamien)	208, 218, 228	79 min.

Proposed AM Peak Reverse Commute Schedules

Train Class	# of Stops San Jose-San Francisco	Runtime SJ-SF
A	10	67 min.
B	12	68 min.
C	10	69 min.
D	11	68 min.
E	11	67 min.
F	11	70 min.

Attachment D



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Historical evidence that electrification caused the 20th century epidemic of "diseases of civilization" ☆

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SUMMARY

The slow spread of residential electrification in the US in the first half of the 20th century from urban to rural areas resulted by 1940 in two large populations; urban populations, with nearly complete electrification and rural populations exposed to varying levels of electrification depending on the progress of electrification in their state. It took until 1956 for US farms to reach urban and rural non-farm electrification levels. Both populations were covered by the US vital registration system. US vital statistics tabulations and census records for 1920–1960, and historical US vital statistics documents were examined. Residential electrification data was available in the US census of population for 1930, 1940 and 1950. Crude urban and rural death rates were calculated, and death rates by state were correlated with electrification rates by state for urban and rural areas for 1940 white resident deaths. Urban death rates were much higher than rural rates for cardiovascular diseases, malignant diseases, diabetes and suicide in 1940. Rural death rates were significantly correlated with level of residential electric service by state for most causes examined. I hypothesize that the 20th century epidemic of the so called diseases of civilization including cardiovascular disease, cancer and diabetes and suicide was caused by electrification not by lifestyle. A large proportion of these diseases may therefore be preventable.

Background

In 2001, Ossiander and I [1] presented evidence that the childhood leukemia mortality peak at ages 2–4 which emerged in the US in the 1930s was correlated with the spread of residential electrification in the first half of the 20th century in the US. While doing the childhood leukemia study, I noticed a strong positive correlation between level of residential electrification and the death rate by state due to some adult cancers in 1930 and 1940 vital statistics. At the time, a plausible electrical exposure agent and a method for its delivery within residences was lacking. However, in 2008 I coauthored a study of a cancer cluster in school teachers at a California middle school [2] which indicated that high frequency voltage transients (also known as dirty electricity), were a potent universal carcinogen with cancer risks over 10.0 and significant dose–response for a number of cancers. They have frequencies between 2 and 100 kHz. These findings are supported by a large cancer incidence study in 200,000 California school employees which showed that the same cancers and others were in excess in California teachers statewide [3]. Power frequency magnetic fields (60 Hz) measured at the school were low and not related to cancer incidence, while classroom levels of high frequency voltage transients measured at the electrical outlets in the classrooms accurately predicted a teacher's cancer risk. These fields are potentially present in all wires carrying electricity and are an important component of ground currents returning to substations especially in rural areas. This helped explain the fact that professional and office workers, like the school teachers, have high cancer incidence rates. It also explained why indoor workers had higher malignant melanoma rates, why melanoma occurred on part of the body which never are exposed to sunlight, and why melanoma rates are increasing while the amount of sunshine reaching earth is stable or decreasing due to air pollution. A number of very different types of cancer had elevated risk in the La Quinta school study, in the California school employees study, and in other teacher studies. The only other carcinogenic agent which acts like this is ionizing radiation.

Among the many devices which generate the dirty electricity are compact fluorescent light bulbs, halogen lamps, wireless routers, dimmer switches, and other devices using switching power supplies. Any device which interrupts current flow generates dirty electricity. Arcing, sparking and bad electrical connections can also generate the high frequency voltage transients. Except for the dimmer switches, most of these devices did not exist in the first half of the 20th century. However, early electric generating equipment

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and electric motors used commutators, carbon brushes, and split rings, which would inject high frequency voltage transients into the 60 Hz electricity being generated and distributed.

With a newly recognized electrical exposure agent and a means for its delivery, I decided to examine whether residential electrification in the US in the first half of the last century was related to any other causes of death. Most cancers showed increasing mortality in this period, and many are still increasing in incidence in the developed world.

Thomas Edison began electrifying New York City in 1880, but by 1920, only 34.7% of all US dwelling units and 1.6% of farms had electric service (Table 1). By 1940, 78% of all dwelling units and 32% of farms had electric service [4]. This means that in 1940 about three quarters of the US population lived in electrified residences and one quarter did not. By 1940, the US vital registration system was essentially complete, in that all the 48 contiguous United States were included. Most large US cities were electrified by the turn of the century, and by 1940, over 90% of all the residences in the northeastern states and California were electrified. In 1940 almost all urban residents in the US were exposed to electromagnetic fields (EMFs) in their residences and at work, while rural residents were exposed to varying levels of EMFs, depending on the progress of rural electrification in their states. In 1940, only 28% of residences in Mississippi were electrified, and five other southern states had less than 50% of residences electrified (Table 2). Eleven states, mostly in the northeast had residential electrification rates above 90%. In the highly electrified northeastern states and in California, urban and rural residents could have similar levels of EMF exposure, while in states with low levels of residential electrification, there were potentially great differences in EMF exposure between urban and rural residents. It took the first half of the 20th century for these differences to disappear. I examined US mortality records by urban and rural residence by percent of residences with electric service by state.

Hypothesis

The diseases of civilization or lifestyle diseases include cardiovascular disease, cancer and diabetes and are thought to be caused by changes in diet, exercise habits, and lifestyle which occur as countries industrialize. I think the critical variable which causes the radical changes in mortality accompanying industrialization is electrification. Beginning in 1979, with the work of Wertheimer and Leeper [5], there has been increasing evidence that some facet of electromagnetic field exposure is associated epidemiologically with an increased incidence of leukemia, certain other cancers and non-cancers like Alzheimer's disease, amyotrophic lateral sclerosis, and suicide. With the exception of a small part of the electromagnetic spectrum from infra red through visible light, ultraviolet light and cosmic rays, the rest of the spectrum is man-made and foreign to human evolutionary experience. I suggest that from the time that Thomas Edison started his direct current electrical distribution system in the 1880s in New York City until now, when most of the world is electrified, the electricity carried high frequency voltage transients which caused and continue to cause what are considered to be the normal diseases of civilization. Even today, many of these diseases are absent or have very low incidence in places without electricity.

Table 1
Growth of residential electric service US 1920–1956 percent of dwelling units with electric service.

Year	All		Urban and rural non-farm
	Dwellings	Farm	
1920	34.7	1.6	47.4
1925	53.2	3.9	69.4
1930	68.2	10.4	84.8
1935	68.0	12.6	83.9
1940	78.7	32.6	90.8
1945	85.0	48.0	93.0
1950	94.0	77.7	96.6
1956	98.8	95.9	99.2

Table 2
Percent of residences with electric lighting 1930 and 1940 by state.

Code	State	1930	1940
AL	Alabama	33.9	43.3
AZ	Arizona	68.8	70.5
AR	Arkansas	25.3	32.8
CA	California	93.9	96
CO	Colorado	69.6	77.6
CT	Connecticut	95.3	96.5
DE	Delaware	78.4	81.8
FL	Florida	60.9	66.5
GA	Georgia	35.5	46.6
ID	Idaho	64.5	79.1
IL	Illinois	86.1	89.9
IN	Indiana	74.8	84
IA	Iowa	65.6	76.7
KS	Kansas	62	71.5
KY	Kentucky	44.2	54.2
LA	Louisiana	42.2	48.9
ME	Maine	76.1	80.4
MD	Maryland	81.8	85.9
MA	Massachusetts	97.1	97.6
MI	Michigan	84.8	92.1
MN	Minnesota	65.9	75.8
MS	Mississippi	19.4	28.3
MO	Missouri	65.5	70.6
MT	Montana	58.2	70.7
NE	Nebraska	61	70.5
NV	Nevada	76.2	80.8
NH	New Hampshire	84.9	87
NJ	New Jersey	95.8	96.6
NM	New Mexico	39.8	49.2
NY	New York	94.5	96.4
NC	North Carolina	40.8	54.4
ND	North Dakota	41.6	53.8
OH	Ohio	85.2	90.6
OK	Oklahoma	45.3	55.1
OR	Oregon	79.5	85.8
PA	Pennsylvania	89.5	92.3
RI	Rhode Island	97.3	97.7
SC	South Carolina	34.3	46.2
SD	South Dakota	44.4	56.6
TN	Tennessee	42	50.9
TX	Texas	*	59
UT	Utah	88.4	93.9
T	Vermont	71.9	80.2
VA	Virginia	50.5	60.6
WA	Washington	86.3	90.9
WV	West Virginia	63.4	69.1
WI	Wisconsin	74.5	83.9
WY	Wyoming	60	70.9

*No data.

Evaluation of the hypothesis

To evaluate the hypothesis, I examined mortality in US populations with and without residential electrification. Vital statistics tabulations of deaths [6], US census records for 1920–1970 [7], and historical US documents [8,9] were examined in hard copy or downloaded from the internet. The same state residential electrification data used in the childhood leukemia study [1] was used in this study. Crude death rates were calculated by dividing number of deaths by population at risk, and death rates by state were then correlated with electrification rates by state using downloaded software [10]. Time trends of death rates for selected causes

of death by state were examined. Most rates were calculated by state for urban and rural residence for whites only in 1940 deaths, since complete racial data was available by urban/rural residence by state for only 13 of 48 states. Data was available for 48 states in the 1940 mortality tabulations. District of Columbia was excluded because it was primarily an urban population. Excel graphing software [11] and "Create a Graph" [12] software was used.

I had hoped to further test this hypothesis by studying mortality in individual US farms with and without electrification, when the 1930 US census 70 year quarantine expired in 2000. Unfortunately, the 1930 US farm census schedules had been destroyed.

Findings

Rural residential electrification did not reach urban levels until 1956 (Table 1). Table 2 shows the level of residential electrification for each state for 1930 and 1940. In 1930 and 1940 only 9.5% and 13%, respectively, of all generated electricity was used in residences. Most electricity was used in commercial and industrial applications.

Figs. 1–4 were copied and scanned from "Vital statistics rates in the United States 1940–1960", by Robert Grove Ph.D. and Alice M. Henzel. This volume was published in 1968. Fig. 1 shows a gradual decline in the all causes death rate from 1900 to 1960 except for a spike caused by the 1918 influenza pandemic. Death rates due to tuberculosis, typhoid fever, diphtheria, dysentery, influenza and pneumonia and measles all fell sharply in this period, and account for most of the decline in the all causes death rate. Figs. 2–4 show that in the same time period when the all causes death rate was declining, all malignant neoplasms (Fig. 2), cardiovascular diseases (Fig. 3), and diabetes (Fig. 4) all had gradually increasing death rates. In 1900, heart disease and cancer were 4th and 8th in a list of 10 leading causes of death. By 1940 heart disease had risen to first and cancer to second place, and have maintained that position ever since. Table 3 shows that for all major causes of death examined, except motor vehicle accidents, there was a sizable urban excess in 1940 deaths. The authors of the extensive 69 page introduction to the 1930 mortality statistics volume noted that the cancer rates for cities were 58.2% higher than those for rural areas. They speculated that some of this excess might have been due to rural residents dying in urban hospitals. In 1940, deaths by place of residence and occurrence are presented in separate volumes. In 1940 only 2.1% of all deaths occurred to residents of one state dying in another state. Most non-resident deaths were residents of other areas of the same state. Table 4 presents correlation coefficients for the relationship between death rates by urban rural areas of each state and the percent of residences in each state with

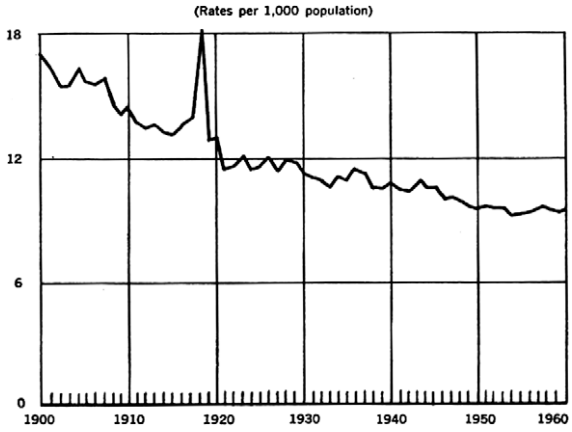

Fig. 1. Death rates: death registration states, 1900–32, and United States, 1933–60.

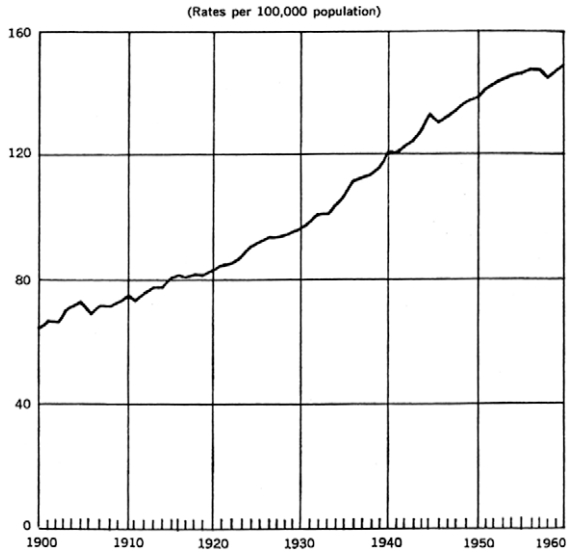

Fig. 2. Death rates for malignant neoplasms: death registration states, 1900–32, and United States, 1933–60.

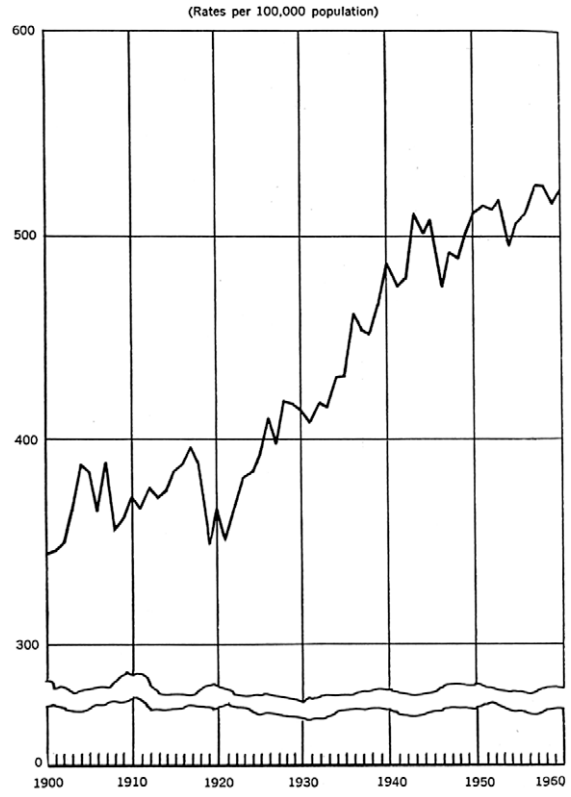

Fig. 3. Death rates for major cardiovascular renal diseases: death registration states, 1900–32, and United States, 1933–60.

electric service. In 1940 urban and rural residence information was not available for individual cancers as it was in 1930, but death rates for each cancer were available by state. They were used to calculate correlations between electric service by state and respiratory cancer, breast cancer and leukemia mortality.

All causes of death

There was no correlation between residential electrification and total death rate for urban areas, but there was a significant

correlation for rural areas ($r = 0.659$, $p = <0.0001$). Fig. 5 shows the 1940 resident white death rates for urban and rural areas of states having greater than 96% of residences electrified and states having less than 50% of residences electrified. In the highly electrified states, urban and rural death rates were similar, but in low electrification states, the urban death rates were systematically higher than the rural death rates. The urban death rates were similar in both high and low electrification states.

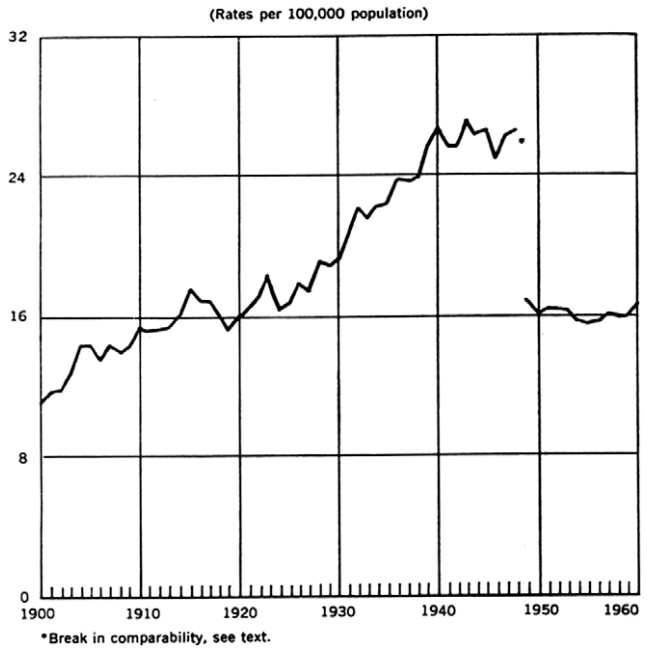

Fig. 4. Death rates for diabetes mellitus: death registration states, 1900–32, and United States, 1933–60.

All malignant neoplasms

In 1940, the urban total cancer rate was 49.2% higher than the rural rate. Both urban and rural cancer deaths rates were significantly correlated with residential electrification. Fig. 6 shows the 1940 resident white total cancer rates for urban and rural areas of states having greater than 96% of residences electrified and states having less than 50% of residences electrified. Four of the five high electrification states had similar urban and rural total cancer rates, while all the low electrification states had urban rates about twice as high as rural rates. Both urban and rural total cancer rates were lower in low electrification states than in high electrification states. Fig. 7 shows the time trend of the total cancer rate between 1920 and 1960 for Massachusetts (1940 electrification rate = 97.6%) and Louisiana (1940 electrification rate = 48.9%). The Massachusetts cancer rate was about twice that of Louisiana between 1920 and 1945. The Massachusetts rate leveled off in 1945, but the Louisiana rate increased steadily between 1920 and 1960. A declining urban–rural gradient for cancer is still evident in 1980–1990 US cancer incidence data [13]. Swedish investigators [14] have reported increasing cancer mortality and incidence time trend breaks in the latter half of the 20th century.

Table 3
1940 US white resident crude death rates per 100,000 by urban/rural residence.

Cause of death	ICD No.[a]	Urban rate	Rural rate	(%) Urban excess
All	1-200	1124.1	929.5	20.9
All cancers	47-55	145.8	97.7	49.2
Coronary disease	94	92.4	69.1	33.7
Other diseases of heart	90b,91,92a,d,e 93a,b,d,e 95a,c	217.0	162.8	33.3
Diabetes	61	33.2	20.0	66.0
Suicide	163-164	17.1	13.2	29.5
Motor vehicle accidents	170	26.6	26.3	1.1

[a] 1938 Revision International classification of disease.

Table 4
Correlation coefficients (r) 1940 crude US death rates by state by electrification for white resident deaths.

Cause	ICD No.[A]	Residence	r	r^2	p One tailed	Slope	Y intercept
All causes	1-200	Urban	0.083	0.007	0.285	0.007	11.114
		Rural	0.659	0.434	<0.0001	0.070	4.185
All cancers	45-55	Urban	0.667	0.445	<0.0001	0.883	75.970
		Rural	0.758	0.575	<0.0001	1.502	−10.040
Respiratory cancer[B]	47	State	0.611	0.374	<0.0001	0.071	1.020
Breast cancer female	50	State	0.794	0.630	<0.0001	0.170	−1.506
Diabetes	61	Urban	0.666	0.444	<0.0001	0.278	8.168
		Rural	0.693	0.480	<0.0001	0.366	−6.184
Leukemia[B]	72a	State	0.375	0.140	0.0042	0.021	1.980
Coronary artery	94	Urban	0.400	0.160	0.0024	0.494	61.570
Disease		Rural	0.781	0.610	<0.0001	1.252	25.319
Other diseases of the heart	90b, 91	Urban	0.449	0.202	0.0006	1.236	100.35
	92a,d,e 93a,b,d,e 95a,c	Rural	0.799	0.639	0.0001	2.887	−48.989
Suicide	163-4	Urban	0.077	0.006	0.2993	0.028	16.235
		Rural	0.729	0.532	<0.0001	0.181	0.299
Motor vehicle	170	Urban	−0.254	0.064	0.0408	−0.171	44.572
Accidents		Rural	0.451	0.203	0.0006	0.195	12.230

[A] International classification of diseases 1938 revision.
[B] Age adjusted death rate both sexes.

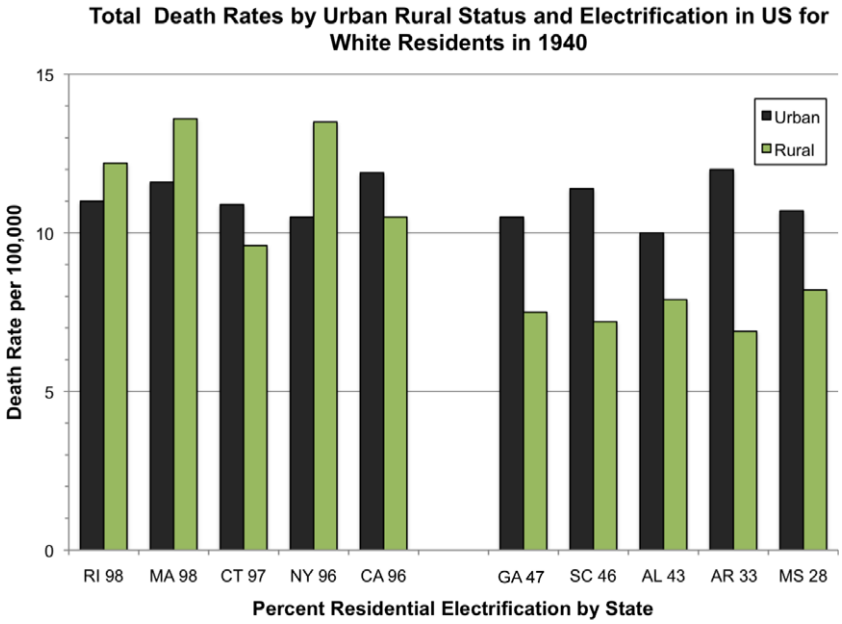

Fig. 5. All causes death rates by urban rural status and electrification in the US for white residents in 1940.

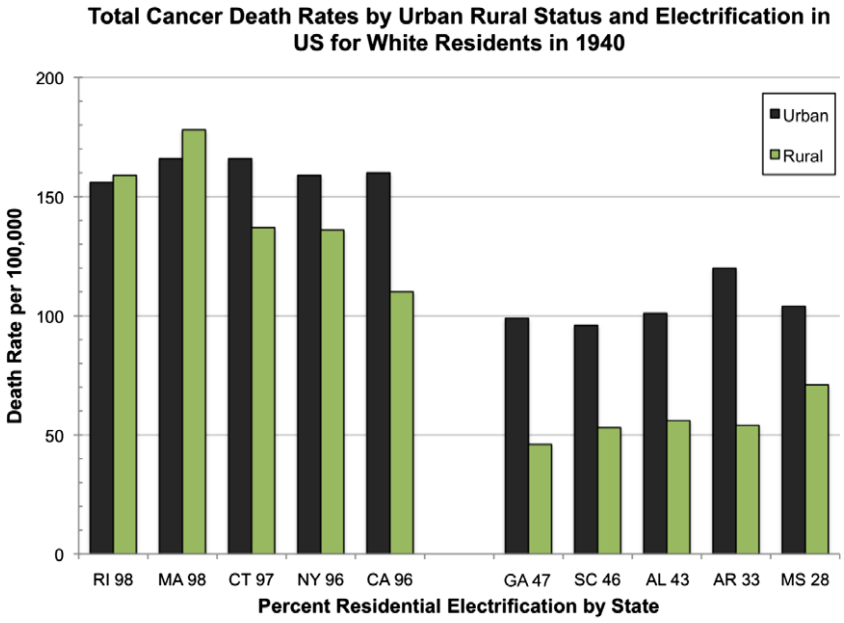

Fig. 6. Total cancer death rates by urban rural status and electrification in the US for white residents in 1940.

Respiratory cancer

No urban rural information was available for respiratory cancer, but the correlation between residential electrification and state death rates was $r = 0.611$; $p = <0.0001$. This cancer is etiologically strongly related to cigarette smoking, so the correlation with electrification is surprising. A large electrical utility worker cohort study found a high respiratory cancer incidence related to high frequency EMF transient exposure independent of cigarette smoking with a significant dose–response relationship [15].

Breast cancer

Although urban/rural information was not available for breast cancer, the 1940 state breast cancer death rates have a correlation of $r = 0.794$; $p = <0.0001$ with residential electrification. Fig. 8 shows the typical time trend of breast cancer death rates for a state with a high level of electrification (96%) and one with a low level of electrification (<50) in 1940. The California breast cancer death rate increased from 1920 to 1940, and then gradually decreased until 1960. The Tennessee breast cancer death rate is less than half of the California rate in 1920 and continues a steady increase until 1960.

Diabetes

This cause has a 66% urban excess. In spite of this, the correlation coefficients for urban and rural areas are similar at $r = 0.66$; $p = <0.0001$. There is some animal and human evidence that EMFs can effect insulin production and blood glucose levels [16]. Fig. 9

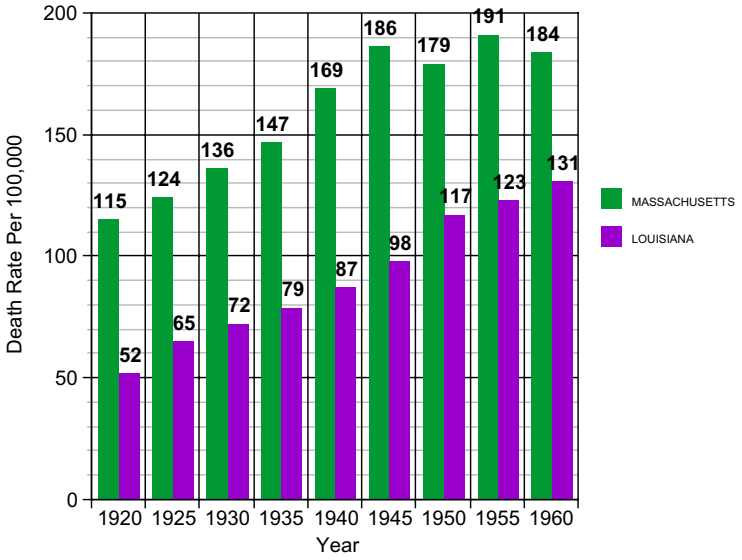

Fig. 7. US white resident total cancer death rates for Massachusetts (97.6% elect.) and Louisiana (48.9% elect.) by year.

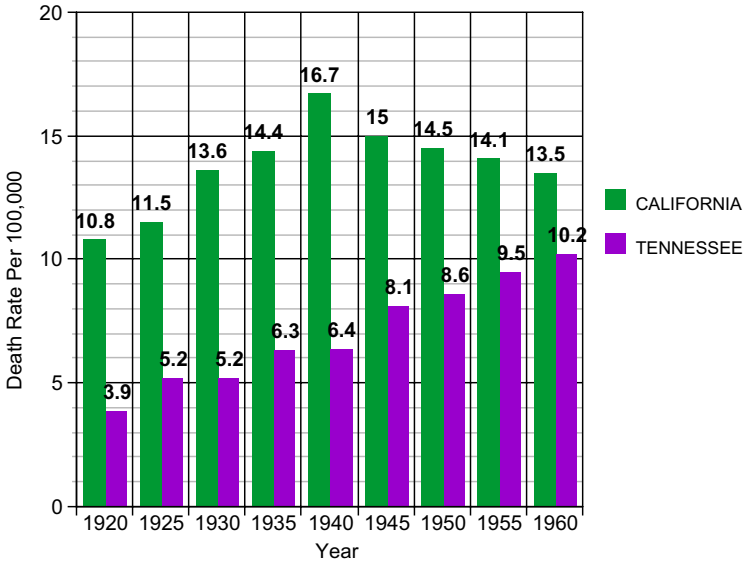

Fig. 8. US white resident breast cancer death rates for California (96% elect.) and Tennessee (50% elect.) by year.

shows that in states with low levels of electrification in 1940, the urban diabetes death rates are consistently higher than the rural rates, but are always lower than the urban and rural rates in the high electrification states.

Leukemia

Since the childhood leukemia age peak is strongly associated with residential electrification, it was interesting that the all leukemia death rate correlation was $r = 0.375$; $p = 0.0042$. Most of these deaths are in adults and are of different types of leukemia. A study of amateur radio operators showed a selective excess only of acute myelogenous leukemia [17].

Coronary artery disease and other heart disease

These two cause groups had the same percentage urban excess (33%), and very similar patterns of urban and rural correlation coefficients with residential electrification. The urban correlations were about $r = 0.4$ and rural deaths had correlations of 0.78 and 0.79, respectively. Fig. 10 shows the 1940 resident white coronary artery disease death rates for urban and rural areas of states having greater than 96% of residences electrified and states having less than 50% of residences electrified. Four of the five high electrification states had similar urban and rural total cancer rates, while all the low electrification states had urban rates about twice as high as rural rates. Urban and rural coronary artery death rates were lower in low electrification states than in high electrification states.

Suicide

The urban suicide death rate is about 30% higher than the rural rate. The urban suicide rate is not correlated with residential electrification ($r = 0.077$; $p = 0.299$), but the rural death rate is correlated with 1940 state residential electrification levels ($r = 0.729$; $p = <0.0001$). Fig. 11 shows the 1940 resident white suicide for

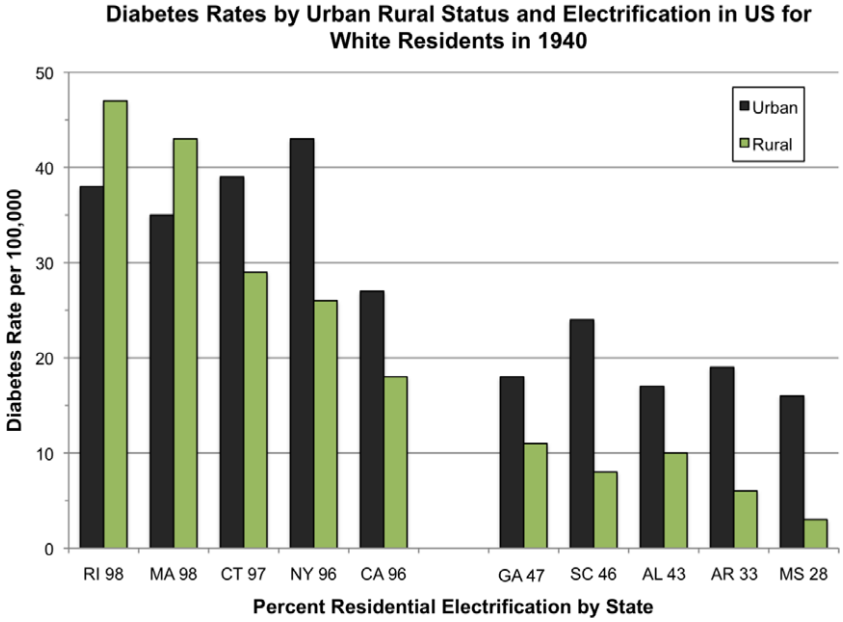

Fig. 9. Total diabetes rates by urban rural status and electrification in the US for white residents in 1940.

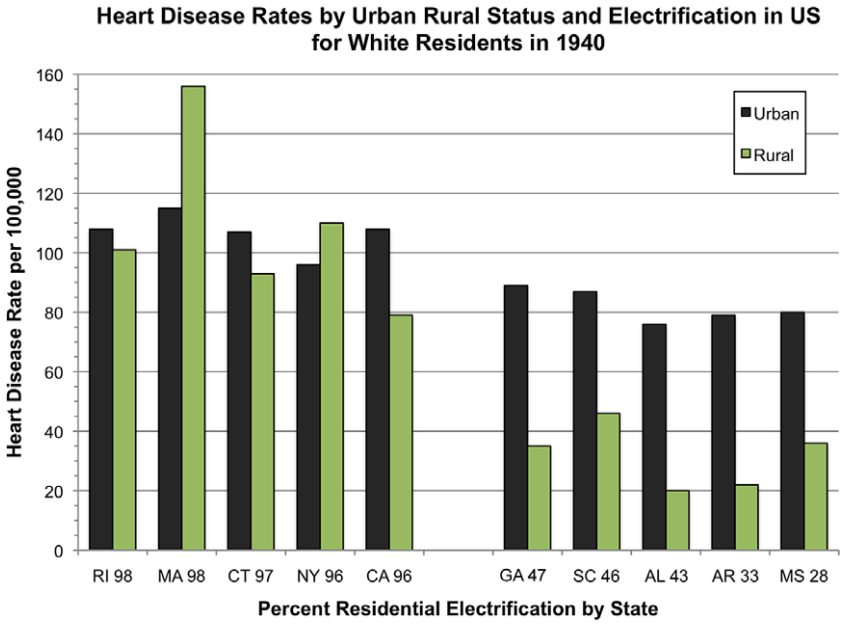

Fig. 10. Total heart disease rates by urban rural status and electrification in the US for white residents in 1940.

urban and rural areas of states having greater than 96% of residences electrified and states having less than 50% of residences electrified. In four of five high electrification states, rural suicide rates are higher than the urban rates. In all of the low electrification states, the urban rate is higher. The rural rates in the high electrification states are higher than the rural rates in the low electrification states. Fig. 12 shows X Y scatter plots for urban and rural suicide by electrification for 48 states. Suicide has been associated with both residential [18] and occupational [19] EMF exposure. Suicide is probably the visible peak of the clinical depression iceberg.

Motor vehicle accidents

Although the mortality rates are similar in urban and rural areas, the correlations with residential electrification levels are different. There is a slight negative correlation ($r = -0.254$) in urban areas and a positive correlation ($r = 0.451$) in rural areas. Since motor vehicle fatality is related to access to a vehicle and to speed. It may be that in the larger cities it was difficult to go fast enough for a fatal accident, and in rural areas especially on farms, a farmer who could afford electrification could also afford a car.

Discussion

When Edison and Tesla opened the Pandora's box of electrification in the 1880s, the US vital registration system was primitive at best, and infectious disease death rates were falling rapidly. City residents had higher mortality rates and shorter life expectancy than rural residents [8]. Rural white males in 1900 had an expectation of life at birth of over 10 years longer than urban residents.

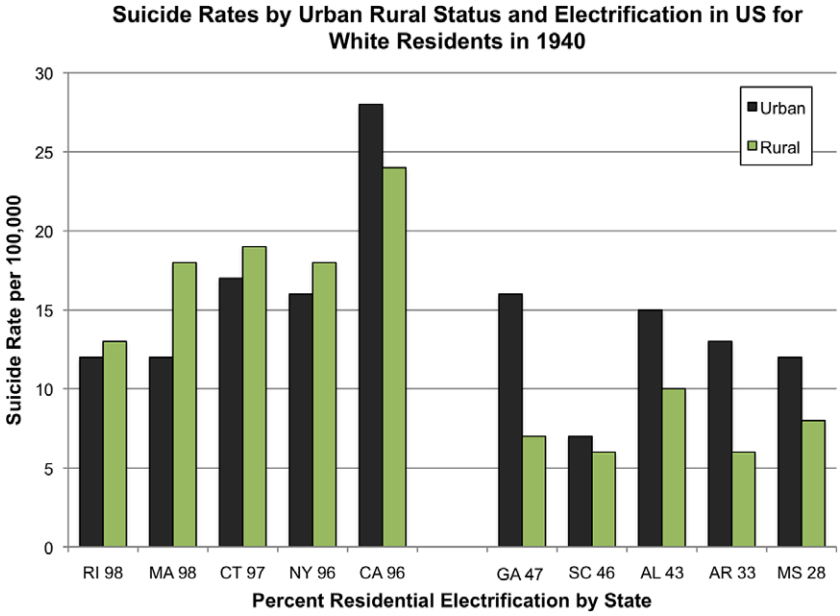

Fig. 11. Total suicide death rates by urban rural status and electrification in the US for white residents in 1940.

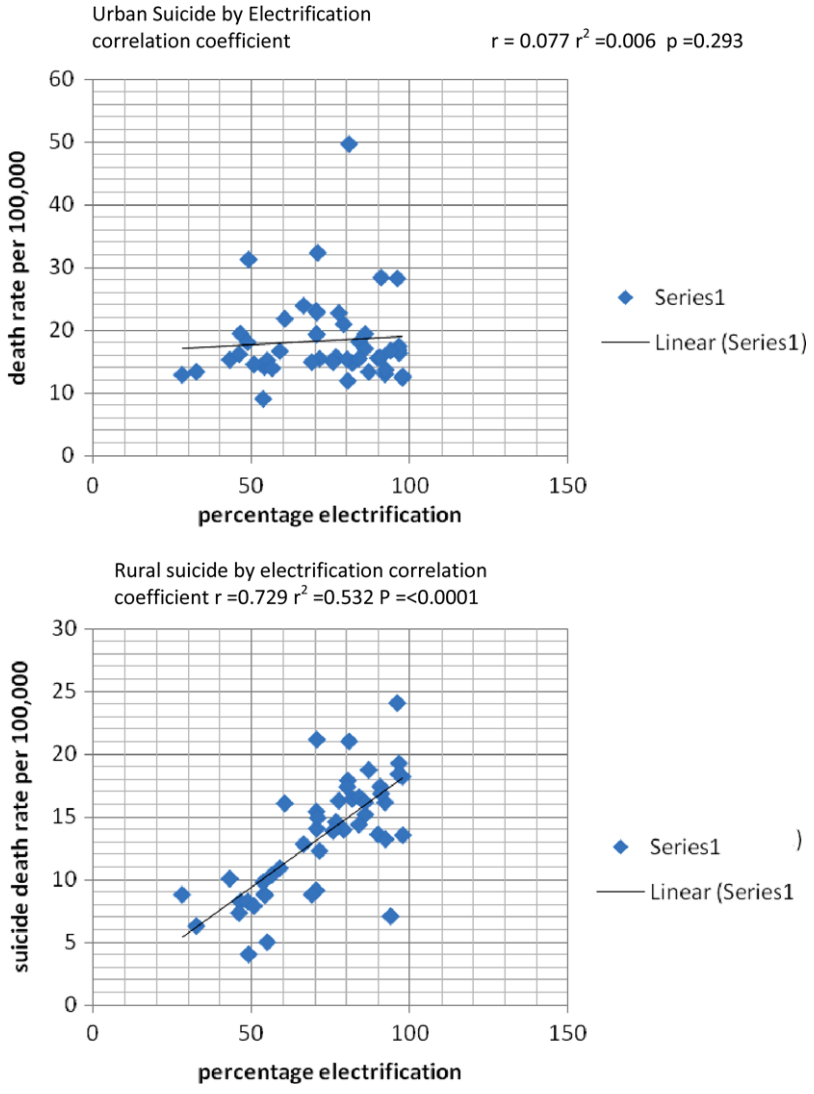

Fig. 12. 1940 US white resident urban rural suicide death rates by state and electrification.

Although the authors of the 1930 US vital statistics report noted a 58.2% cancer mortality excess in urban areas, it raised no red flags. The census bureau residential electrification data was obviously not linked to the mortality data. Epidemiologists in that era were still concerned with the communicable diseases.

Court Brown and Doll reported [20] the appearance of the childhood leukemia age peak in 1961, forty years after the US vital statistics mortality data on which it was based was available. I reported a cluster of childhood leukemia [21] a decade after it occurred, only because I looked for it. Real time or periodic analysis of national or regional vital statistics data is still only rarely done in the US.

The real surprise in this data set is that cardiovascular disease, diabetes and suicide, as well as cancer seem to be strongly related to level of residential electrification. A community-based epidemiologic study of urban rural differences in coronary heart disease and its risk factors was carried out in the mid 1980s in New Delhi, India and in a rural area 50 km away [22]. The prevalence of coronary heart disease was three times higher in the urban residents, despite the fact that the rural residents smoked more and had higher total caloric and saturated fat intakes. Most cardiovascular disease risk factors were two to three times more common in the urban residents. Rural electrification projects are still being carried out in parts of the rural area which was studied.

It seems unbelievable that mortality differences of this magnitude could go unexplained for over 70 years after they were first reported and 40 years after they were noticed. I think that in the early part of the 20th century nobody was looking for answers. By the time EMF epidemiology got started in 1979 the entire population was exposed to EMFs. Cohort studies were therefore using EMF-exposed population statistics to compute expected values, and case-control studies were comparing more exposed cases to less exposed controls. The mortality from lung cancer in two pack a day smokers is over 20 times that of non-smokers but only three times that of one pack a day smokers. After 1956, the EMF equivalent of a non-smoker ceased to exist in the US. An exception to this is the Amish who live without electricity. Like rural US residents in the 1940s, Amish males in the 1970s had very low cancer and cardiovascular disease mortality rates [23].

If this hypothesis and findings outlined here are even partially true, the explosive recent increase in radiofrequency radiation, and high frequency voltage transients sources, especially in urban areas from cell phones and towers, terrestrial antennas, wi-fi and wi-max systems, broadband internet over power lines, and personal electronic equipment, suggests that like the 20th century EMF epidemic, we may already have a 21st century epidemic of morbidity and mortality underway caused by electromagnetic fields. The good news is that many of these diseases may be preventable by environmental manipulation, if society chooses to.

Conflicts of interest statement

None declared.

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