Lewin Survey Finds Large Optometry Surpluses
An Editorial Analysis

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Lewin Finds

Optometrists Total 39,600 in 2012
Optometry Surplus of 12,672 in 2012
Future Shortages of Ophthalmologists
Replacing Ophthalmologists with Optometrists
Still Leaves Large Optometry Surpluses
Supply of Eye Care “Providers” is “Adequate”

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The 2012 Lewin National Workforce Survey of Optometrists gathered extensive demographic data about the average optometrist’s practice.

The survey found in 2012 the average optometrist could see 32% more patients (19.8/week) without adding staff or increasing hours reserved for patient care. This was the equivalent of 12,672 full-time surplus optometrists.

Lewin next developed three eye care supply-demand models. Models 1 and 2 ignored the 2012 surplus. Model 3 did not, but assumed a future “total” eye care market in which 1.36 surplus FTE optometrists fill each 1.0 FTE ophthalmologist shortage.

Model 1 (zero 2012 OD surplus) projected a surplus of 3,100 optometrists and a shortage of 5,400 ophthalmologists by 2025.

Model 2 used all surplus optometrists to replace ophthalmology shortages which reduced the ophthalmology shortage from 5,400 to 4,300 in 2025.

Model 3 recognized the 2012 surplus of 12,672 FTE optometrists and projected OD surpluses would fall to 4,400 FTE by 2025 if all ophthalmology shortages were filled with surplus optometrists and demand for eye care increased significantly. If optometrists did not fill all ophthalmology shortages and demand did not increase, the 2025 optometry OD surplus would be about 11,000 FTE.

The OD surpluses and OMD shortages will continue to increase until 2045.

All three Lewin Models are seriously flawed. But the 2012 surplus of 12,672 FTE optometrists found by the Lewin Survey must be addressed to mitigate its damaging effect on younger optometrists burdened by student loan debt.

The Survey found that of those under age 30, 65% practiced at two or more locations as did 40% of those aged 30 to 39. In fact, 11.5% of those under the age of 30 practiced at four locations.
Despite its flawed manpower models, the Lewin Survey report itself provided much needed data on the extent of the optometry surplus and its effect on younger optometrists. That Survey was the first to document there is a surplus of optometrists and to evaluate its impact on younger practitioners as shown by the high percentages of younger optometrists attempting to practice full-time by piecing together two or more part-time practice sites.

But Lewin’s total eye care supply and demand model, that uses the optometry surplus to replace future shortages of ophthalmologists, is highly implausible as explained in this analysis, as it assumes all future shortages of ophthalmology care will be provided by optometrists at the rate of 1.36 optometrists providing the same services as one ophthalmologist.

In the total eye care supply and demand Model 3, Lewin shows a surplus in 2012 of 12,672 optometry FTE that could only decline by 2025 to a surplus of about 4,400 if:

- All ophthalmology shortages are filled by optometrists.
- There is a large future increase in demand for eye care.

The author believes it more likely the current surplus will grown rather than decline by 2025 due to the untenable nature of the above assumptions.

Finally, thought must be given to the nature of the optometry surplus. The 2012 surplus of 12,672 is distributed across some 40,000 ODs and Lewin’s assumption this surplus FTE pool will be tapped to replace ophthalmology services and thus reduce optometry surpluses somewhat, ignores market place realities and licensing laws.

While a portion of ophthalmology shortages may be filled from the optometry surplus, it is likely those shortages will be filled by greater efficiencies, enhanced technical means and support practitioners affiliated with medical physicians and ophthalmologists. The surplus optometrists will likely remain as entropy within the “optometry market”, in competition with other optometrists which, due to population growth rates of only 0.87% per year, will produce increasing difficulties for younger practitioners attempting to establish viable independent office-based practices.
**Lexicon**

ACA  Affordable Care Act (Obama Care)

CHI  Children’s Health Insurance

Diabetes Demand  Expected demand for eye care due to its complications

OD = An optometrist

OMD = An ophthalmologist

ODe = A surplus optometrist providing all services of an ophthalmologist at the rate 1.36 ODe FTE = 1.00 OMD FTE.

Lewin Models 2 & 3 solve future shortages of OMDs by assuming they are all replaced by ODe FTE. A 1.00 OMD FTE shortage is replaced by (1.36) x (1.00 OMD FTE) = 1.36 ODe FTE using surplus optometry FTE.

Optometrist Defined FTE = In Lewin manpower Models 2 and 3, a hypothetical “total eye care market” is used in which ophthalmology supply and demand is converted into equivalent optometry supply and demand and all shortages of ophthalmologists are filled using surplus optometry FTE. The author uses ODe to refer to surplus optometrist FTE used by Lewin to fill ophthalmology shortages. See below.

D = Density = Numbers of optometrists per 100,000 population

Supply OD FTE = An average OD treating 2,956 patients per year

Supply OMD FTE = An average OMD treating 4,027 patients per year

Supply ODe FTE = A surplus OD FTE seeing 2,956 OMD patients per year in place of an ophthalmologist [4,027/2,956 = 1.36]
Demand OD FTE = Demand for OD treatments in OD FTE

Demand OMD FTE = Demand for OMD treatments in OMD FTE

Demand ODe FTE = Demand for OMD treatments using ODe FTE surplus at the rate 1.36 ODe FTE = 1.0 OMD FTE.

Surplus = The amount by which the supply of manpower exceeds the amount of manpower required to equal, or match, the demand or need for that manpower. Lewin measures supply, demand and surplus in “Optometry Defined FTE” in its Model 2 and 3 “total eye care markets”, in which an OD is assumed to supply the same services as an OMD except at the lower rate per year of 2,956 patients.

a, 1 OD FTE = services of one OD at rate of 2,956 patients per year
b, 1 OMD FTE = services of one OMD at rate of 4,072 patients per year
c, 1 Optometry Defined FTE= services of one OD = 1/1.36 = 0.74 Optometry Defined FTE = 2,956 ophthalmology or optometry patients per year.

FTE Surplus or Shortage

The surplus, or shortage, of ODs or OMDs expressed in FTEs of supply and demand for each respective provider type. ODe FTE denotes surplus OD FTE used to fill ophthalmology FTE. 1 ODe FTE = 1 OD FTE = 0.74 OMD FTE.

Surplus OD FTE Supply

Lewin’s optometry survey determined an average OD in 2012 could see 19.8 (32%) additional patients/week without additional patient care hours, staff or equipment. This “excess capacity” totaled 12,672 OD FTE in 2012.

Lewin’s Models 1 and 2 assumed the supply of OD FTE in 2012 equaled (matched) demand: ie, there was no surplus of optometrists in 2012.

Lewin’s Model 3, however, used the 2012 surplus OD FTE to fill all ophthalmology shortages which still leaves large future OD surpluses.
The driving force behind current surplus numbers of practicing optometrists began around 1990 as schools began to enlarge their enrollments and new schools began to open. Surpluses first began to appear around 1995.

For decades, the density $D$, of optometrists per 100,000, had been at about 10.0 but, by 1997, had reached 11.5 and then 12.8 at the time of the 2012 Lewin National Optometry Survey. This was a 28% increase in numbers of optometrists per 100,000 since 1997, which correlates well with the Lewin finding of a 32% “optometry excess capacity” in 2012. The small difference between 28% and 32% indicates there was “excess capacity” already present in 1997 as the Abt. Survey at that time did not ask optometrists how busy they were and merely assumed supply equaled demand at $D=11.5$.

The two projections of $D$ beyond 2015 reflect graduation rates of 1,700 or 1,900 per year. Lewin assumed a future rate of 1,800 per year which will result in $D$ reaching 16.0. The author believes these future $D$ values will create still larger surpluses of optometrists after Lewin’s end point of 2025.
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Introduction

A: The Three Lewin Manpower Models.

Understanding the Lewin Eye Care Workforce Study requires careful study because Lewin employs three different, flawed, supply-demand models and makes varying, often unrealistic assumptions which require the reader to pay strict attention as to which projections correspond to which assumptions.

Only Model 3 recognizes an optometrist surplus in 2012, as Models 1 and 2 assume OD supply exactly equaled optometry demand in 2012.

**Model 1** assumes zero optometry surpluses in 2012 and projects separate supply-demand data for optometrists and ophthalmologists that show a future OD surplus of 3,100 FTE and a 5,400 FTE OMD shortage in 2025. [Figures 1, 2 and 3 below]

Figure 1 shows Lewin’s projected numbers of optometrists and resulting lower net FTE by Lewin assuming future entering optometrists would see fewer patients, a questionable assumption since entering optometrists have always seen fewer patients. As a result the Lewin supply projection is not compatible with other studies and underestimates future surpluses.
Figures 2-3 show Lewin Model 1 projections of an optometry surplus of 3,100 FTE and an ophthalmology shortage of 5,400 FTEE by 2025. They each assume zero optometry and ophthalmology surpluses in 2012.
Model 2 converts Model 1 data, implausibly, into a “total eye care market” in which one ophthalmologist FTE provides the same type, and quantity, of patient care as 1.36 FTE optometrists. [Figure 4.]

After converting ophthalmologists into optometrists, Model 2 adds them to the optometry supply to give a “total eye care supply” in “optometry defined FTE”. Total eye care demand is similarly determined by multiplying ophthalmology FTE demand by 1.36 and adding it to optometry FTE demand to give total eye care demand in “optometry defined FTE”.

Model 2 combines the Model 1 optometry and ophthalmology supply and demand into a total eye care market supply and demand on the basis 1.36 OD FTE optometrists equal 1.00 OMD FTE.

Total eye care supply = 46,900 ODs + 1.36 x (15,100 OMDs) = 67,500 OD defined FTE.

Total eye care demand = 43,800 ODs + 1.36 x (20,500 OMDs) = 71,700 OD defined FTE.

To fill the 71,700 – 67,500 = 4,200 Optometry Defined OD shortage of eye total care “providers” requires 4,200 OD FTE but the surplus of 3,100 OD FTE is 1,100 FTE short.

Model 2 uses the same data as Model 1 but, by changing ophthalmology supply and demand into “optometry defined FTE”, Model 2 projects a
shortage of 4,300 “optometry defined FTE” rather than a 3,100 FTE surplus of optometrists and a 5,400 FTE shortage of ophthalmologists in 2025.

The reader is left to wonder why Lewin invented this model which does not project optometry and ophthalmology supply-demand curves but total supply-demand curves of a theoretical “total eye care market” in which one “Optometry Defined FTE” stands for either 0.74 OMD FTE or 1.0 OD FTE. For example, Model 2 projects a future shortage of “optometry defined FTE” in 2025 but this hides the fact this is actually a 3,100 FTE surplus of optometrists and a 5,400 FTE shortage of ophthalmologists.
Unfortunately, Model 3, (above) also converts ophthalmology supply and demand into “optometry equivalents” and adds them to optometry supply and demand FTE to produce another “total eye care market with “optometry defined FTE” supply and demand projections [Figure 5].

Model 3 is a “total” eye care market that now includes projected “total eye care demands” expected to result from future ACA, CHI and Diabetic eye care demands, recognizes the 2012 optometry surplus of 12,672 FTE and uses future surplus optometry FTE to fill all ophthalmology shortages at the rate of 1.36 OD FTE for each 1.0 OMD FTE shortage.

From Model 3, Lewin finds there is a surplus of 12,672 optometry FTE in 2012 that declines to 4,400 FTE by 2025. Lewin describes this finding as showing “there will be an adequate supply of eye care providers in the future”. [Failing to mention there will be a shortage of ophthalmologists.]

However, the reader should note that the decline of the 12,672 FTE optometry surplus in 2012 to “only” 4,400 FTE by 2025 requires that all ophthalmology shortages be filled by optometry surplus FTE in the future and that ACA, CHI and Diabetic care increases greatly in the future as shown in Model 3 above.

In the author’s opinion, the 2025 optometry surplus is more likely to be over 10,000 FTE for the following reasons.

Model 3:

- Is implausible and would be a bureaucratic nightmare to operate as it is unlikely optometrists can, and would, fill all ophthalmology shortages even if state licensing laws were changed to permit this.

- Lumps optometrists together with ophthalmologists as “total providers” which, like Model 2, obscures the fact there will be large surplus of optometrists and a large shortage of ophthalmologists from 2012 to 2025.
Is myopic by stopping its projections at 2025 since the impact of the large increase in optometry graduates will not be fully realized until about 2045, resulting in still larger optometry surpluses as density $D$ rises to 16-17. (See first Figure showing rises in optometry density.)

As a result, all Lewin Models contain serious flaws from either failing to recognize the 2012 optometry surplus (Models 1,2) or, using surplus ODs (Model 2,3) to replace all future shortages of ophthalmologists, a highly implausible assumption.

B: The 2012 Lewin National Optometry Survey

Unlike the three confusing Lewin manpower studies, the Lewin national optometry survey is clear and easy to understand upon reading. The key survey findings are the surplus of 12,672 FTE optometrists in 2012, high percentages of young optometrists practicing at multiple sites and almost universal dissatisfaction with income.

C: Purpose of This Analysis.

The author hopes the following detailed assessment will render the Lewin documents easier to understand and will allow readers to reach their own conclusions rather than relying upon press releases and executive summaries which appear, to the author, to “spin” the findings, and to better understand the three different manpower models and their different assumptions and conclusions.

The author found summaries of the Lewin Reports in the printed and social media to be confusing, contradictory and less than enlightening.

For example, here is a summary in a recent national ophthalmic trade paper, that results of the Lewin reports,

“Predict an adequate supply of eye care providers in the baseline market with excess of demand. However, when alternative scenarios are analyzed, an excess supply may result.”
While the 2012 Lewin Optometrist Survey is straightforward, it is not possible to understand the Lewin Eye Care Workforce projections from the press releases or executive summaries, nor even from reading the Lewin findings themselves without patience and study.

As it is likely only a few eye care policy makers, educators and practitioners will be sufficiently interested to read the Lewin reports, this paper is offered as a summary, prepared for the average practicing optometrist that aims to be impartial while offering frank opinions.

After projecting a future surplus of optometrists and shortage of ophthalmologists in its baseline manpower study (Model 1), Lewin employs Models 2 and 3 that combined all eye care providers and all eye care demand into a total market in which surplus optometry FTE will fill all projected future shortages of ophthalmologists at the rate of 1.36 OD FTE surplus replacing a 1.0 OMD FTE.

The author does not assert there is no value to these Lewin manpower projections but points out their serious weaknesses. The Lewin optometrist survey, however, contains demographic data of value to practitioners, teachers and ophthalmic suppliers. As prime example, the Survey found the average OD in 2012 was operating at only 68% of capacity.

For reasons Lewin did not explain, the word “surplus” appears nowhere in the Lewin reports. Instead, the phrases “excess capacity” or “adequate supply” are used.

Lewin’s conclusion in Model 3 that there will be an “adequate” future supply of “eye care providers” is based on Lewin assuming all shortages of ophthalmologists are filled by surplus optometry FTE.

The author believes replacing ophthalmology shortages with optometry at a ratio of 1 OMD FTE = 1.36 OD FTE is implausible due to state optometry practice laws, and impractical as well as it would require a large national, bureaucratic matching service by which ophthalmology patients could be referred to appropriate optometrists (forgetting state licensing laws).
Lewin deserves credit for using a survey instrument that asked optometrists if they could see more patients and, if so, how many (an average of 19.8 per week). To the author’s knowledge no prior national survey asked this question, including the 2000 Abt. Associates Report. Unfortunately, Lewin keeps the 2012 optometry surplus off-stage, only revealing it late, on pages 66-67 of its 71 page report, in Model 3.

The author urges readers to secure their own copies of the two Lewin Reports and hopes this paper assists them in their reading. The Reports will be mailed at no cost to any AOA member utilizing the AOA website.

**What is An Adequate Supply?**

It is, in the author’s opinion, inaccurate to describe the Lewin Report as finding there will be an “adequate” supply of eye care “providers” to meet future eye care demands as this will be the case only if there are sufficient numbers of surplus optometry FTE to fill all ophthalmology shortages and that state laws will permit optometrists to offer ophthalmology care.

But, by making this assumption, Lewin is admitting there was a 12,672 optometry surplus in 2012 since it uses this surplus to fill ophthalmology shortages in its Model 3.

Lewin makes this assumption within its “total eye care Model 3 which interchanges OD and OMD FTE, replaces OMD shortages with ODs and includes the optometry surplus of 12,672 in 2012.

But when OD and OMD supply-demand needs are considered separately, matching apples with apples and oranges with oranges (Model 1), there is a future large OD surplus and a large OMD shortage.

An “adequate supply” can be any number of providers that equals or exceeds (by any amount), total demand on those providers for eye care. Adequate is therefore ambiguous as it can describe a wide range of surpluses.

A “surplus”, while adequate to match demand, denotes more providers available than needed to equal match demand. It represents wasted manpower.
Origin of Lewin Study:

In 2011 the American Optometric Association (AOA) and the Association of Schools and Colleges of Optometry (ASCO) commissioned the Lewin Group, Inc. to conduct a demographic national survey of US optometrists and prepare an eye care manpower study based upon that national survey.

The reports, entitled below, were released in May and June, 2014.


2: Eye Care Workforce Study: Supply and Demand Projections.

Understanding these reports is important and both, with a separate Executive Summary, are available free, shipped at no charge, to all AOA members.

Funding for the Lewin study was provide by seven major ophthalmic firms and an AOA-ASCO Workforce Study Project Team and an AOA-ASCO Workforce Study Expert Panel provided support and guidance during the course of the study. The Lewin reports were scheduled for release in 2013 but were delayed to 2014 due to what were described to the author as “serious problems”.

An earlier report by the author, on the impact of increased enrollments at schools of optometry upon the optometry supply density was published at www.charlesmullen.com. That study showed optometry density D had risen from a historic level of about 10.0, to 12.8 by 2012 and rising thereafter.

The Lewin Workforce Survey of Optometrists

Lewin mailed a four-page survey instrument to 4,000 randomly selected, actively practicing optometrists. The response rate was 18% and, after adjustments to ensure equitable representative of age, gender and location, a final sample of 721 respondents resulted.
This cohort of 721 was 40% female and 60% male and Lewin reported a total of 6,289 enrolled optometry students for academic year 2011-2012, or an average class size of 1,572.

There is a wealth of information in the Lewin survey but only those findings relevant to the Lewin Eye Care Workforce Study are shown below.

1. Average hours practicing per week was 40.7 with 33.5 of those hours reserved for direct patient care (face-to-face).

2. On average, 34% of optometrists practiced at 2 or more locations. For those aged 30-39 it was 40% and for those over age 65 it was 20%.

3. The average optometrist saw 62 patients per week. This equates to 12.5 per day or 1.8 per hour.

4. Employed optometrists averaged 68 patients per week while self-employed optometrists saw 53 patients per week.

5. An average “excess capacity” per optometrist to see an additional 19.8 (32%) patients per week within existing patient hours was found.

   Page 19: “Overall, optometrists indicated that they had, on average, additional capacity for 19.8 patient visits per week. This suggests excess capacity of about 32%. (Note that this reflects existing capacity considering the respondents current number of hours worked that are devoted to patient care.).”

   Page 31: “On average, optometrists reported that they have the capacity to provide about 19.8 additional patient visits per week within the context of their current hours of work in patient care activities.”

6. The survey of income found 87% of optometrists were not satisfied with their practice income or compensation.

7. On average, 20% of responding optometrists practiced at a site affiliated with a regional or national retail optical company.
Key Finding of Lewin Survey

It is customary in health care supply and demand studies to use FTE (Full Time Equivalent) to measure supply and demand. One supply FTE represents the services an average clinician can provide in one day [as currently utilized] and demand FTE is the amount of services in provider FTE demanded by patients.

What does the statement “supply equals demand” mean?  Care must be taken because “supply equals demand” is not the same as “supply meets demand”.

If shoppers at a grocery store find every food item on their list, they say supply equals demand, but could be wrong.

If shoppers leaving see bins of rotting food, they could conclude supply did not equal demand but had met demand with a surplus of supply unused.

Lewin’s Model 1 shows optometry supply equaled demand in 2012 since its supply and demand lines touch for year 2012. That is, Lewin Model 1 assumed no optometry surplus in 2012 despite the survey finding.

Lewin calculated the total number of patients seen annually by responding optometrists and divided that number by the number of respondent FTE, yielding 2,956 patient visits (face-to-face) per year per OD FTE. But that data can not determine if demand equaled supply as it is only a report that, in 2012, X number of optometrists saw Y number of patients. That data reveals nothing about whether there was a surplus of supply.

This type of data can only indicate the supply X met the demand made by Y patients unless the providers were asked if they were fully utilized.

This situation also existed with the Abt. report in 2000 that assumed no surplus of optometrists in 1997 but offered no evidence to support the assumption. Lewin made this same assumption in its Models 1a,b and 2a.
By definition, a survey that counts the number of providers, totals up the number of patients seen by them and computes average patients seen per FTE per year can not state supply equaled demand.

When Abt. made the assumption supply equaled demand in 1997, \( D \) was **11.5** and in 2012 \( D \) was **12.8** when Lewin also assumed supply equaled demand in 2012 in Models 1 and 2.

But \( D \) had been rising each year, from under **10** in 1970, to **12.8** by 2012 and is on a path to eventually peak at **16-17** (if no more schools open).

For the last 20 years, the author has heard a rising drum beat about a surplus from practicing optometrists, which led the author to track optometry density \( D \) since the 1960s (page 4) and to project future values from rising enrollments. This gave the alarming result \( D \) was on a path to reach **16-17**.

**Lewin Survey Revealed 2012 Optometry Surplus**

Fortunately, and to its credit, Lewin did have the data to determine if a surplus existed in 2012 but did not, for some reason, use it in Model 1a,b,c, and Model 2, which show supply equaling demand in 2012. In the author’s opinion, the most important fact resulting from the Lewin survey is the finding the average optometrist had an “excess capacity” of 19.8 patients per week, which is a surplus of optometry supply of 32% or a surplus of up to 12,672 optometrist FTE in 2012.

Question #9 of the Lewin survey was:

“Considering the total visits provided in item 8d, if you were fully booked with zero no-shows, how many additional (if any) visits could you have personally provided per week? That is, what is your excess capacity for additional visits per week?”

On page 19 (E. Excess Capacity) of the Survey report Lewin made these comments:

“Overall, optometrists indicated that they had, on average, additional capacity for 19.8 patient visits per week. This suggests excess capacity of
about 32%. (Note this reflects existing capacity considering the respondents current number of hours worked that are devoted to patient care.”

Lewin stated this “excess capacity” could provide a total of 37,149,838 additional optometry visits per year which equates to 12,672 OD FTE.

The author believes it correct to describe “excess capacity” as a “surplus”

**Was the 2012 optometry surplus 12,672 FTE?**

Yes and No.

A fully booked schedule always suffers from “no-shows” unless double booking is done.

When the author entered the profession it was not uncommon for ODs to schedule one-hour appointments. Lewin found the average is now 1.8 per hour in keeping with the belief optometrists are doing more, for less, in order to maintain income.

The author believes the 32% surplus supply of optometrists should be adjusted downwards for no-shows to more realistically measure the additional patients that could be seen if every OD was fully booked.

The Medical Group Management Association, in 2000, reported an average no-show rate of 5.5% and more recently reported it at 7%. An article by optometry practice advisor Gary Gerber in Optometry Management in 5-1-07 stated it was 5% for optometrists and an article at the “Optometry CEO” website is entitled “Getting Below 5%.

To be conservative, the author assumes that with a 10% no-show rate, the average OD, with a full appointment book would see an additional 19.8 x (0.9) = 17.82 patients per week rather than 19.8. These assumed no-shows reduce the 2012 surplus from 12,672 FTE to a more realistic 11,404 FTE.

[Lewin did not adjust the 2012 surplus for no-shows and assumed the full 12,672 FTE surplus supply is utilized providing OMD patient care.]
1. The Lewin surplus, correcting for no-shows, gives an effective surplus of about 11,404 optometrists in 2012. But since this analysis is based on Lewin data, it uses 12,672 for the 2012 surplus in 2012.


3. The Author’s study based on a zero surplus in 1997, but with updated graduation rates, calculated a 2012 surplus of about 5,500.

These projections for 2012 can be reconciled by assuming there already was a surplus in 1997 of about 5,000 FTE not detected by the Abt. study because it did not ask optometrists how busy they were.

Testing for a 1997 surplus of about 5,500 can be done by adding it to the Abt. projection for 2012 and the author’s study based upon Abt.

1. 2012 Abt. Surplus becomes 3,957 + 5,500 = 9,457
2. 2012 Author’s Surplus becomes 5,500 + 5,500 = 11,000
3. 2012 Lewin Surplus = 12,672 (or 11,404 effective from no-shows)

The rough agreement of these surpluses for 2012 indicates it is reasonable to believe an optometry surplus of about 5,500 was already present in 1997, as density rose from about 10 to 11.5 in 1997 and to 12.8 in 2012.

**Analysis of Lewin’s Three Manpower Projections**

**Model 1a, Baseline Optometry Supply-Demand**

Lewin Model 1a and Model 1b project separate, supply and demand, curves for optometrists and ophthalmologists from 2012 to 2025 that do not take into account the optometry 2012 surplus or future demand from ACA-CHI-Diabetes.
They assume optometry and ophthalmology supply equaled demand in 2012 (no surplus) and do not assume optometrists and ophthalmologists are interchangeable with optometrists filling vacant ophthalmology FTE.

Model 1a, projects a modest future optometrist surplus of 3,100 FTE in 2025 since it assumed no optometry surplus in 2012.

Model 1a has these problems:

a) Lewin assumed zero optometry surpluses in base year 2012 although its own survey found a 32% surplus and prior studies projected 2012 surpluses.

b) Instead of using projected head count as FTE, Lewin discounted them in the future by assuming entering future graduates will see fewer patients than the older ODs they replace. While true, this has always been the case and was taken into account by using “average” optometrists. The author believes the 2025 supply should equal 48,300 FTE instead of 46,900.

c) The surplus in 2025, using Model 1, in the author’s opinion, should be 3,100 + 1,400 = 4,500 FTE instead of Lewin’s 3,100 OD FTE.

**Model 1b, Baseline Ophthalmology Supply-Demand**

Lewin also assumed ophthalmology supply equaled demand in 2012 with 16,400 FTE ophthalmologists and projected this supply declining while demand increased such that in 2025 an ophthalmology shortage of 5,400 OMD FTE results.

**Model 1b predicts an ophthalmology shortage of 5,400 FTE ophthalmologists in 2025.**

While these findings can be questioned because they assume optometry and ophthalmology supplies equaled the demand for their services in 2012, they do compare apples with apples and oranges with oranges as they project independent supply-demand curves for optometry and ophthalmology.
But, in Model 2, and all following Lewin models, apples and oranges merge into what Lewin terms “optometry defined FTE” in a theoretical market in which shortages of ophthalmologists are filled by surplus optometrists.

**Model 2, Combined Baseline Supply and Demand**

Lewin now uses an imaginary Total Eye Care Market in which optometrists and ophthalmologists are interchangeable. By this, Lewin means that 1.36 optometry FTE is assumed able to provide the same quantity and range of care as 1.00 ophthalmology FTE.

Since Model 1 projected future ophthalmology shortages but optometry surplus, Model 2 proposes to fill those ophthalmology shortages using surplus optometrists.

Here is how Lewin blithely justified replacing ophthalmologists by optometrists in its model 2, “Total” Eye Care Market.

“We combine the baseline supply and demand for optometry and ophthalmology respectively, into one total baseline for the eye care market as a whole. As discussed earlier, while there are some services that only one type of provider offers, most eye care services can be provided by either an optometrist or ophthalmologist. Hence, there is, in that sense, one total market for eye care services. The market is described in terms of FTE optometrists. Using this measure, ophthalmology supply and demand are transformed into optometrist equivalent FTE where one ophthalmologist FTE equals the productivity of 1.36 optometrist FTEs, as described in Section IV: Methodology and Data.”

Unfortunately, the optometry surplus projected by Lewin Model 1a is too small to fill all future ophthalmology shortages in Model 2.

To try to fill the 5,400 OMD FTE shortage projected by Model 1b in 2025 requires $1.36 \times 5,400 = 7,344$ ODe (OD equivalent) FTE but Model 1a projected only a 3,100 FTE optometry surplus, which is not enough to fill all ophthalmology shortages. It reduces the optometry surplus in 2025 to zero but still leaves an ophthalmology shortage.
Using Model 2, Lewin projects a shortage of 4,300 ODe “eye care providers” by 2025, to describe the findings of Model 1 which was a 3.100 surplus of optometry FTE and a 5,400 shortage of ophthalmology FTE.

The author finds this transformation of ophthalmologists into “optometry defined FTE” implausible and impractical as fully enumerated later because, in essence, an average 1.36 OD FTE is not the same, by law, or common sense, as an average 1.0 OMD FTE.

The author uses ODe (OD Equivalent) to measure Lewin total provider FTE and demand FTE rather than using Lewin’s cumbersome term “optometry defined FTE”.

The reader should remember that 1.36 OD FTE equals 1.36 ODe FTE equals 1.0 OMD FTE. ODe is only used to keep track of those surplus ODs filling vacant ophthalmology positions.

**Lewin Model 3**  
**Total Eye Care Market**

After **ignoring** the findings of its national optometry survey of an optometrist surplus of 12,672 OD FTE in 2012, in Models 1 and 2, Lewin now includes that surplus in a Model 3 which shows a surplus of 12,672 FTE optometrists in 2012 and projects an ensuing surplus of optometrists that declines to 4,400 FTE by 2025 if all OMD shortages are filled with ODs and there is significant increased demand due to ACA, CHI and Diabetes as Lewin projects. [Figure 5]

But still, in Model 3, with surplus 2012 optometry FTE being used to fill all projected ophthalmologist shortages, and with increased demand, an optometry surplus of 4,400 FTE again remains in 2025.

And if ODs do not fill all vacant OMD positions and demand shows little increase, there will be a surplus of up to 11,744 OD FTE in 2025.

As the reader will recall, the Lewin baseline model 1 projected a 5,400 OMD FTE shortage in 2025 which, in Model 3, takes 1.36 x (5,400) or 7,344 ODe FTE to replace.
This means that if OMD shortages are not filled by ODs, the OD surplus in 2025 becomes \(4,400 + 7,344 = 11,744\) FTE.

In other words, if surplus ODs are not utilized to see ophthalmology patients, the 2025 optometry surplus will increase from 4,400 FTE up to 11,744 FTE.

**Concluding Comments on Lewin Manpower Models**

The author believes Lewin Model 2 and Model 3 that replace ophthalmologists with surplus optometrists are implausible and unworkable for these reasons:

- State optometry licensing acts, by law, do not permit ODs to provide all the treatments offered by OMDs and vary widely from state-to-state.

- An optometrist performing OMD treatments not within his or her license is subject to license revocation and liable for charges of malpractice if those treatments do not meet the standards of a medical physician eye care provider.

- The average OD office usually does not have the necessary additional ophthalmologic equipment for other than exterior segment surgical procedures or topical medical treatments. For example, diabetic retinopathy patients required fluorescence angiography studies and very few ODs have the necessary equipment, skill or interest to perform these studies or provide retinal treatments when needed.

- The average OD holds a restricted FDA schedule of legend prescriptive agents (palliative and therapeutic) due to recent FDA regulatory changes.

- There is no national system to identify and refer back-logged OMD patients to OD offices or to identify those OD offices with “excess capacity” and the appropriate skills and equipment, or interest, that
would be willing to accept these referrals. A system to perform such referrals would be a bureaucratic nightmare.

- Studies conclusively show practitioners more frequently performing a procedure have far lower morbidity and mortality than the casual operator.

- Few ODs would find the expense of additional equipment worthwhile.

- Many, if not most, OMDs would not make OD referrals of this type.

- Many ODs would not be interested in such referrals.

- A significant amount of primary medical, non-surgical, eye care is already provided by general practice, family practice physicians or ER staff as well as physician assistants rather than ophthalmologists. It is likely overburdened ophthalmologists would refer cases to them rather than optometrists.

- The most logical result of a shortage of ophthalmologists will be their development of more efficient medical eye practices including the employment of more optometry staff.

The author’s criticism of Models 2 and 3 as implausible and impractical however, does not mean they contain no useful information.

1) Model 3 recognizes the OD surplus and gives an estimate of the extent and range of the optometry surpluses. But these surpluses will be far larger than shown in Figure 5 because only a small portion of future ophthalmology shortages will be absorbed by surplus optometrist capacity.

2) The additional eye care demands in Model 3 projected from the ACA, CHI programs and higher diabetes rates may be useful to health care policy makers but remain subject to political unknowns.
3) The best projection of future eye care supply and demand would be given by a Model 1 that does not mix apples with oranges or interchange OD and OMD FTE if it were corrected to:

- Include the 2012 optometry surplus.
- Include the increased eye care demands due to ACA, etc.

That better projection shows continuing large surpluses of optometrists that, allowing for no-shows, starts at about 11,000 FTE in 2012 and remains at about 11,000 FTE by 2025 accompanied by a continuing and growing shortage of ophthalmologists in excess of 7,000 FTE in 2025.

So far, no one can predict how the eye care market will deal with these contrasting surpluses of optometrists and shortages of ophthalmologists.

The author believes this imbalance between eye care provider types poses serious problems for coming generations of optometrists and ophthalmologists and that the optometry profession must face its part of the problem rather than denying there is an optometry surplus or describing the surplus as a “opportunity” for optometry to provide general medical eye care or attempting, as some advocate, to relegate ophthalmologists into providing only ocular surgery.

Optometry and ophthalmology have distinct cultures, traditions and missions and Lewin’s assumed “total eye care market” in its models 2 and 3 are as unlikely as merging Army, Navy, Marines and Air Force personnel into one “total” military force to meet “total war fighting demand”.

**Cause of Optometry Surplus**

The table below shows that from 1985 to 2010 the number of optometry graduates increased by 30% whereas its sister health care professions stayed at steady levels. But, by 2014 the, optometry graduation rate has reached 1,600 per year and will continue to increase as recently opened schools produce graduates, eventually reaching just under 1,800 per year (but only if the additional schools under consideration are not established)

This is a total increase of 75% since 1985.
<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
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<td>15,043</td>
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<td>4,391</td>
<td>4,389</td>
<td>4,918</td>
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<tr>
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<td>589</td>
<td>650</td>
<td>528</td>
<td>347</td>
<td>491</td>
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<tr>
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<td>2,647</td>
<td>3,379</td>
<td>3,769</td>
<td>2,564</td>
<td>2,601</td>
<td>-23%</td>
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<tr>
<td>Law</td>
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<td>37,945</td>
<td>39,828</td>
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<td>43,423</td>
<td>44,345</td>
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<tr>
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<td>1,029</td>
<td>1,115</td>
<td>1,231</td>
<td>1,289</td>
<td>1,198</td>
<td>1,335</td>
<td>+30%</td>
</tr>
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</table>

For decades, optometry graduates hovered around 1,200 per year. The jump in graduates from 2005 to 2010 signaled the start of a second rapid increase in graduates that far outpaced the other medical professions (even law). It should be noted that population growth, under 1% for decades, is now at 0.87% and projected to continue to fall so growing into these increases is not possible.

For 2014, there were about 1,600 graduates, an increase of 56%. And Lewin projects graduation rates barely under 1,800 by 2018 for a total increase of 75%. (If no additional schools open.)

The Lewin supply projections are based on the current 21 schools and four additional schools that will produce graduates by 2018. But, there are two more schools being formed in Virginia and Kentucky, and three under consideration in Wisconsin, Illinois, and North Carolina.

**Why More Schools?**

Formerly, schools were established by efforts of state optometry associations to correct shortages of optometrists in their states. These profession-led efforts led state legislations to appropriate funds to found schools within state-supported universities. For example, the State University System of New York’s State College of Optometry in Manhattan, The University of Alabama at Birmingham’s College of Optometry, The University of Missouri at St. Louis’ College of Optometry and the Michigan College of Optometry, at Ferris State University in Michigan.
But additional new schools have, and are now being creating de novo by universities on their own initiative from a belief there is a need for more optometrists.

Why do they believe there is such a need?

a) The author’s opinion is this is due to the perception of an optometry shortage stemming from a series of inaccurate reports from the U.S. Bureau of Labor statistics (BLS). These reports have put optometry on the lists of “hot professions” and are often cited by universities starting an optometry school, and used by schools themselves to attract student applicants.

Consider these “facts” in the current U.S. Bureau of Labor’s Occupational Outlook Handbook for optometry:

“Job Outlook 2012-22. 24% (Much faster than average)”

“Employment Change, 2012-22 8,100”

“Job Outlook” “Employment of optometrists is projected to grow 24% from 2012 to 2022, much faster than the average for all occupations. Because vision problems tend to occur more frequently later in life, an aging population will require more optometrists.”

These claims do not jibe with the three earlier optometry manpower studies or the Lewin survey finding of a 32% optometry surplus in 2012.

BLS statements are often shaped by, if not taken from, data supplied by trade associations lobbying for their occupation. In the author’s opinion, this is the source of overly optimistic BLS claims. The number of qualified applicants to optometry schools have been declining despite the schools’ efforts to portray optometry as a “hot” health field. Ironically, those efforts have contributed to more schools being started which further dilute the pool which now is at about 1 qualified applicant per available seat.

b) Recessions frequently lead to increased post-graduate attendance as the young seek to better their employment prospects and health careers are considered recession proof. The “great recession of 2007” has almost been
reversed which may reduce the number of applicants just as new schools are opening.

c) Guaranteed Government loans (easy credit) for which a school receives an immediate “commission” but for which repayment is solely the responsibility of the student. (Similar to sub-prime home mortgages.)

Total student debt is now 1.1 billion, larger than total consumer credit card debt, and growing. The 90 day delinquency rate is over 11% and reduced standards just announced are predicted to add 370,000 more student borrowers.

A respected Michigan university is planning to “give free additional education to graduates who can’t find a job” and its President describes it thusly “This program isn’t a gimmick…This is Davenport putting its money where its mouth is.”

d) In the author’s opinion the accreditation standards for optometry schools and post graduate residencies lack meaningful quantitative clinical training requirements and present only minimal requirements, not on a par with the expanding extent of optometry clinical responsibilities in today’s practice environment or the clinical standards of their medical-dental colleagues.

In the author’s opinion there is a bubble in optometry enrollments that began about 1997 with a current surplus of optometrists similar to the surpluses of architects, veterinarians, lawyers and other once “hot” sectors of the job market.

It is unfair to do nothing and assume the market will work this out. While it eventually will, the consequences will be harmful to the schools, the students, those in practice and the public.

One immediate consequence of any educational bubble is lowering of admittance standards in order to fill seats, and less satisfactory economic rewards for graduates. The author closes this summary by citing another factual finding of the Lewin survey.
When polled as to satisfaction with their income or reimbursement, “only 17% of respondents reported that they were satisfied, or more than satisfied, with their income or reimbursements”. In other words, 83% were less than satisfied. (page 32, Report of 2012 Eye Care Workforce Study of Optometrists)

**Lewin Reports**  
**Compared with Earlier Studies**

A 1995 study by the Rand Corp. predicted future optometry surpluses and the 2000 Abt. Associates study estimated optometry surpluses would reach just over 4,000 by 2014 when Abt. predicted there would be about 40,000 optometrists, or essentially the number in practice today.

Both those studies assumed optometry graduation rates would continue at about 1,100. But graduation rates are now at 1,600 and going higher. Meanwhile the density of optometrists has risen from 10.0 to 12.7 by 2012 per 100,000, since 1965, and will continue to rise to record levels of 16-17.

Density of optometrists, rather than numbers, is the best indicator of supply.

The third study, by the author in early 2014, before the Lewin reports were released, factored in increases in optometry schools and graduates since 1995 and projected surpluses likely ranging from about 4,000 in 2010 to 11,000 by 2025 with densities continuing to increase up to 16-17 optometrists per 100,000.

Lewin Model 3 shows the excess supply to be 12,700 in 2012 and then declining to 4,400 by 2025 if the full estimated impact of the Affordable Care Act (ACA), Child Health Insurance (CHI) and increased incidence of Type II diabetes is realized and all OMD shortages are filled with surplus optometry FTE.

Model 3 is particularly important as it shows an optometry “excess capacity” of 12,700 or 32% already existed in 2012.

This “excess capacity” became evident in Lewin’s national survey of optometrists in 2012 which found optometrists reporting they could, on
average, see 32% more patients without increasing staff, equipment or devoting more hours to patient care.

This “excess capacity” has been developing for some time and is not due to a lack of desire by optometrists to see more patients since the Lewin survey reveals 83% of optometrists were not satisfied with their income in 2012.

This “excess capacity” is consistent with D, the density of optometrists, having been about 10 from 1965 to 1990 but then rising after 1990 to 12.8 in 2012, a 25% increase in density at the time of the Lewin Survey.

It seems probable this 25% increase in density of optometrists per 100,000 since 1990 accounts for most of the 32% “excess capacity” in 2012.

It should be noted Lewin states the 2012 “excess capacity” of 12,700 FTE may decline by 2025 to 4,400 FTE only if there is an increase in eye care demand due to new insurance plans and continued high rates of Type II diabetes and surplus ODs fill all OMD shortages.

But, since the Lewin report, schools are being considered in the states of Wisconsin, Illinois and North Carolina and the numbers of ophthalmologists in training are showing signs of increasing, along with new medical schools to address the issue of a scarcity of general practice physicians.

Evidence of “excess capacity” is also shown by the Lewin survey finding that 30% of optometrists practice at 2 or more sites.

**Optometry Surplus Not Unique**

Optometry is not alone in questioning if it is producing too many graduates. There seems widespread evidence of surplus numbers of attorneys, veterinarians, and architects for example, not to mention those holding liberal arts undergraduate degrees flipping burgers.

When one veterinarian school dean was asked about the surplus of young veterinarians he was quoted as describing the surplus as “good for the nation” since, if a foreign animal virus were introduced into the United
States, there would be a large number of veterinarians “standing by” to treat infected livestock.”

In the author’s opinion, the optometrist surplus, commented upon for years by practitioners, was first documented when the optometrists Lewin surveyed in 2012 stated they could, on average, see 32% more patients at their practice(s) without adding staff, equipment or reserving more time for patient care. While Lewin used the euphemism “excess capacity” to describe this finding it is, by definition, a surplus supply.

Supporting evidence of this surplus is shown by Lewin finding 39,580 actively practicing optometrists in 2012, a year for which the U.S. Census Bureau lists as having a population of 310 million.

These give an optometry density of $D=12.8$ per 100,000 population in 2012.

Optometry densities had hovered around $D=10.0$ from 1960 to 1990 but then began to steadily climb, reaching $D=11.5$ in 1997 and continuing to rise due to $D$ from 10 to 12.8 in 2012, a 28% density increase and the highest $D$ since the 1950’s when, for a brief period, enrollments tripled due to returning Korean War veterans attending optometry school.

With the density of optometrists having increased by 28% above its historic average since 1990, it is not surprising Lewin found an optometry surplus as enrollments have greatly outpaced population growth.

Further evidence of the 2012 surpluses comes from the Lewin survey finding 30% of all surveyed optometrists maintained 2 or more practice sites and 83% were not satisfied with their incomes.

If all predictions of increased demand due to the ACA, CHI, and Type II diabetes come to pass, Lewin projects the 2012 optometry surplus may fall to “only” 4,400 FTE by 2025 if ODs fill all OMD shortages. But:

- Lewin did not take into account the additional graduates that will result if the schools being considered in Illinois, Wisconsin and North Carolina are established.
Lewin’s projection assumes that all shortages of ophthalmologists will be filled using surplus optometrists which the author believes is unlikely.

Lewin put it this way:

“In fact, our estimates indicate that there is a significant excess supply and, though it declines modestly over the forecast period, it remains substantial at about 9,000 FTE by 2025. Accounting for two of the factors that could increase demand, increased insurance coverage under the ACA and increased prevalence of diabetes, excess supply is reduced substantially to 4,400 FTE by 2025.”

This surplus should surprise no one:

In 1997 there were 13 US schools of optometry (one in Puerto Rico) with graduation rates hovering around 1,100 during the prior decade. There are now 20 schools with two new schools (Virginia and Kentucky) planning to admit students by 2016-17 and three in the planning stage in Illinois, Wisconsin and North Carolina.

By 2018 there will be 23 schools operating with total enrollments of 1,800, a 64% increase from 1997. If the schools being considered in Illinois, Wisconsin and North Carolina open, enrollments may then exceed 1,900 which would be a 73% increase in graduates since 1997.

From 1985 to 2010, enrollments in medical and dental schools changed by +2.5% and -2.5% respectively. [Digest of Educational Statistics, U.S. Dept. of Education, see later.]

There is a perception optometry may soon have a surplus larger than those that exist in law and veterinarian medicine.

The consequences of such surpluses can no longer be in doubt and, coupled with a declining applicant pool, portend serious repercussions for educators, young optometrists and the public.
Were Lewin Findings Understood?

Following their release, most media discussion centered on the findings of the Lewin Model 3 manpower model rather than the optometry survey.

That was unfortunate, in the author’s opinion, as the survey, conducted by Lewin, is highly informative and reported in a straightforward manner with little editorial comment. As pointed out earlier, this survey appears to have been the first to ask respondents how busy they were and whether respondents were fully utilizing their current capacity to see patients. The survey findings of a 32% underutilization rate of patient care capacity, along with younger optometrists practicing at two or more sites and an almost universal dissatisfaction with practice income, nicely describe the existence of surplus numbers of optometrists with time on their hands or “standing by” as the veterinarian school dean put it earlier.

The three Lewin “eye care provider” supply-demand studies are, to varying degrees, implausible and only Model 3 took into account the 2012 surplus of over 12,000 optometry FTE. While Model 3 included this surplus, it made the untenable assumption all future ophthalmology shortages would be filled by surplus optometrists and also projected much higher future demands for eye care than Models 1 and 2. Yet even under these questionable assumptions, Model 3 showed large optometry surpluses into the future.

Most media comments were about Lewin Model 3 projections and often taken nearly verbatim from the Lewin Executive Summary or given unusual interpretations by various optometry personages as shown below.

- “Officials with the American Optometric Association (AOA) and the Association of Schools and Colleges of Optometry (ASCO) expressed satisfaction with the results.”

- “Study Finds Eye Care Workforce is Adequate to Meet Projected Demand.”
• “The data collected indicates with increases in productivity, optometrists currently view themselves as able to accommodate much of the expected increase in demand.”

• “Eye care workforce is “adequate” for current and projected demand.”

  “According to Dr. Looms (sic) [AOA Vice President] an “adequate eye care workforce means “sufficient or enough. We think it is about just right.” “Results of this study should not be taken as a commentary on the number of optometry schools or students.”

• “So what do these numbers mean for those students working towards graduation—and for that matter, those who will follow? A promising future, says Jennifer Coyle, O.D.,M.S., ASCO President. It’s a profession where you’re really going to be needed.” When asked about the survey finding of excess capacity, Dr. Coyle responded “That’s how research is: You ask a question, you pursue an answer and it always opens up ideas for future study.”

• A key conclusion that the AOA-ASCO team drew from the study--an adequate supply of ODs to meet future demand--is a reasonable assessment, Dr. Heath says.”

• “Dr. Heath also addresses the survey question and subsequent measurement of excess capacity—what he deems an “intriguing finding”.”

• “Workforce study results may indicate opportunities for optometry.”

• “The workforce study is simply that moment where we look at this explosion of medical eye care services that will be required in the years ahead. Now is our time, now is our moment. Our profession is ready.” Kevin Alexander, O.D., Ph.D.

Lewin only projected manpower to 2025. But it takes over 30 years for the full impact of increasing enrollments to appear and Lewin stated graduation rates will rise to about 1,800 by 2018 (unless more schools open) which
means optometry D (density per 100,000) and the surpluses will continue to grow after 2025 to about 2045 as shown by the figure on page 4.

To the author, the above quotes appear to be “whistling in the grave yard” and represent denial or failure to have actually read the two Lewin publications. As a result, most of the media debate about the Lewin Survey and the three Lewin Manpower projections are, sadly, uninformed.

**Nature of the Optometry Surplus**

Aside from the obvious legal and practical problems presented by Lewin’s Models 2 and 3, in which surplus optometrists will fill future ophthalmology shortages, is an additional basic flaw. Models 2 and 3 assume surplus optometry FTE is a homogeneous, liquid and portable resource that can be “collected” and then used to “fill” all future ophthalmology shortages (and thereby somewhat reduce the optometry surpluses).

But, in reality, the optometry surplus is a resource not easily recoverable that more closely resembles wasted resources, or entropy, within the optometry workforce. The Lewin national optometry survey clearly showed most of the surplus was associated with younger optometrists under age 40.

<table>
<thead>
<tr>
<th>Age</th>
<th># of Sites</th>
<th>% Self Employ</th>
<th>Mean Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under age 30</td>
<td>46%  8%  12%</td>
<td>m 11%  f 29%</td>
<td>m 69  f 77</td>
</tr>
<tr>
<td>Age 30-39</td>
<td>30%  9%  1%</td>
<td>m 49%  f 51%</td>
<td>m 124  f 87</td>
</tr>
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</table>

[m=male,  f=female, Income x $1,000, % rounded to nearest integer]

The most probable market place to absorb some of the optometry surpluses will be employment of younger optometrists at mall practices affiliated with optical stores, ophthalmologists operating group eye practices and medical facilities offering eye care. Further weakening OD-owned private office practices.

And, as the surpluses remain, eventually prospective students will question the return on an investment in an O.D. degree, producing a reduction in
applicants. Already, the number of qualified applicants to optometry schools about equals the current number of seats and seat capacity is projected to increase an additional 12% by 2018. This will eventually cause schools to admit less qualified applicants, reduce seats or close.

Unfortunately this is how the process has worked in other fields as educators are known to fill all seats until the bitter end.

It will therefore be the younger generations of optometrists most adversely affected by the shortsightedness of their elders.

Appendix

Demand and Supply of Optometrists

Chart 1: Lewin Model 1 Data

Baseline OD Supply-Demand

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>OD-FTE</th>
<th>OD-FTE</th>
<th>OD-FTE</th>
</tr>
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<td>39,600</td>
<td>39,600</td>
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<tr>
<td>2013</td>
<td>39,900</td>
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<td>400</td>
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<td>41,100</td>
<td>700</td>
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</tr>
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</tbody>
</table>

* Lewin OMD-FTE shortage as measured in “optometry-equivalent FTE” or ODD-FTE, in which 1 OMD FTE shortage is replaced with 1.36 optometry defined FTE in Lewin Model #2.
Chart 3: Lewin Model 2 Data

Combined OD and OMD Baseline Supply-Demand Expressed in OD FTE Equivalent

1 ODe FTE = 1 OD FTE
1 ODe = 0.74 ODM FTE

<table>
<thead>
<tr>
<th>Year</th>
<th>Supply ODe FTE</th>
<th>Demand ODe FTE</th>
<th>Shortage ODe FTE</th>
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<tbody>
<tr>
<td>2012</td>
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<td>61,900</td>
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<td>1,600</td>
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<tr>
<td>2019</td>
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<td>66,900</td>
<td>2,600</td>
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<tr>
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<td>67,500</td>
<td>71,800</td>
<td>4,200</td>
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*Lewin adds the Lewin Baseline Eye Care Supply and Demand data for ODs and OMDs together by converting OMD FTE of supply and demand into 1.36 ODe of supply and demand and using optometry to fill ophthalmology shortages.

Chart 4: Lewin Model 3 Data
Combined OD-OMD Baseline Supply-Demand With Added Demand From ACA, CHIP & Increased Diabetes And With Optometry Excess Capacity Added

<table>
<thead>
<tr>
<th>Year</th>
<th>Baseline Supply In ODe</th>
<th>Baseline Demand In ODe</th>
<th>ACA+CHIP+DM In ODe</th>
<th>With Excess ODe surplus</th>
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</thead>
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<td>71,800</td>
<td>76,500</td>
<td>80,900</td>
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</tbody>
</table>

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**Figures and Charts**

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