

The Honorable Robert S. Lasnik

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UNITED STATES DISTRICT COURT  
WESTERN DISTRICT OF WASHINGTON AT SEATTLE

ANDREA SCHMITT; ELIZABETH )  
MOHUNDRO; and O.L. by and through her )  
parents, J.L. and K.L., each on their own behalf, )  
and on behalf of similarly situated individuals, )

CASE NO. 2:17-cv-01611-RSL

Plaintiffs,

v.

DECLARATION OF SCOTT CARR, PH.D.

KAISER FOUNDATION HEALTH PLAN OF )  
WASHINGTON; KAISER FOUNDATION )  
HEALTH PLAN OF WASHINGTON )  
OPTIONS, INC.; KAISER FOUNDATION )  
HEALTH PLAN OF THE NORTHWEST; and )  
KAISER FOUNDATION HEALTH PLAN, )  
INC., )

Defendants.

I, Scott Carr, Ph.D., declare the following:

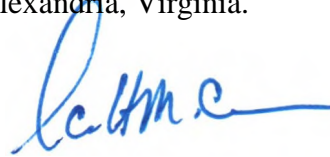
1. I am a Senior Managing Director and leader of the Competition and Class Actions Practice at Ankura Consulting Group. I make this declaration based on personal knowledge and am otherwise competent to testify to the matter stated herein.

2. Attached hereto as Exhibit A is a true and correct copy of an expert report dated May 12, 2023, which I prepared for Kaiser’s counsel. The report presents a summary of my opinions in this matter, and includes a true and correct copy of my *Curriculum Vitae* as an exhibit.

1           3.       Attached hereto as Exhibit B is a true and correct copy of an expert rebuttal report  
2 dated June 12, 2023, which I also prepared for Kaiser’s counsel, that presents a summary of  
3 additional opinions in this matter.  
4

5           I declare under penalty and perjury under the laws of the United States that the foregoing  
6 is true and correct.

7           EXECUTED this 20th day of June, 2023, at Alexandria, Virginia.  
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11 Scott Carr, Ph.D.  
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**CERTIFICATE OF SERVICE**

I, Luci Brock, affirm and state that I am employed by Karr Tuttle Campbell in King County, in the State of Washington. I am over the age of 18 and not a party to this action. My business address is: 701 Fifth Avenue, Suite 3300, Seattle, Washington 98104. On this day, I caused a true and correct copy of the foregoing document to be filed with the Court and served on the parties listed below in the manner indicated.

Eleanor Hamburger  
Richard E. Spoonemore  
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Via Electronic Mail  
Via Overnight Mail  
CM/ECF via court's website

I declare under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct, to the best of my knowledge.

Executed on this 20<sup>th</sup> day of June, 2023, at Seattle, Washington.

s/ Luci Brock  
Luci Brock  
Legal Assistant

# Exhibit A

**U.S. District Court  
United States District Court for the Western District of Washington (Seattle)  
Docket NO. 2:17-cv-01611-RSL**

**ANDREA SCHMITT; ELIZABETH MOHUNDRO;  
and O.L. by and through her parents, J.L. and K.L.,  
each on their own behalf, and on behalf of similarly situated individuals,  
Plaintiffs**

**v.**

**KAISER FOUNDATION HEALTH PLAN OF WASHINGTON; KAISER FOUNDATION HEALTH PLAN  
OF WASHINGTON OPTIONS, INC.; KAISER FOUNDATION HEALTH PLAN OF THE NORTHWEST;  
and KAISER FOUNDATION HEALTH PLAN, INC.,  
Defendants**

**EXPERT REPORT OF SCOTT CARR, PH.D.  
May 12, 2023**

**EXPERT REPORT OF SCOTT CARR, PH.D.**

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## EXPERT REPORT OF SCOTT CARR, PH.D.

### I. Introduction and Summary of Opinions

I am Scott Carr, Ph.D., a Senior Managing Director and leader of the Competition and Class Actions Practice at Ankura Consulting Group (“Ankura”). I was engaged by the Defendants, Kaiser Foundation Health Plan of Washington, Kaiser Foundation Health Plan of Washington Options, Inc., Kaiser Foundation Health Plan of the Northwest, and Kaiser Foundation Health Plan (collectively, “Kaiser”), to prepare expert opinions about the prevalence of hearing loss and hearing aid usage.

This report sets forth the conclusions I have reached to date in this proceeding. To summarize, I have reached four primary conclusions based on the data and documents I have reviewed:

1. A large majority of hearing-impaired people do not experience disabling hearing loss.<sup>1</sup> Instead, about two-thirds of people with hearing loss established by pure-tone audiometry have only mild hearing loss, with this percentage increasing for people below 70 years old.
2. Most people with disabling hearing loss do not use hearing aids. For example, the National Institute on Deafness and Other Communication Disorders reports that hearing aids are used by just 16.3 percent of adults with disabling hearing

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<sup>1</sup> For the purpose of this report, disabling hearing loss is moderate or worse hearing loss as identified by a measured hearing loss using pure-tone audiometry of greater than 40 dB.

loss between 20 to 69 years old.<sup>2</sup> Moreover, to the extent the published statistics include people who have conductive hearing loss, deafness and/or hearing loss that can be treated with cochlear implants or bone-anchored hearing aids (which, unlike air conduction hearing aids, are covered by the relevant Kaiser plans), those statistics will overstate the number of people that could benefit from air conduction hearing aids for which coverage is excluded by hearing-related health insurance exclusions of the form relevant to this proceeding.

3. Many people with only mild hearing loss use hearing aids; numerous organizations, governmental agencies, and researchers indicate that hearing aids are appropriate for people with mild hearing loss; and hearing aids are widely marketed to people with mild hearing loss. Consequently, hearing-related health insurance exclusions of the form relevant to this proceeding affect (or would affect) many people with only mild hearing loss.
4. For these and other reasons discussed in this report, the population with disabling hearing loss has only a weak or moderate correlation with the population of air-conduction hearing aid users, meaning that the two populations are substantially different.

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<sup>2</sup> National Institute on Deafness and Other Communication Disorders website, "Use of Hearing Aids in 2006" (updated 2012); see chart and supporting data indicating hearing rate usage by 163 per 1,000 adults with moderate-to-severe hearing loss. <https://www.nidcd.nih.gov/health/statistics/use-hearing-aids-2006> and <https://www.nidcd.nih.gov/health/statistics/text-description-use-hearing-aids-2006>



**A. Overview of Credentials**

I hold a Ph.D. in Business Administration and in Industrial and Operations Engineering, an M.S.E. in Industrial and Operations Engineering, an M.S.E. in Construction Management and Engineering, and a B.S.E. in Mechanical Engineering. These degrees are from the University of Michigan. In my current position at Ankura, I provide consulting and expert services on a variety of economic and engineering topics, including in the context of litigation. To perform these services, I regularly perform complex economic and statistical analyses, often using sophisticated computer and analytical tools. Prior to joining Ankura, I was a Director at Navigant Consulting, Inc., a Senior Managing Director at ARPC, a Principal at LECG, and a professor at the UCLA Anderson School of Management in the Department of Decisions, Operations, and Technology Management. As a professor, I taught courses in the areas of Operations Management and Quantitative Analysis to M.B.A. and Ph.D. students and to business executives. I also performed and published research related to Operations Management and Industrial Economics.

I have extensive experience in the analysis and modeling of complex business, financial, and health-related circumstances and events. For example, my prior projects included statistical analysis of health insurance payment amounts for out-of-network emergency services; forecasting the future incidence of diseases and cognitive impairments due to concussions in National Football League players; developing a machine-learning algorithm to predict outcomes of asbestos-related litigation; testimony regarding housing accommodations for people with physical disabilities and health insurance usage by transgender persons; analyzing markets for mental health services; and forecasting of future personal injury liabilities due to environmental

contamination. My areas of expertise include probability and statistics, data analytics, and predictive modeling. Exhibit 1 contains my current *curriculum vitae*, and the materials I relied upon when preparing this report are listed in Exhibit 2 and/or cited herein. Ankura is being compensated at a rate of \$750 per hour for the time I spend on this engagement; this compensation does not depend on the outcome of this proceeding.

## II. Prevalence Rates for Hearing Loss

In the published literature, measurements of hearing loss are typically based on “pure-tone audiometry,” which is the most reliable widely-used assessment for sensorineural hearing loss.<sup>3,4</sup> Pure-tone audiometry measures the decibel (dB) levels of the quietest sounds a person can hear and averages them across several frequency levels. For example, the World Health Organization categorizes hearing loss based on the average decibel levels required to hear sounds of 500, 1,000, 2,000, and 4,000 Hz. Based on this average value, the WHO defines hearing loss as mild in the range of 26-40 dB, moderate at 41-60 dB, severe at 61-80 dB, and profound at 81 dB or greater.<sup>5</sup> Consistent with this classification, as well as much of the existing

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<sup>3</sup> Sliwinska-Kowalska, M. “Chapter 19 – Hearing.” *Handbook of Clinical Neurology*. 2015. Vol. 131, pp. 341-363.

<sup>4</sup> The American Speech-Language-Hearing Association sets guidelines for pure-tone audiometry in an effort to establish “standard procedures that in the final analysis should benefit the persons we serve,” and the CDC uses pure-tone audiometry in its National Health and Nutritional Examination Survey. See “Guidelines for Manual Pure-Tone Threshold Audiometry.” *ASHA.org*. <https://www.asha.org/policy/gl2005-00014/>. See also “Audiometry Procedures Manual.” *Centers for Disease Control National Health and Nutrition Examination Survey*. January 2003.

<sup>5</sup> Olusanya B, Davis A, and Hoffman H. “Hearing loss grades and the International Classification of functioning, disability, and health.” *Bull World Health Organ*. October 1, 2019, pp 725-728. Higher decibel levels indicate that louder sounds are required for a person to hear them, so higher decibel levels indicate worse hearing loss.

literature,<sup>6,7,8,9</sup> I use 40 dB. as the threshold level above which hearing loss is disabling. Also, I use the term “impaired” (as in “impaired hearing” or “hearing impaired persons”) to mean any hearing loss that is mild or worse.

The majority of hearing-impaired people do not experience *disabling* hearing loss. Doctors Adele Goman and Frank Lin published a study (“Goman and Lin 2016”) based on data from the National Health and Nutritional Examination Survey (NHANES) administered by the U.S. Centers for Disease Control and Prevention.<sup>10</sup> These researchers concluded that 38.2 million Americans (roughly one in seven) are hearing impaired. Of those, about two thirds (25.4 million, or 66.5 percent) have mild hearing loss.<sup>11</sup> Moreover, this percentage rises to 77.9

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<sup>6</sup> “Addressing the rising prevalence of hearing loss.” World Health Organization, February 2018.

<sup>7</sup> Hlayisi VG, Petersen L, and Ramma L. “High prevalence of disabling hearing loss in young to middle-aged adults with diabetes.” *International Journal of Diabetes in Developing Countries*. June 20, 2018, pp. 148–153.

<sup>8</sup> Sheffield A and Smith R. “The Epidemiology of Deafness.” *Cold Spring Harbor Perspectives in Medicine*. Originally published online September 24, 2018.

<sup>9</sup> Davis A, McMahon C, Pichora-Fuller K, Russ S, Lin F, Olusanya B, Chadha S, and Tremblay K. “Aging and Hearing Health: The Life-course Approach.” *The Gerontologist*. 2016, Vol. 56, No. S2, pp. S256–S267.

<sup>10</sup> Goman A, Lin FR. “Prevalence of Hearing Loss by Severity in the United States.” *American Journal of Public Health (AJPH)*. October 2016. Vol. 106, No. 10. The article describes the NHANES study as, “an ongoing biannual epidemiological survey of a representative sample of the US noninstitutionalized population.”

<sup>11</sup> Goman A, Lin FR. “Prevalence of Hearing Loss by Severity in the United States.” *AJPH*. October 2016. Vol. 106, No. 10. The authors report that another 10.7 million (27.9 percent) have moderate hearing loss, 1.8 million (4.6 percent) have severe hearing loss, and 0.35 million (0.9 percent) have profound hearing loss.

percent (14.6 million) after excluding Americans greater than 70 years old who, according to plaintiffs, are unlikely to be included in their proposed class.<sup>12,13</sup>

These percentages are also consistent with another study by Dr. Lin focused exclusively on adults aged 60-69.<sup>14</sup> In this study, Dr. Lin concluded that the hearing loss in 74.4 percent of hearing-impaired people was only mild.

An additional study based on self-reported hearing loss data is consistent with the observation that about two-thirds of hearing-impaired people experience only mild hearing loss. Doctors Hossein Mahboubi, Harrison Lin, and Neil Bhattacharyya analyzed data from the 2014 National Health Interview Survey (also administered by the U.S. Centers for Disease Control and Prevention) to estimate, among other things, the prevalence of hearing loss in the United States.<sup>15</sup> They estimated that 40.3 million Americans have some degree of hearing difficulty, defined as respondents indicating they had at least “a little trouble” hearing without a hearing aid. Among those with at least some hearing difficulty, 61 percent said they were “seldom” or “never” frustrated with their hearing; 71.1 percent indicated that their hearing

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<sup>12</sup> Goman A, Lin FR. “Prevalence of Hearing Loss by Severity in the United States.” *AJPH*. October 2016. Vol. 106, No. 10.

<sup>13</sup> Fourth Amended Complaint, December 15, 2020, ¶ 44 (“Based on information and belief, the proposed class includes few if any individuals over the age of 65, since most, if not all, of Washington insured Kaiser enrollees lose their private Kaiser coverage when they become eligible for Medicare, even if they transfer to a Kaiser Medicare Advantage plan.”).

<sup>14</sup> Lin, FR. “Hearing Loss and Cognition Among Older Adults in the United States.” *Journal of Gerontology*. October 2011. Vol. 66A, No. 10, pp. 1131-1136.

<sup>15</sup> Mahboubi H, Lin H.W., and Bhattacharyya N. “Prevalence, Characteristics, and Treatment Patterns of Hearing Difficulty in the United States.” *JAMA Otolaryngology – Head and Neck Surgery*. 2018. Vol. 144, No. 1, pp. 65-70.

“never” causes safety concerns; and 32.2 percent had never seen a physician/clinician about hearing problems.<sup>16</sup>

### **III. Prevalence of Hearing Aid Use**

In this section, I discuss the prevalence of hearing aid usage by hearing-impaired people. In Subsection A below, I present research and information showing that most people with disabling hearing loss do not use hearing aids. In Subsection B, I present research and information showing that many people with only mild hearing loss use hearing aids; numerous organizations, governmental agencies, and researchers indicate that hearing aids are appropriate for people with mild hearing loss; and hearing aids are widely marketed to people with mild hearing loss.

#### **A. Hearing Aid Usage with Disabling Hearing Loss**

Published literature and other sources document that most Americans with disabling hearing loss do not use hearing aids. For example, the National Institute on Deafness and Other Communication Disorders (within the U.S. Department of Health & Human Services) reports that hearing aids are used by just 16.3 percent of adults with disabling hearing loss between 20 to 69 years old.<sup>17</sup>

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<sup>16</sup> Mahboubi H, Lin H.W., and Bhattacharyya N. “Prevalence, Characteristics, and Treatment Patterns of Hearing Difficulty in the United States.” *JAMA Otolaryngology – Head and Neck Surgery*. 2018. Vol. 144, No. 1, pp. 65-70.

<sup>17</sup> “Use of Hearing Aids in 2006” (updated 2012). National Institute on Deafness and Other Communication Disorders website; see chart and supporting data indicating hearing rate usage by 163 per 1,000 adults with moderate-to-severe hearing loss. <https://www.nidcd.nih.gov/health/statistics/use-hearing-aids-2006> and <https://www.nidcd.nih.gov/health/statistics/text-description-use-hearing-aids-2006>

Similarly, a published study by Drs. Wade Chien and Frank Lin (“Chien and Lin 2012”) estimated hearing aid usage among U.S. adults across four age brackets (50-59, 60-69, 70-79, and 80+).<sup>18</sup> They found that the highest rates of hearing aid usage among people with disabling hearing loss (*i.e.*, moderate or worse hearing loss) was in the 70-79 age bracket, where 47.8 percent use hearing aids. Among 60-69 year-olds, they found that just 23.9 percent of people with disabling loss use hearing aids, and for 50-59 year-olds, the percentage drops to 11.8 percent.

Researchers have also studied the degree to which cost is a determinant of hearing aid usage. Doctors Michael Valente and Aryn Amlani compared hearing aid adoption rates in the U.S. against adoption rates in countries where hearing aid costs are subsidized by the government.<sup>19</sup> The authors’ conclusions, based on self-reported “hearing difficulty” data from a hearing aid industry market study, include the following: (1) hearing aid adoption rates are limited in these other countries “despite the fact that no cost is expected from the patient”; (2) even if the U.S. government subsidized hearing aids, the percentage of people with “hearing difficulty” that use hearing aids would increase by only 10 percent or less; (3) “cost is not the primary barrier to [hearing aid] adoption”; and (4) “Other factors impeding hearing aid adoption include heightened social stigma, denial of hearing loss, and reduced self-efficacy.”

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<sup>18</sup> Chien, W and Lin, FR. “Prevalence of Hearing Aid Use Among Older Adults in the United States.” *Arch Internal Medicine*. February 13, 2012. Vol. 172, No. 3, pp 292-293.

<sup>19</sup> Valente M, Amlani A. “Cost as a Barrier to Hearing Aid Adoption.” *JAMA Otolaryngology–Head & Neck Surgery*. July 2017. Vol. 143, No. 7, pp. 647-648. This article includes a figure visually indicating that, in every country studied, less than 50 percent of people with hearing difficulties use hearing aids.

Similarly, citing Dr. Lin (whose work I discuss above), National Public Radio reported that, for “older adults with untreated [hearing] problems,”

Medicare’s refusal to pay for these high-cost devices is not the only obstacle. Hearing aids are free in England, yet only 25% of those with hearing loss use them there, [Dr. Lin] adds. Access to hearing aids and problems with the devices’ technical capabilities are issues, too.<sup>20</sup>

A 2010 study in the *Journal of the American Geriatrics Society* also showed some of the limits of hearing aid costs as an explanation for low hearing aid usage rates.<sup>21</sup> The study’s subjects were U.S. veterans who were selected to ensure eligibility for free hearing aids paid for by U.S. Veterans Affairs, and the goal of the study was to track long-term hearing aid use by individuals given three different types of hearing screenings. All subjects exhibiting hearing loss were given “written instructions to call the VA ... for formal evaluation.” Of the subjects with hearing loss who followed through with a visit to an audiologist, just 27.7 percent were wearing hearing aids one year later even though hearing aids were available to them at no cost. Moreover, even for subjects who visited an audiologist *and received an audiogram result showing correctable hearing loss*, just 38.2 percent were wearing a hearing aid one year later.

As a final point, not all hearing-disabled individuals would benefit from air conduction hearing aids that are part of the insurance exclusions of the form that are relevant to this

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<sup>20</sup> “Untreated Hearing Loss Linked to Loneliness and Isolation for Seniors.” *National Public Radio*. September 12, 2019. <https://www.npr.org/sections/health-shots/2019/09/12/760231279/untreated-hearing-loss-linked-to-loneliness-and-isolation-for-seniors>.

<sup>21</sup> Yueh, B et al. “Long-Term Effectiveness of Screening for Hearing Loss: The Screening for Auditory Impairment – Which Hearing Assessment Test (SAI-WHAT) Randomized Trial.” *Journal of the American Geriatrics Society*. 2010. Vol. 58, pp. 427–434.

proceeding. Specifically, I understand that there are four (potentially overlapping) categories of hearing-disabled people who would not benefit from aid conduction hearing aids: (1) people with conductive, rather than sensorineural, hearing loss; (2) people treated with cochlear implants (according to the Plaintiffs, “5.6 percent of the 9.2 million people under 65 with self-reported hearing losses” are potentially eligible for cochlear implants<sup>22</sup>); (3) people treated with bone-conduction hearing aids; and (4) people who are deaf and get no benefit from air conduction hearing aids.<sup>23</sup> Thus, to the extent that the data includes hearing-disabled individuals in these categories, the published data on hearing aid usage will overstate the number of hearing-disabled people who could benefit from air conduction hearing aids.

#### **B. Hearing Aid Usage with Mild Hearing Loss**

Many people with mild hearing loss use hearing aids. Based on hearing loss statistics from the Chien and Lin 2012<sup>24</sup> study and hearing aid usage statistics from the Goman and Lin 2016 study,<sup>25</sup> 120 thousand mildly hearing-impaired people aged 50-59 use hearing aids, which is 46 percent of all hearing aid users in that age group. For the 60-69 age group, 180 thousand mildly hearing-impaired people use hearing aids, which is 24 percent of all hearing aid users in that age group. Across these age groups collectively, 300 thousand mildly hearing-impaired people use hearing aids, which is 30 percent of all hearing aid users aged 50-69.

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<sup>22</sup> Fourth Amended Complaint, December 15, 2020, ¶ 67.

<sup>23</sup> Fourth Amended Complaint, December 15, 2020, ¶ 14.

<sup>24</sup> Chien W, Lin FR. “Prevalence of Hearing Aid Use Among Older Adults in the United States.” *Arch Internal Medicine*. February 13, 2012. Vol. 172, No. 3, pp 292-293.

<sup>25</sup> Goman A, Lin FR. “Prevalence of Hearing Loss by Severity in the United States.” *AJPH*. October 2016. Vol. 106, No. 10.



Further, numerous organizations, governmental agencies, and researchers indicate that hearing aids are appropriate for people with mild hearing loss. For example:

- For people with mild hearing loss, the World Health Organization recommends “Counselling. *Hearing aids may be needed.*”<sup>26</sup> (italics added)
- The U.S. Food and Drug Administration (FDA) describes prescription hearing aids as a medical device and electronic product “[f]or people *with any degree of hearing loss.*”<sup>27</sup> (italics added)
- A published review of 10 articles with “reported separate pre-/postfitting hearing aid outcomes” concluded that patients with mild sensorineural hearing loss (defined in this case as <45 dB) benefit from hearing aids.<sup>28</sup>
- In 2017, President Trump signed legislation sponsored by Senators Elizabeth Warren and Chuck Grassley<sup>29</sup> to “establish a category of over-the-counter

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<sup>26</sup> Olusanya B, Davis A, Hoffman H. “Hearing loss grades and the International Classification of functioning, disability, and health.” *Bull World Health Organ*. October 1, 2019. Vol. 97, No. 10, pp. 725-728.

<sup>27</sup> “Hearing Aids.” FDA. May 3, 2023. <https://www.fda.gov/medical-devices/consumer-products/hearing-aids>. Accessed May 6, 2023.

<sup>28</sup> Johnson C, Danhauer J, Ellis B, and Jilla A. “Hearing Aid Benefit in Patients with Mild Sensorineural Hearing Loss: A Systematic Review.” *Journal of the American Academy of Audiology*. Vol. 27, pp. 293-310.

<sup>29</sup> “Over-the-Counter Hearing Aid Legislation Signed into Law.” Press Release from the Office of Senator Elizabeth Warren. August 21, 2017. <https://www.warren.senate.gov/newsroom/press-releases/over-the-counter-hearing-aid-legislation-signed-into-law>.

hearing aids” that would “compensate for perceived *mild* to moderate hearing impairment.”<sup>30</sup> (italics added)

- The U.S. Food and Drug Administration allows (since 2022) over-the-counter purchases of hearing aids for people with *mild*-to-moderate hearing loss.<sup>31</sup> (italics added)
- The President’s Council of Advisors on Science and Technology stated that over-the-counter sales of hearing aids are an “Opportunity to increase access to basic technology for *mild* to moderate hearing loss, like reading glasses.”<sup>32</sup> (italics added)

Moreover, hearing aids are widely marketed to people with mild hearing loss. For example:

- Hearing Doctors, which claims to be the “Washington DC Metro Area’s top rated audiology practice,”<sup>33</sup> has a webpage that markets hearing aids to people with

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<sup>30</sup> Over-the-Counter Hearing Aid Act of 2017, S. 670, 115<sup>th</sup> Cong. (2017). <https://www.congress.gov/bill/115th-congress/senate-bill/670>

<sup>31</sup> “FDA Approves Over-The-Counter Hearing Aids for Mild to Moderate Hearing Problems.” *PBS NewsHour*, August 16, 2022. [www.pbs.org/newshour/health/fda-approves-over-the-counter-hearing-aids-for-mild-to-moderate-hearing-problems](http://www.pbs.org/newshour/health/fda-approves-over-the-counter-hearing-aids-for-mild-to-moderate-hearing-problems). Accessed May 6, 2023.

<sup>32</sup> “Aging America & Hearing Loss: Imperative of Improved Hearing Technologies.” Presentation by the President’s Council of Advisors on Science and Technology. September, 2015. <https://hearingreview.com/wp-content/uploads/2015/10/PCAST-Slides.pdf>. Accessed May 6, 2023.

<sup>33</sup> “Why Choose Us?” Hearing Doctors website. <https://hearingaiddoctors.com/why-choose-us/>. Accessed May 6, 2023.

mild hearing loss. The webpage states that “hearing aids can be pivotal to people with *mild* hearing loss.”<sup>34</sup> (italics added)

- The University of Connecticut Health Center’s Department of Ear, Nose and Throat/Otolaryngology advises on its website that “[a]nyone who has *mild* to severe hearing loss can benefit from a hearing aid.”<sup>35</sup> (italics added)
- The website of The Stanford Ear Institute, part of Stanford University Medical Center, states that, “With the proper selected, fitted and adjusted hearing device, patients with any degree of hearing loss from *very mild* to total deafness can achieve hearing functions that were not attainable previously.”<sup>36</sup> (italics added)
- The Columbia University Irving Medical Center’s Ear, Nose & Throat website describes “completely-in-the-canal,” “invisible-in-the-canal,” and “in-the-canal and in-the-ear” hearing aids as “suitable for *mild* to severe hearing loss.”<sup>37</sup> (italics added)

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<sup>34</sup> “Does Mild Hearing Loss Require Hearing Aids?” Hearing Doctors website. <https://hearingaiddoctors.com/patient-resources/hearing-aids/does-mild-hearing-loss-require-hearing-aids/>. Accessed May 6, 2023.

<sup>35</sup> “Hearing Aids to Treat Hearing Loss.” UConn Health Department of Ear, Nose and Throat/Otolaryngology. <https://health.uconn.edu/otolaryngology/areas-of-care/hearing-aids-to-treat-hearing-loss/>. Accessed May 6, 2023.

<sup>36</sup> “Hearing Devices – Hearing Aids.” Stanfordhealthcare.org. <https://stanfordhealthcare.org/medical-treatments/h/hearing-aids.html>. Accessed May 6, 2023.

<sup>37</sup> “Hearing Aids.” ColumbiaDoctors.org. <https://www.columbiadoctors.org/specialties/ear-nose-throat/our-services/hearing-balance/hearing-aids>. Accessed May 6, 2023.

- Starkey, a hearing aid manufacturer, describes itself as “the only American-owned and operated provider of hearing technologies,”<sup>38</sup> and a company “that has more than 5,000 employees, operates 24 facilities and does business in more than 100 markets worldwide.” Its website encourages people with mild hearing loss to explore the benefits of hearing aids, stating that “*mild* hearing loss is correctable with hearings aids.”<sup>39</sup> (italics added)

Given (1) the large number of mildly hearing-impaired people using hearing aids, (2) the above-documented appropriateness of hearing aids for mildly hearing-impaired people, (3) the extensive marketing of hearing aids to mildly hearing-impaired people, and (4) the fact that mild hearing loss can progress over time to disabling hearing loss due to aging or other causes: people with only mild hearing loss are or would be affected by hearing-related health insurance exclusions of the form relevant to this proceeding.

#### **IV. Correlation Between Disabling Hearing Loss and Hearing-Aid Usage**

The large number of hearing aid users with mild hearing loss together with the large number of hearing-disabled people that don’t use hearing aids and the significant number of deaf people and cochlear implant and/or bone-anchored hearing aid users among the hearing-disabled population means that there is a substantial lack of overlap between the hearing-

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<sup>38</sup> “Starkey Hearing Technologies Named CES Innovation Awards Honoree.” Starkey Hearing Technologies Press Release. November 8, 2018. <https://www.starkey.com/press/press-releases/2018/11/starkey-named-ces-innovation-awards-honoree>. Accessed May 6, 2023.

<sup>39</sup> “All Ears: What is mild hearing loss?” Starkey Hearing. August 14, 2019. <https://www.starkey.com/blog/articles/2019/08/What-is-mild-hearing-loss>. Accessed May 6, 2023.

disabled population and the population of air-conduction hearing aid users. More formally, the materials and data I've reviewed indicate only a weak to moderate correlation between the population with disabling hearing loss and the population of air-conduction hearing aid users, meaning that the two populations are not equivalent; they are substantially different.

## **V. Conclusions**

In this report, I documented prevalence rates for hearing loss, both mild and disabling, as well as the rates at which hearing-impaired people use hearing aids. I found that about two-thirds of hearing-impaired people have only mild hearing loss, with that percentage increasing for people less than 70 years old. I also found that many people with mild hearing loss use hearing aids – which means that health insurance exclusions of the form relevant to this proceeding affect or would affect many people with only mild hearing loss. Also, most people with disabling hearing loss do not use hearing aids. Consequently, hearing-related health insurance exclusions of the form relevant to this proceeding affect or would affect many people with only mild hearing loss who might benefit from hearing aids. Moreover, the population with disabling hearing loss only weakly or moderately correlates with the population of air-conduction hearing aid users. These conclusions are detailed throughout this report and summarized more thoroughly in Section I.



Scott Carr, Ph.D

# Scott M. Carr, Ph.D.

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### Education

PhD Business Administration and Industrial & Operations Engineering, University of Michigan

MS Engineering, Industrial & Operations Engineering, University of Michigan

MS Engineering, Construction Management and Engineering (Civil and Environmental Engineering), University of Michigan

BS Engineering, Mechanical Engineering, University of Michigan

### Affiliations

American Bar Association

Scott Carr, Ph.D., is a Senior Managing Director and leader of the Competition and Class Actions Practice at Ankura Consulting Group. His areas of expertise include manufacturing; supply chain and distribution systems; energy and health care economics; financial modeling; data analytics; and predictive and probabilistic modeling.

Dr. Carr has extensive experience in the analysis and modeling of complex business, financial, and health-related circumstances and events. His projects include (1) expert testimony in contractual disputes within manufacturing supply chains, both in the U.S. and internationally; (2) economic analysis of crude oil, gasoline, and ethanol markets; (3) analyses of the United States Postal Service's pricing; (4) expert testimony regarding health insurance coverage and reimbursement rates for transgender and mental health services; (5) analysis of oil pipeline tariff rates and capacity allocation policies; (6) estimating financial losses caused by the BP oil spill; and (7) estimation of future cognitive impairments due to concussions in retired National Football League players.

Dr. Carr is a professor at the University of Virginia and, formerly, at the UCLA Anderson School of Management. As a professor, he has taught courses on operations management, manufacturing and supply chain management, and quantitative analysis to MBA and Ph.D. students and to executives, and he has performed and published research on industrial economics and supply chain and distribution systems. Prior to joining academia, Dr. Carr traded and managed portfolios of foreign exchange and Treasury bond options as a member of both the Chicago Board of Trade and the Chicago Mercantile Exchange.

Dr. Carr has provided expert testimony to state and federal courts and regulatory bodies and to arbitration panels.



## AREAS OF EXPERTISE

- Manufacturing and supply chain management, logistics, production and operations management
- Energy economics, health care economics competition economics, and environmental economics
- Process design and analysis
- Financial modelling
- Risk modeling, analysis, and management
- Probability and statistics
- Optimization, modeling, simulation, pricing, forecasting, and data analytics

## PROFESSIONAL EXPERIENCE

### Expert Services and Faculty Experience

Ankura Consulting Group, August 2018 – Present

Senior Managing Director and Competition and Class Actions Practice Leader, April 2019 - Present

Managing Director, August 2018 – March 2019

Navigant Economics, Director, 2014 – August 2018

ARPC, 2011 – 2013

Senior Managing Director, 2012 – 2013

Managing Director, 2011

LECG, 2006-2010

Principal, 2009 – 2010

Senior Managing Economist, 2006 – 2009

UCLA Anderson School of Management, Faculty, 1999 – 2007

### Professional Activities – representative examples

Economic modeling and analysis including:

- Testimony regarding statistical methodologies for assessing the appropriateness of reimbursement rates for out-of-network emergency room services on behalf of a major healthcare insurance carrier

- Economic analysis of mental health services markets on behalf of a major healthcare insurance carrier
- Testimony in a supply chain dispute on behalf of a major consumer goods packaging manufacturer
- Testimony in a supply chain dispute related to the distribution of rum in Puerto Rico
- Testimony for Blue Cross Blue Shield of Illinois regarding insurance coverage for transgender persons
- Testimony for Saddlehorn Pipeline Company regarding competition in crude oil transportation as part of a market-based rates application for its pipeline running between Rocky Mountain crude oil production regions and Cushing, Oklahoma.
- Testimony regarding gasoline and ethanol distribution on behalf of Joint Defendants in environmental litigation
- Testimony for the New York State Department of Health regarding the availability of accessible housing for people with mobility disabilities in New York City
- Analysis of the pricing and profitability of the United States Postal Service's (USPS's) ten largest Negotiated Service Agreements on behalf of the USPS Board of Governors
- Testimony for BridgeTex Pipeline Co. involving disputed rates and capacity allocation procedures for the transportation of crude oil
- Testimony in a supply chain dispute involving the manufacture and distribution of women's shoes in Australia and New Zealand
- Engaged as Testifying Expert regarding supply chain management and manufacturing issues involved in an \$800 million light rail project in Canada
- Testimony for Wells Fargo regarding the valuation of oil-producing properties
- Testimony for Scotiabank regarding financial modeling practices in the investment banking industry and damages in a failed Build-Operate-Transfer construction project in Chile
- Testimony for Rayonier Advanced Materials regarding the pricing and supply of raw materials in the chemicals industry
- Testimony for the Tennessee Fuel and Convenience Store Association to the Tennessee Regulatory Authority regarding competition in the market for compressed natural gas as a transportation fuel
- Testimony for TransCanada regarding competition in crude oil transportation as part of a market-based rates application for its Marketlink Pipeline running between Cushing, Oklahoma, and Houston, Texas
- Testimony for Buckeye Pipe Line Company to the Federal Energy Regulatory Commission regarding competition in wholesale gasoline markets as part of a market-based rates protest of a refined products pipeline running from Delaware City, Delaware, to Pittsburgh and Harrisburg, Pennsylvania



- Testimony for Tyson Foods regarding production and supply chain practices in U.S. Dept. of Agriculture litigation brought under the Packers and Stockyards act
- Testimony to Federal District Court regarding a new business valuation in a breach of contract matter
- Testimony to the Federal Energy Regulatory Commission regarding credit issues in the New England ISO on behalf of Constellation Energy and other electricity generators
- Arbitration testimony in support of a Tier-1 automotive supplier's claim that its profits were negatively impacted by a partner firm's inability to reliably supply raw materials to their joint venture manufacturing plant
- Damages analysis (submitted in arbitration) for a delayed Guatemalan hydroelectric construction project
- Preparation of market-based rate applications for
  - Saddlehorn Pipeline Company, LLC (crude oil pipeline running from Fort Laramie, Wyoming, and Denver, Colorado, to Cushing, Oklahoma)
  - Marketlink, LLC (crude oil pipeline running from Cushing, Oklahoma, to the U.S. Gulf Coast)
  - Osage Pipeline Company (crude oil pipeline running from Cushing, Oklahoma, to El Dorado, Kansas)
  - Buckeye Pipe Line Company, Long Island System (refined products pipeline running from Linden, New Jersey, to Long Island, New York)
  - Seaway Crude Pipeline Company (crude oil pipeline running from Cushing, Oklahoma, to the U.S. Gulf Coast)
  - Enterprise TEPPCO (refined products pipeline running from the U.S. Gulf Coast to Louisiana and Arkansas)
  - Magellan Pipeline Mountain System (refined products pipeline running from Kansas to Colorado)
- Testimony to the California Air Resources Board regarding the financial impact of automotive emissions control regulations for the Alliance of Automobile Manufacturers
- Forecasting of the future incidence of diseases and cognitive impairments due to concussions for the National Football League players
- Analysis of fuel costs for an electric generation firm in bankruptcy litigation
- Analysis of gasoline and ethanol supply chain economics for Tesoro Corporation in several cases involving MTBE groundwater contamination
- Creation of a machine-learning algorithm to predict outcomes of asbestos-related litigation
- Estimation of lost income and other financial damages due to the BP oil spill in the Gulf of Mexico for the \$20 billion Gulf Coast Claims Facility

- Probabilistic modeling of future mass tort litigation at environmental contamination sites for Anadarko Petroleum Corporation
- Analysis of large data sets in class action litigation related to labor disputes, antitrust claims, and insurance litigation.
- Analysis of the cost-of-capital implications of subsidies provided to Persian Gulf airlines by their respective governments on behalf of several major U.S. airlines
- Financial analysis of natural gas pipeline leases for the U.S. Department of Justice and the Internal Revenue Service
- Estimation of the likelihood of injury from home electrical devices for Underwriter Laboratories
- Probabilistic modeling and simulation of private equity funds' performance
- Analysis of demand variability within the automobile supply network for Brembo Brakes
- Valuation and depreciation analysis of crude oil pipelines for Imperial Oil
- Bond, stock, and derivative analyses for bankruptcy litigation in the electricity industry
- Valuation of supply contracts for a new mining venture
- Analysis for class-certification and merits stages of antitrust litigation for Dow Chemical
- Analysis of alleged monopolization of industrial chemicals for Honeywell
- Managed, advised, or performed strategic projects for firms/organizations including:
  - Rio Tinto Energy America (coal mining)
  - TRW Aerospace (semiconductor manufacturing technology and equipment)
  - Broadcom (Bluetooth chipsets)
  - Meade Instruments (night vision technology)
  - Macy's (retail clothing)
  - Los Angeles Community Redevelopment Agency
  - Los Angeles County Metropolitan Transportation Authority
  - Pilkington (glass manufacturing)
  - Deutsch Advertising
  - Six Flags (amusement parks)

Numerous Speeches/presentations delivered at academic conferences

Principal investigator in a project and grant to improve small enterprises' access to business expansion capital

Member of editorial board for *Decision Sciences Journal* and frequent reviewer for *Management Science*, *Operations Research*, and other academic journals

## Professional Affiliations

- American Bar Association – Infrastructure and Regulated Industries Section; Section of Litigation and its Environmental & Energy Litigation Committee
- LECG, Los Angeles (Affiliate) – Professional services for antitrust litigation and competition policy, 2005–2006

## Graduate-Level Courses Taught at the UCLA Anderson School of Management

*Competition and Industrial Organization* [Ph.D.] – Game theoretic models of inter-firm interaction. Classic and seminal oligopoly models. Pricing theory. Advanced game theory. Models of strategic interaction within complex production networks. Antitrust. Analysis and proof techniques, 2006

*Managerial Model Building* [MBA] – Mathematical modeling, analysis, and optimization. Linear, non-linear, and integer programming/optimization. Monte-Carlo simulation. Forecasting methods. Project Management models and tools. Application of optimization models in business settings, 2005-2006

*Simulation Theory and Applications* [Ph.D.] – Monte-Carlo, discrete event, and agent-based simulation for finance, marketing, and operations. The use of simulation in empirical research. Simulation of stochastic processes. Option valuation (both financial and real) using simulation. Applications (e.g., simulation of intellectual property piracy over the Internet), 2004-2006

*Management in the Information Economy* [MBA] – Internet and telecommunication technology. Internet business models and strategy. Economics of information products and processes, 2003

*Fundamentals of Operations Management* [MBA] – Analysis of business processes. Formulating and executing business strategy. Service and performance measurement and metrics. Managing risk, variability, and uncertainty. Management of supply chains and production processes. 1999-2003, 2006

*Dynamic Programming and Sequential Optimization* [Ph.D.] – Dynamic programming, Markov chains and decision processes, solution and proof techniques, and structural results and proofs, 2000

## Other Teaching

Ph.D. Dissertation Committees (including Dissertation Advisor) – topic areas including: competition economics, operations management, information technology, international business, simulation

Executive Education at UCLA Anderson – Various topics in the following programs (1999 to 2007):

- Managing the Information Resource
- Creating and Leading the Project-Centered Organization (faculty director)
- Supply Chain Management
- Head Start – Johnson & Johnson Management Fellows Program
- UCLA Strategic Leadership Institute
- California HealthCare Foundation's Health Care Leadership Program
- Johnson & Johnson Healthcare Leadership Program

University of Michigan, Ross School of Business [BBA] – Operations Management, 1997

University of Michigan, College of Engineering [BSE] – Computer Programming, 1995

### Research

Sriram Dasu, Reza Ahmadi, and Scott Carr, “Gray Markets, A Product of Demand Uncertainty and Excess Inventory,” *Production and Operations Management*, vol. 21, April 2012, 1102-1113

Guillaume Roels, Uday Karmarkar, and Scott Carr, “Contracting for Collaborative Services,” *Management Science*, 56:5, May 2010, 849-863.

Ram Bala and Scott Carr, “Usage-based Pricing of Software Services,” *Journal of Revenue and Pricing Management*, 9:3, 2010, 204-216

Ram Bala and Scott Carr, “Pricing Software Upgrades: The Role of Product Improvement and User Costs,” *Production and Operations Management*, September-October 2009, 560-580

Scott Carr and Uday Karmarkar, “Competition in Multi-Echelon Assembly Supply Chains,” *Management Science*, vol. 51, January 2005, 45-59

Scott Carr, “Online Auctions with Costly Bid Evaluation,” *Management Science* (special issue on e-Business) vol. 49, November 2005, 1521-1528

Dissertation Advisor for Ram Bala, Ph.D. (faculty, Santa Clara University), Dissertation title: *Pricing and Contracting Strategies for Software Products and Services*, 2004

Scott Carr and William Lovejoy, “Choosing an Optimal Demand Portfolio for Capacitated Resources,” *Management Science*, vol. 46, July 2000, 912-927

Scott Carr and Izak Duenyas, “Optimal Admission Control and Sequencing in a Make-to-Stock/Make-to-Order Production System,” *Operations Research*, vol. 48, Sept.-Oct. 2000, 709-719

Scott Carr, *Essays on the Allocation of Scarce Capacity Among Multiple Market Segments*, Ph.D. dissertation

### Other Relevant Experience

Automotive Supply Chain and Manufacturing – Libbey-Owens-Ford (1995–1998)

- Consulting and research related to contracting and demand management, information systems, data-mining, production planning and scheduling, demand forecasting, and materials management
- Analysis to determine which of the firm’s products to manufacture using a joint venture manufacturing plant instead of the client firm’s own fully-owned facilities

Legal – Case management and expert-witness preparation (1995–1998)

- Researched case and administrative law on employers’ and owners’ safety responsibilities in multi-employer construction jobsites
- Developed case theories and strategies, wrote briefing materials, and engaged in trial preparation

Finance – Traded and managed portfolios of foreign exchange and Treasury bond options (1986–1991)

- Member of Chicago Board of Trade
- Member of Chicago Mercantile Exchange

Information Technology – Computer Associates, Chicago Illinois (1991–1992)

- Mainframe software systems (datacenter management, security, database management, finance and production applications)

## **EXPERT TESTIMONY AND SUBMISSIONS**

Expert Report of Scott Carr, Ph.D.; on behalf of Heineken Brouwerijen B.V.; Krynica Vitamin S.A. v. Heineken Brouwerijen B.V.; International Centre for Dispute Resolution, American Arbitration Association, Case Number 01-22-8374; May 12, 2023

Deposition Testimony of Scott Carr, Ph.D.; on behalf of Cigna Health and Life Insurance Company; AMISUB, Inc. d/b/a Saint Francis Hospital and Saint Francis Hospital - Bartlett, Inc. v. Cigna Health and Life Insurance Company; United States District Court, Western District of Tennessee, Docket No. 3:21-cv-02308-JFT-atc, April 12, 2023.

Expert Report of Scott Carr, Ph.D. on behalf of Cigna Health and Life Insurance Company; AMISUB, Inc. d/b/a Saint Francis Hospital and Saint Francis Hospital - Bartlett, Inc. v. Cigna Health and Life Insurance Company; United States District Court, Western District of Tennessee, Docket No. 3:21-cv-02308-JFT-atc, March 24, 2023.

Mental Health Services Market Analysis, by Scott Carr, PhD, on behalf of Premera Blue Cross; December 30, 2022.

Expert Rebuttal Report of Scott Carr, PhD, on behalf of Blue Cross Blue Shield of Illinois; C.P., by and through his parents, Patricia Pritchard and Nolle Pritchard, and Patricia Pritchard v. Blue Cross Blue Shield of Illinois; United States District Court, Western District of Washington, Docket No. 3:20-cv-06145-RJB; October 21, 2022.

Arbitration testimony of Scott Carr, Ph.D. on behalf of Ball Corporation and Rexam Beverage Can Company; Arizona Beverages USA LLC v. Ball Corporation and Rexam Beverage Can Company; American Arbitration Association, Case Number 01-21-0017-2481; June 2, 2022.

Deposition Testimony of Scott Carr, Ph.D. on behalf of Brugal & CO., S.A.; Ballester Hermanos, Inc. v. Brugal & CO., S.A.; United States District Court, District of Puerto Rico, Docket No. 3:19-cv-02100; May 11, 2022.

Deposition Testimony of Scott Carr, Ph.D. on behalf of Joint Defense Group; Commonwealth of Pennsylvania, etc. v. Exxon Mobil Corporation, et al, Docket No. 1:14-cv-06228-SAS, MDL No. 1358, May 20, 2022.

Prepared Direct Testimony of Scott Carr, PhD, on behalf of Saddlehorn Pipeline Company, LLC, in support of the Application of Saddlehorn Pipeline Company, LLC for Authorization to Charge Market-Based Rates; April 12, 2022.

Expert Report of Scott Carr, Ph.D. on behalf of Brugal & CO., S.A.; Ballester Hermanos, Inc. v. Brugal & CO., S.A.; United States District Court, District of Puerto Rico, Docket No. 3:19-cv-02100; March 29, 2022.

Rebuttal Expert Report of Scott Carr, Ph.D. on behalf of Ball Corporation and Rexam Beverage Can Company; Arizona Beverages USA LLC v. Ball Corporation and Rexam Beverage Can Company; American Arbitration Association, Case Number 01-21-0017-2481; March 7, 2022.

Expert Report of Scott Carr, Ph.D. on behalf of Ball Corporation and Rexam Beverage Can Company; Arizona Beverages USA LLC v. Ball Corporation and Rexam Beverage Can Company; American Arbitration Association, Case Number 01-21-0017-2481; February 25, 2022.

Expert Report of Scott Carr, Ph.D. on behalf of Joint Defense Group; Commonwealth of Pennsylvania, etc. v. Exxon Mobil Corporation, et al, Docket No. 1:14-cv-06228-SAS, MDL No. 1358, May 24, 2021.

Deposition Testimony of Scott Carr, Ph.D.; Michelle Bagley et al. against The New York State Department of Health et al.; United States District Court, Eastern District of New York; Case No. 15-cv-4845 (FB) (CLP); February 4, 2021, and February 25, 2021.

Expert Report of Scott Carr, Ph.D.; Michelle Bagley et al. against The New York State Department of Health et al.; United States District Court, Eastern District of New York; Case No. 15-cv-4845 (FB) (CLP); December 16, 2020.

United States Postal Service, Negotiated Service Agreement Review, Solicitation 2A-20-A-0029; October 2020.

Prepared Direct Testimony of Dr. Scott M. Carr on behalf of Marketlink, LLC, in support of the Application of Marketlink, LLC, for Authorization to Charge Market Based Rates. F.E.R.C. Docket No. OR19-30; July 24, 2019.

Expert Report of Scott Carr, PhD, and Michal Malkiewicz Regarding the 2019 Roland Garros Code Violation Against Anna Tatishvili; Grand Slam Board (for tennis); June 20, 2019.

Prepared Rebuttal Testimony of Dr. Scott M. Carr on behalf of BridgeTex Pipeline Company, LLC; Occidental Energy Marketing, Inc. v. BridgeTex Pipeline Company, LLC; Railroad Commission of Texas GUD No.10675; December 21, 2018.

Prepared Rebuttal Testimony of Dr. Scott M. Carr on behalf of BridgeTex Pipeline Company, LLC; Occidental Energy Marketing, Inc. v. BridgeTex Pipeline Company, LLC; F.E.R.C. Docket Nos. IS18-102-001, IS18-147-000, and OR18-6-001; October 25, 2018.

Prepared Answering Testimony of Dr. Scott M. Carr on behalf of BridgeTex Pipeline Company, LLC; Occidental Energy Marketing, Inc. v. BridgeTex Pipeline Company, LLC; F.E.R.C. Docket Nos. IS18-102-001, IS18-147-000, and OR18-6-001; July 10, 2018.

Prepared Direct Testimony of Dr. Scott M. Carr on behalf of BridgeTex Pipeline Company, LLC; Occidental Energy Marketing, Inc. v. BridgeTex Pipeline Company, LLC; Railroad Commission of Texas GUD No.10675; June 29, 2018.

Prepared Direct Testimony of Dr. Scott M. Carr on behalf of BridgeTex Pipeline Company, LLC; Occidental Energy Marketing, Inc. v. BridgeTex Pipeline Company, LLC; F.E.R.C. Docket Nos. IS18-102-001, IS18-147-000, and OR18-6-001; May 11, 2018.

Expert Report of Scott Carr, Ph.D., on behalf of Lew Footwear Holdings Pty Ltd; Madden International, Ltd., v. Lew Footwear Holding Pty Ltd; Supreme Court of the State of New York, County of New York; Index No. 650209/2015; March 2018.

Engaged as Testifying Expert on behalf of Metrolinx; Bombardier Transportation Canada Inc. v. Metrolinx; November 2017.



Financial analysis by Scott Carr, Ph.D., and Cliff Hamal on behalf of OHL Industrial; OHL Industrial S.L. and OHL Industrial Delegacion Guatemala, Sociedad Anonima disclosed in Claimants' Rejoinder to Counterclaim; OHL Industrial S.L. and OHL Industrial Delegacion Guatemala, Sociedad Anonima, v. Energia Limpia De Guatemala, S.A.; International Chamber of Commerce International Court of Arbitration, September 19, 2017.

Expert Report of Scott Carr, Ph.D., on behalf of Wells Fargo Bank, N.A.; Extex Energy Partners, Ltd., v. Wells Fargo, N.A.; American Arbitration Association, Case No. 01-16-0003-7384; August 25, 2017.

Deposition Testimony of Scott Carr, Ph.D., on behalf of The Bank of Nova Scotia, Scotiabank Global Banking and Markets, and Scotia Capital; S.A. de Obras y Servicios, COPASA v. The Bank of Nova Scotia, and Scotiabank Global Banking and Markets f/k/a Scotia Capital Inc.; Supreme Court of the State of New York, County of New York; IAS Part 49, Index No. 651649/2013; December 20, 2016.

Expert Report of Scott Carr, Ph.D., on behalf of The Bank of Nova Scotia, Scotiabank Global Banking and Markets, and Scotia Capital; S.A. de Obras y Servicios, COPASA v. The Bank of Nova Scotia, and Scotiabank Global Banking and Markets f/k/a Scotia Capital Inc.; Supreme Court of the State of New York, County of New York; IAS Part 49, Index No. 651649/2013; September 28, 2016.

Expert Disclosure of Scott M. Carr, Ph.D., on behalf of Rayonier Advanced Materials, Inc.; Eastman Chemical Company v. Rayonier Advanced Materials Inc., Rayonier Performance Fibers, LLC, and Rayonier A.M. Sales and Technology Inc.; Chancery Court for Sullivan County, Tennessee, Case No. 15-ck-40024(C); October 22, 2015.

Live Testimony of Dr. Scott M. Carr on Behalf of Buckeye Pipe Line Company; Guttman Energy v. Buckeye Pipe Line Company, L.P. and Laurel Pipe Line Company, L.P.; F.E.R.C. Docket No. OR14-4-000 and -001; October 13, 2015.

Answering Testimony to Commission Trial Staff of Dr. Scott M. Carr on Behalf of Buckeye Pipe Line Company; Guttman Energy v. Buckeye Pipe Line Company, L.P. and Laurel Pipe Line Company, L.P.; F.E.R.C. Docket No. OR14-4-000 and -001; June 26, 2015.

Answering Testimony of Dr. Scott M. Carr on Behalf of Buckeye Pipe Line Company; Guttman Energy v. Buckeye Pipe Line Company, L.P. and Laurel Pipe Line Company, L.P.; F.E.R.C. Docket No. OR14-4-000 and -001; January 20, 2015.

Live Testimony of Scott M. Carr, Ph.D. on behalf of the Tennessee Fuel and Convenience Store Association; Petition of Piedmont Natural Gas Company, Inc. for Approval of a CNG Infrastructure Rider to its Approved Rate Schedules and Service Regulations; Tennessee Regulatory Authority, Docket No. 14-00086; January 12, 2014.

Direct Written Testimony of Scott M. Carr, Ph.D. on behalf of the Tennessee Fuel and Convenience Store Association; Petition of Piedmont Natural Gas Company, Inc. for Approval of a CNG Infrastructure Rider to its Approved Rate Schedules and Service Regulations; Tennessee Regulatory Authority, Docket No. 14-00086; December 11, 2014.

Live Testimony of Scott M. Carr, Ph.D. on behalf of Tyson Farm's Inc. before the U.S. Department of Agriculture, P&S Docket No. D-12-0123, December 10, 2012.

Written Testimony of Scott Carr, Ph.D., on behalf of Summit Point Automotive Research Center and William Scott Inter Vivos Trust. Homeland Training Center LLC v. Summit Point Automotive Research Center and William Scott Inter Vivos Trust. U.S. District Court for the Northern District of West Virginia, Case No. 3:07-cv-00160-JPB, September 15, 2010.

Affidavit of Scott Carr, Ph.D., in support of the New England Credit Policy Coalition; U.S. Federal Energy Regulatory Commission, Docket No. ER10-942-000; April 16, 2010.

Prepared Testimony of Scott M. Carr, Ph.D. on behalf of Brembo North America and Affiliated Companies; Sanluis Rassini S.A. de C.V. and Rassini Frenos S.A. de C.V. vs. Brembo North America, Brembo Participations S.A. and Brembo S.p.A., Brembo International S.A., and Brembo-Rassini, S.A. de C.V.; International Centre for Dispute Resolution, Case No. 50 154 T 00450 07; July 2008.

Comments by Scott Carr, Ph.D., to the California Air Resource Board Regarding California's Emission Warranty Information Reporting and Recall Regulations and Emission Test Procedures on behalf of the Alliance of Automobile Manufacturers, March 20, 2007.



**Exhibit 2**  
**Materials Relied Upon**

<b>Legal Filings</b>
Deposition of Jessica Hamp, 30(b)(6). December 23, 2022.
Deposition of Susan Porter. April 5, 2023.
Fourth Amended Complaint, Andrea Schmitt; Elizabeth Mohondro; and O.L. by and through her parents, J.L. and K.L., each on their own behalf, and on behalf of all similarly situated individuals, v. Kaiser Foundation Health Plan of Washington; Kaiser Foundation Health Plan of Washington Options, Inc.; Kaiser Foundation Health Plan of the Northwest; and Kaiser Foundation Health Plan, Inc. No. 2:17-cv-01611-RSL. December 15, 2020.
<b>Public Documents and Data</b>
National Institute on Deafness and Other Communication Disorders website. "Use of Hearing Aids in 2006" (updated 2012). <a href="https://www.nidcd.nih.gov/health/statistics/use-hearing-aids-2006">https://www.nidcd.nih.gov/health/statistics/use-hearing-aids-2006</a> and <a href="https://www.nidcd.nih.gov/health/statistics/text-description-use-hearing-aids-2006">https://www.nidcd.nih.gov/health/statistics/text-description-use-hearing-aids-2006</a>
"Addressing the rising prevalence of hearing loss." World Health Organization, February 2018.
"Aging America & Hearing Loss: Imperative of Improved Hearing Technologies." Presentation by the President's Council of Advisors on Science and Technology. September, 2015. <a href="https://hearingreview.com/wp-content/uploads/2015/10/PCAST-Slides.pdf">https://hearingreview.com/wp-content/uploads/2015/10/PCAST-Slides.pdf</a> .
"All Ears: What is mild hearing loss?" Starkey Hearing. August 14, 2019. <a href="https://www.starkey.com/blog/articles/2019/08/What-is-mild-hearing-loss">https://www.starkey.com/blog/articles/2019/08/What-is-mild-hearing-loss</a> .
"Audiometry Procedures Manual." <i>Centers for Disease Control National Health and Nutrition Examination Survey</i> . January 2003.
"Does Mild Hearing Loss Require Hearing Aids?" Hearing Doctors website. <a href="https://hearingaiddoctors.com/patient-resources/hearing-aids/does-mild-hearing-loss-require-hearing-aids/">https://hearingaiddoctors.com/patient-resources/hearing-aids/does-mild-hearing-loss-require-hearing-aids/</a> .
"FDA Approves Over-The-Counter Hearing Aids for Mild to Moderate Hearing Problems." <i>PBS NewsHour</i> . August 16, 2022. <a href="http://www.pbs.org/newshour/health/fda-approves-over-the-counter-hearing-aids-for-mild-to-moderate-hearing-problems">www.pbs.org/newshour/health/fda-approves-over-the-counter-hearing-aids-for-mild-to-moderate-hearing-problems</a> .
"Guidelines for Manual Pure-Tone Threshold Audiometry." <i>ASHA.org</i> . <a href="https://www.asha.org/policy/gl2005-00014/">https://www.asha.org/policy/gl2005-00014/</a> .
"Hearing Aids to Treat Hearing Loss." UConn Health Department of Ear, Nose and Throat/Otolaryngology. <a href="https://health.uconn.edu/otolaryngology/areas-of-care/hearing-aids-to-treat-hearing-loss/">https://health.uconn.edu/otolaryngology/areas-of-care/hearing-aids-to-treat-hearing-loss/</a> .
"Hearing Aids." ColumbiaDoctors.org. <a href="https://www.columbiadoctors.org/specialties/ear-nose-throat/our-services/hearing-balance/hearing-aids">https://www.columbiadoctors.org/specialties/ear-nose-throat/our-services/hearing-balance/hearing-aids</a> .
"Hearing Aids." FDA. May 3, 2023. <a href="https://www.fda.gov/medical-devices/consumer-products/hearing-aids">https://www.fda.gov/medical-devices/consumer-products/hearing-aids</a> .
"Hearing Devices – Hearing Aids." Stanfordhealthcare.org. <a href="https://stanfordhealthcare.org/medical-treatments/h/hearing-aids.html">https://stanfordhealthcare.org/medical-treatments/h/hearing-aids.html</a> . Accessed May 6, 2023.
"Over-the-Counter Hearing Aid Legislation Signed into Law." Press Release from the Office of Senator Elizabeth Warren. August 21, 2017. <a href="https://www.warren.senate.gov/newsroom/press-releases/over-the-counter-hearing-aid-legislation-signed-into-law">https://www.warren.senate.gov/newsroom/press-releases/over-the-counter-hearing-aid-legislation-signed-into-law</a> .

**Exhibit 2**  
**Materials Relied Upon**

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<p>“Why Choose Us?” Hearing Doctors website. <a href="https://hearingaiddoctors.com/why-choose-us/">https://hearingaiddoctors.com/why-choose-us/</a>.</p>
<p>Chien W, Lin FR. “Prevalence of Hearing Aid Use Among Older Adults in the United States.” <i>Arch Internal Medicine</i> . February 13, 2012. Vol. 172, No. 3, pp 292-293.</p>
<p>Davis A, McMahon C, Pichora-Fuller K, Russ S, Lin F, Olusanya B, Chadha S, and Tremblay K. “Aging and Hearing Health: The Life-course Approach.” <i>The Gerontologist</i> . 2016. Vol. 56, No. S2, pp. S256–S267.</p>
<p>Goman A, Lin FR. “Prevalence of Hearing Loss by Severity in the United States.” <i>American Journal of Public Health</i> . October 2016. Vol. 106, No. 10.</p>
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<p>Johnson C, Danhauer J, Ellis B, and Jilla A. “Hearing Aid Benefit in Patients with Mild Sensorineural Hearing Loss: A Systematic Review.” <i>Journal of the American Academy of Audiology</i> . Vol. 27, pp. 293-310.</p>
<p>Lin, FR. “Hearing Loss and Cognition Among Older Adults in the United States.” <i>Journal of Gerontology</i> . October 2011. Vol. 66A, No. 10, pp. 1131-1136.</p>
<p>Mahboubi H, Lin H.W., and Bhattacharyya N. “Prevalence, Characteristics, and Treatment Patterns of Hearing Difficulty in the United States.” <i>JAMA Otolaryngology – Head and Neck Surgery</i> . 2018. Vol. 144, No. 1, pp. 65-70.</p>
<p>National Public Radio. “Untreated Hearing Loss Linked to Loneliness and Isolation for Seniors.” September 12, 2019. <a href="https://www.npr.org/sections/health-shots/2019/09/12/760231279/untreated-hearing-loss-linked-to-loneliness-and-isolation-for-seniors">https://www.npr.org/sections/health-shots/2019/09/12/760231279/untreated-hearing-loss-linked-to-loneliness-and-isolation-for-seniors</a>.</p>
<p>Olusanya B, Davis A, Hoffman H. “Hearing loss grades and the International Classification of functioning, disability, and health.” <i>Bull World Health Organ</i> . October 1, 2019, pp 725-728.</p>
<p>Over-the-Counter Hearing Aid Act of 2017, S. 670, 115th Cong. (2017). <a href="https://www.congress.gov/bill/115th-congress/senate-bill/670">https://www.congress.gov/bill/115th-congress/senate-bill/670</a></p>
<p>Sheffield A, Smith R. “The Epidemiology of Deafness.” <i>Cold Spring Harbor Perspectives in Medicine</i>. Originally published online September 24, 2018.</p>
<p>Sliwinska-Kowalska, M. “Chapter 19 – Hearing.” <i>Handbook of Clinical Neurology</i> . 2015. Vol. 131, pp. 341-363.</p>
<p>Valente M, Amlani A. “Cost as a Barrier to Hearing Aid Adoption.” <i>JAMA Otolaryngology–Head &amp; Neck Surgery</i> . July 2017. Vol. 143, No. 7, pp. 647-648.</p>
<p>Yueh, B et al. “Long-Term Effectiveness of Screening for Hearing Loss: The Screening for Auditory Impairment – Which Hearing Assessment Test (SAI-WHAT) Randomized Trial.” <i>Journal of the American Geriatrics Society</i>. 2010. Vol. 58, pp. 427–434.</p>

# Exhibit B

**U.S. District Court  
United States District Court for the Western District of Washington (Seattle)  
Docket NO. 2:17-cv-01611-RSL**

**ANDREA SCHMITT; ELIZABETH MOHUNDRO;  
and O.L. by and through her parents, J.L. and K.L.,  
each on their own behalf, and on behalf of similarly situated individuals,  
Plaintiffs**

**v.**

**KAISER FOUNDATION HEALTH PLAN OF WASHINGTON; KAISER FOUNDATION HEALTH PLAN  
OF WASHINGTON OPTIONS, INC.; KAISER FOUNDATION HEALTH PLAN OF THE NORTHWEST;  
and KAISER FOUNDATION HEALTH PLAN, INC.,  
Defendants**

**EXPERT REBUTTAL REPORT OF SCOTT CARR, PH.D.  
June 12, 2023**

**EXPERT REBUTTAL REPORT OF SCOTT CARR, PH.D.**

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## EXPERT REBUTTAL REPORT OF SCOTT CARR, PH.D.

### I. Introduction and Summary of Opinions

I am Scott Carr, Ph.D., a Senior Managing Director and leader of the Competition and Class Actions Practice at Ankura Consulting Group (“Ankura”). I was engaged by the Defendants, Kaiser Foundation Health Plan of Washington, Kaiser Foundation Health Plan of Washington Options, Inc., Kaiser Foundation Health Plan of the Northwest, and Kaiser Foundation Health Plan (collectively, “Kaiser”) to prepare expert opinions regarding statistics about hearing loss prevalence and hearing aid usage. I submitted an Expert Report (“Carr Report”) on that topic on May 12, 2023, which also sets forth my credentials for performing this work and includes my *curriculum vitae*. In this report, I address reports submitted by Dr. Frank Fox (“Fox Updated Report”) and Dr. Frank Lin (“Lin Report”) on behalf of Plaintiffs.<sup>1</sup> Materials I relied upon when preparing this report are listed in Exhibit 1 and/or cited herein.

In Section II immediately below, I first describe (in Section II.A) Dr. Fox’s estimation of damages experienced by the Kaiser enrollees who were subject to the hearing aid coverage exclusions that are the subject of this proceeding. I then (in Section II.B) discuss flaws in Dr. Fox’s methodology. I conclude that Dr. Fox’s damages estimate is inaccurate and unreliable because he failed to account for the fact that many people with hearing loss, even disabling hearing loss, do not use hearing aids, even when cost is not a factor, and because he applied audiometric criteria that are not “standard classifications that audiologists are taught in school

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<sup>1</sup> Expert Report of Frank Fox, PhD, submitted on May 12, 2023, and updated on May 23, 2023 (“Fox Updated Report”); Expert Report of Frank R. Lin, MD, PhD, submitted on May 12, 2023 (“Lin Report”).

and that are used by most audiologists”<sup>2</sup> to define hearing thresholds. After adjustments to address these flaws, Dr. Fox’s damages estimate drops to between \$3.96 million (58.6 percent reduction) and \$2.39 million (75.0 percent reduction).

In Section III, I discuss Dr. Fox’s “Cost Avoidance” estimate, which, as Dr. Fox describes it, is “the amount of cost avoidance that the Defendant experienced by not providing coverage of medically necessary hearing aids to the applicable class of insureds.”<sup>3</sup> I conclude that this estimate, which he presents as an intermediate step in his damages analysis, is irrelevant, incorrect, and unreliable because it suffers from the same flaws as his damages estimate, is not a measure of whether Kaiser benefited financially from the hearing aid exclusions, and other reasons.

In Section IV, I discuss Dr. Lin’s report in which he opines, “with only exceedingly rare exceptions, individuals who use hearing aids would be considered to have a hearing disability from the medical perspective.”<sup>4</sup> I conclude that this opinion is contradicted by his own research showing that many people with non-disabling hearing loss use hearing aids, by low or weak correlation between hearing aid usage and hearing disability, by the substantial number of people with non-disabling hearing loss who use hearing aids, and other reasons.

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<sup>2</sup> Declaration of Dr. Benjamin Gilham, Au.D., dated June 2, 2023 (“Gilham Declaration”), p. 2.

<sup>3</sup> Fox Updated Report, p. 17.

<sup>4</sup> Lin Report at Executive Summary (the Lin Report does not include page numbers)

Section V then concludes this report.

## II. Dr. Fox's Damages Analysis

### A. Description of Dr. Fox's Damages Analysis

Dr. Fox states that he conducted a “damages analysis in Sections V, VI, and VII” of his report, and he presents a “total damage estimate” of \$9.6 million for the period November 1, 2014 through April 30, 2023 (the “relevant period”)<sup>5</sup> in Section VI of his report.<sup>6</sup> Dr. Fox describes his total damages estimate as “the amount of utilization and expenditures experienced by the applicable class of insureds under Defendants’ Washington health insurance plans over the study period *assuming no coverage of hearing aids.*”<sup>7</sup> In effect, Dr. Fox’s \$9.6 million damages estimate is simply his estimate of out-of-pocket hearing aid expenditures incurred by uncovered Kaiser enrollees during the relevant period.

Dr. Fox’s damages model can be described in the following four steps, which are detailed in the subsections below.

**STEP 1:** Estimate the number of uncovered Kaiser enrollees<sup>8</sup> during the relevant period, by year and age group.

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<sup>5</sup> Fox Updated Report, pp. 12, 17, 29-32, 40, Table 15.

<sup>6</sup> Fox Updated Report, pp. 7, 32, 40. Section V is entitled “Methodology and Findings of Baseline Hearing Loss Prevalence and Hearing Aid Expenditure Model.” Section VI is entitled “Methodology and Findings of Insurance Effect Hearing Loss Prevalence and Hearing Aid Expenditure Model.” Section VII, which does not include Dr. Fox’s primary damages computations, is entitled “Comparative Analysis.” See Fox Updated Report, pp. 17-39. For brevity and clarity, I refer to Dr. Fox’s Section V and VI analyses as his “damages model,” “damages estimate,” or “total damages estimate.”

<sup>7</sup> Fox Updated Report, p. 28 (*italics in original*). Dr. Fox refers to this analysis as the ‘Insurance Effect’ model.

<sup>8</sup> Throughout this report, I use the term “uncovered Kaiser enrollees” to refer to those Kaiser enrollees who were subject to a hearing aid exclusion during the relevant period.



**STEP 2:** Estimate the number of uncovered Kaiser enrollees who used a hearing aid.

**STEP 3:** Estimate the rate at which uncovered Kaiser enrollees purchased hearing aids.

**STEP 4:** Estimate uncovered Kaiser enrollees' out-of-pocket hearing aid expenditures.

These steps are discussed in the four Subsections below.

### **1. Dr. Fox's Estimate of Uncovered Kaiser Enrollees by Year and Age Group**

In Step 1 of his damages model, Dr. Fox estimates the number of uncovered Kaiser enrollees during the relevant period by year and age group. First, Dr. Fox estimates the number of uncovered Kaiser enrollees in four age groups (based on an analysis prepared by Veronica Fontana of Kaiser<sup>9</sup> and uncovered enrollment counts produced by Kaiser<sup>10</sup>). Second, he assumes that persons 65 years and older are primarily covered under Medicare, and he thus excludes persons 65 years and older from his damages analysis.<sup>11</sup> Dr. Fox's estimates of uncovered Kaiser enrollees by year and age group appear in Table 5 of his report.<sup>12</sup>

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<sup>9</sup> Fox Updated Report, p. 18, citing to NATIVE CONFIDENTIAL KAISER\_002110-KAISER\_002110.

<sup>10</sup> "Insured counts for 2014 through 2022 are based on Defendants' First Supplemental Responses to Plaintiffs' Second Discovery Requests, produced on May 10, 2023. These are estimates of Defendant insureds without hearing aid coverage and exclude Federal Employee Health Benefit (FEHB), self-funded and Medicare plans." See Fox Updated Report, pp. 17-18.

<sup>11</sup> See Fox Updated Report at Tables 4-5 and footnote 12.

<sup>12</sup> See Fox Updated Report at Table 5.

## 2. Dr. Fox's Estimate of the Number of Uncovered Kaiser Enrollees Who Used a Hearing Aid

In Step 2 of his damages model, Dr. Fox begins with a dataset he extracted from the National Health and Nutrition Examination Survey ("NHANES")<sup>13</sup> from 2015 through 2018.<sup>14</sup> This dataset comprises answers to demographic and audiological questions for 5,619 survey respondents between the ages of 6 and 64 years old.<sup>15</sup>

Dr. Fox then filters this data on two criteria. For his first criterion, Dr. Fox designates each respondent as having either: (1) "no/mild" hearing loss, (2) "unilateral" (single ear) hearing loss, or "bilateral" (both ears) hearing loss – and he excludes respondents with no/mild hearing loss from his damages analysis.<sup>16</sup>

To implement this criterion, Dr. Fox first uses audiological examination information in the NHANES data to categorize the survey respondents' hearing loss *in each ear* using the following decibel ranges categorized by Dr. Fox: 0-19 dB for no hearing loss, 20-34 dB for mild hearing loss, 35-49 dB for moderate hearing loss, 50-64 dB for moderately severe hearing loss, 65-79 dB for severe hearing loss, 80-94 dB for profound hearing loss, and 95 dB or greater for

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<sup>13</sup> The NHANES survey is "designed to assess the health and nutritional status of adults and children in the United States" through a combination of physical examinations and self-assessment interviews administered by the Centers for Disease Control and Prevention (CDC) to a "nationally representative sample of about 5,000 persons each year." See CDC, About the National Health and Nutrition Examination Survey, [https://www.cdc.gov/nchs/nhanes/about\\_nhanes.htm](https://www.cdc.gov/nchs/nhanes/about_nhanes.htm).

<sup>14</sup> Fox Updated Report, pp. 19-20.

<sup>15</sup> To create this dataset, Dr. Fox filtered the original NHANES data for the 2015-2018 survey years. He excluded survey respondents more than 64 years old and survey respondents with missing or incomplete information. The resulting dataset used by Dr. Fox has respondents from 20 to 64 years old from the 2015-2016 survey years and respondents from 6 to 19 years old from the 2017-2018 survey years.

<sup>16</sup> Fox Updated Report, p. 10.

complete or total hearing loss.<sup>17</sup> He then uses these “each ear” hearing loss designations to assign each respondent an (overall) hearing loss designation of no/mild, unilateral, or bilateral using the following rules: (1) “no/mild” hearing loss means mild hearing loss, or no hearing loss, in both ears; (2) “unilateral” hearing loss means no hearing loss in one ear and moderate or worse hearing loss in the other ear; “bilateral” hearing loss means moderate or worse hearing loss in one ear and mild or worse hearing loss in the other ear.<sup>18</sup> Finally, Dr. Fox estimates hearing loss prevalence percentages by age group for the no/mild, unilateral, and bilateral hearing loss categories; these percentages are shown by age group in Table 7 of his report.<sup>19</sup>

For his second criterion, Dr. Fox filters survey respondents based on their responses to a question about their general hearing ability without the use of hearing aids. The respondents selected from the following options regarding their hearing: excellent, good, a little trouble, moderate hearing trouble, a lot of trouble, and deaf.<sup>20</sup> Using respondents who reported they had “moderate hearing trouble,” “a lot of trouble,” or “deaf,” Dr. Fox estimates that 42.93 percent of those survey respondents he previously classified as having unilateral hearing loss and 43.63 percent of those survey respondents he previously classified as having bilateral

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<sup>17</sup> Fox Updated Report, p. 20 and Table 6. Dr. Fox takes these decibel ranges from World Health Organization’s thresholds updated in March 2021. However, as discussed below, these are not the “standard classifications that audiologists are taught in school and that are used by most audiologists.” Instead, the standard classification is to, “define hearing thresholds of 26-40 dB as mild hearing loss; moderate hearing loss as 41-55dB; moderate to severe loss as 56-70 dB; severe loss as 70-90 dB; and profound loss as 90+dB.” Gilham Declaration, p. 2.

<sup>18</sup> Fox Updated Report, p. 20 and Table 6.

<sup>19</sup> Fox Updated Report, p. 21 and Table 7. Since the NHANES data does not include audiometric examination data for ages 0 to 5 years, Dr. Fox estimates hearing loss prevalence for the 0 to 5 age group by extrapolating the prevalence rates for the 6 to 19 age group. See Fox Updated Report, fn. 17, for additional detail.

<sup>20</sup> Fox Updated Report, pp. 21-22.

hearing loss used a hearing aid.<sup>21</sup> Thus, Dr. Fox assumes that all survey respondents with unilateral or bilateral hearing loss from his first criterion who also self-reported having “moderate hearing trouble” or worse in his second criterion use a hearing aid. Dr. Fox presents these percentages, which he refers to as “Assumed Prescription Hearing Aid Utilization Factor[s]” in Table 8 of his report.<sup>22</sup>

Finally, Dr. Fox estimates the number of uncovered Kaiser enrollees using a hearing aid by multiplying the following together: (1) his estimated number of uncovered Kaiser enrollees for each year and age group (Fox Table 5); (2) his estimates of the prevalence of hearing loss (Fox Table 7); and (3) his “Assumed Prescription Hearing Aid Utilization Factor[s]” (Fox Table 8). Dr. Fox presents his estimated number of uncovered Kaiser enrollees using monaural hearing aids by age group in Table 9 of his report, and his estimated number of uncovered Kaiser enrollees using binaural hearing aids by age group in Table 10 of his report.<sup>23</sup>

### **3. Dr. Fox’s Estimate of the Rate at Which Uncovered Kaiser Enrollees Purchased a Hearing Aid**

In Step 3 of his damages model, Dr. Fox estimates the number of uncovered Kaiser enrollees who purchased hearing aids out-of-pocket during the relevant period. Using data from the 2019 Medical Expenditure Panel Survey, Dr. Fox calculates the average number of visits per person, as measured by office-based and outpatient visits (without regard to whether the visits were hearing-related which, presumably, the vast preponderance were not), by

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<sup>21</sup> Fox Updated Report, pp. 21-22, Table 8.

<sup>22</sup> See Fox Updated Report at Table 8.

<sup>23</sup> See Fox Updated Report at Table 9 and Table 10.

insurance status (*i.e.*, the uninsured and those individuals in the survey with any type of insurance coverage).<sup>24</sup> He estimates that medical utilization by uninsured persons, as measured by the average number of visits per person, was 25.8% of the utilization by individuals with insurance coverage.<sup>25</sup> In other words, Dr. Fox assumes that the number of uncovered Kaiser enrollees who purchased either a monaural or binaural hearing aid device out-of-pocket is 25.8% of the number of hearing aid users he estimated in Step 2 of his damages model.

#### **4. Dr. Fox's Estimate of Uncovered Kaiser Enrollees' Out-of-Pocket Hearing Aid Expenditures**

In Step 4 of his damages model, Dr. Fox estimates "actual out-of-pocket expenditures by Kaiser insureds."<sup>26</sup> Dr. Fox estimates these expenditures by multiplying the number of uncovered Kaiser enrollees who he assumed purchased either a monaural or binaural hearing aid device out-of-pocket (as estimated in Step 3 of his damages model) by his estimated monthly costs for monaural and binaural hearing aids (Fox Table 11). In sum, Dr. Fox estimates that uncovered Kaiser enrollees incurred damages of \$9.6 million related to out-of-pocket purchases of hearing aid devices during the relevant period.<sup>27</sup>

#### **B. Discussion of Dr. Fox's Damages Analysis**

As discussed below, Dr. Fox, in the computations underlying his \$9.6 million damages estimate, fails to recognize that many people with hearing loss do not use hearing aids, even

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<sup>24</sup> Fox Updated Report, pp. 29-30, Table 14. Dr. Fox also limits his analysis to survey respondents between the ages of 0 and 64 years old.

<sup>25</sup> Fox Updated Report, pp. 29-30, Table 14.

<sup>26</sup> Fox Updated Report, p. 12.

<sup>27</sup> Fox Updated Report, p. 12.

when hearing aids are available to them at low or no cost. Consequently, Dr. Fox's \$9.6 million damages estimate is incorrect and unreliable.

As described in Section II.A above, Dr. Fox's damages estimate calculations comprise four computational steps. In one of these steps (Step 2 as described in Section II.A.2 above), Dr. Fox purports to estimate the number of uncovered Kaiser enrollees who used hearing aids during the relevant period. These estimates, which Dr. Fox describes as "estimated insured counts to utilize monaural and binaural hearing aids" appear in Tables 9 and 10 of his report.<sup>28</sup>

Dr. Fox, in his written text (but not in his calculations, as this discussion indicates) recognizes that many people with hearing loss do not use hearing aids. Dr. Fox states,

[M]any people who can benefit from hearing aids do not actually get hearing aids. Cost has been found to be one of the significant barriers to hearing aid adoption, but non-financial factors also play a role. People who need hearing aids often face various barriers, such as comfort, stigma, and self-underestimation of hearing loss, that prevents them from purchasing or using hearing aids. This can be seen in examples of some European countries' health systems, as well as domestic health systems like the Department of Veteran's Affairs, which provide access to hearing aids at little-to-no cost yet do not see full adoption of hearing aids among those with disabling hearing loss. *Consequently, a model estimating hearing aid utilization assuming effective insurance should not assume full 100% utilization of hearing aids among persons with hearing loss.*<sup>29</sup> (italics added)

However, in contradiction to the italicized sentence in the quotation above, Dr. Fox *does* assume 100 percent utilization of hearing aids. Specifically, he assumes that every person with measured binaural or monaural hearing loss (as categorized by Dr. Fox) who self-assesses their

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<sup>28</sup> Fox Updated Report, pp. 23-24.

<sup>29</sup> Fox Updated Report, p. 21, citations omitted.

hearing ability as “moderate hearing trouble” or worse uses a hearing aid. Thus, Dr. Fox’s calculations are contradicted by his own words.

Dr. Fox’s calculations are also contradicted by the NHANES data on which he relies. Of the people in the NHANES dataset with measured binaural/monaural hearing loss (as categorized by Dr. Fox) and who self-assess as having “moderate hearing trouble” or worse, far fewer than 100 percent use hearing aids. In particular:<sup>30</sup>

- Of respondents with binaural hearing loss and moderate hearing trouble or worse, only 38 percent reported that they frequently use a hearing aid,<sup>31</sup> and only 44 percent reported that they had ever used a hearing aid.<sup>32</sup>
- Of the respondents with monaural hearing loss and moderate hearing trouble or worse, only 16 percent reported that they frequently use a hearing aid, and only 37 percent reported that they had ever used a hearing aid.

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<sup>30</sup> Here and throughout this report, all averages that I calculated from the NHANES data are weighted averages using NHANES survey weights that are included in the original data.

<sup>31</sup> *I.e.*, For 2015-2016, NHANES respondents indicated that they wear a hearing aid more frequently than “seldom” over the past year given the following choices: “never,” “seldom,” “about half the time,” “usually,” and “always.” For 2017-2018, respondents indicated that they wear a hearing aid more often than “1 to 3 hours a day” over the past two weeks given the following choices: “Less than 1 hour a day,” “1 to 3 hours a day,” “4 to 7 hours a day,” “8 or more hours per day,” and “Never.”

<sup>32</sup> *I.e.*, NHANES respondents in 2015-2016 were asked if they had ever worn a hearing aid/cochlear implant. Those who responded “yes,” and that subsequently responded that the device was a hearing aid, are counted here. For 2017-2018, respondents were asked if they “now use” a hearing aid/amplifier/implant. Those who responded “yes,” and that the device is a hearing aid, are counted here.

Further, publicly available research indicates that hearing aid utilization is well below 100 percent among people with hearing loss, even when hearing aids are available to them at low or no cost. For instance:

- On average across Norway, Denmark, and the United Kingdom, all of which fully cover hearing aid costs,<sup>33</sup> surveys indicate that hearing aid utilization among people who self-assess as having moderate or worse hearing loss is just 63 percent.<sup>34</sup>
- Research published in the *Journal of the American Geriatrics Society* measuring hearing aid uptake showed limited utilization of hearing aids among hearing-impaired subjects, even when the hearing aids were fully subsidized.<sup>35</sup> The study's subjects were U.S. veterans eligible for free hearing aids paid for by U.S. Department of Veterans Affairs ("VA"). All subjects exhibiting hearing loss were given "written instructions to call the VA ... for formal evaluation." Of the subjects who visited an audiologist *and received an audiogram result showing*

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<sup>33</sup> "What is the Most Efficient Reimbursement System in Europe?" *The Hearing Review*. December 30, 2015. <https://hearingreview.com/practice-building/practice-management/continuing-education/efficient-reimbursement-system-europe>.

<sup>34</sup> European Hearing Instrument Manufacturers Association: EuroTrak Country Market Surveys (UK 2022, Denmark 2022, and Norway 2019). Downloaded from <https://www.ehima.com/surveys>. These countries, in addition to providing hearing aids at no cost to consumers, also have the highest hearing aid adoption rates among the hearing impaired in Europe according to the EuroTrak Country Market Surveys.

<sup>35</sup> Yueh, B et al. "Long-Term Effectiveness of Screening for Hearing Loss: The Screening for Auditory Impairment – Which Hearing Assessment Test (SAI-WHAT) Randomized Trial." *Journal of the American Geriatrics Society*. 2010. Vol. 58, pp. 427–434.



*correctable hearing loss*, just 38.2 percent were wearing a hearing aid one year later.

Dr. Fox's failure to account for less than 100 percent hearing aid utilization is not benign. Within Dr. Fox's methodology, his damages estimate is proportional to the hearing aid utilization percentage among uncovered Kaiser enrollees with binaural/monaural hearing loss who self-assesses as having "moderate hearing trouble." Thus, Dr. Fox's assumption of 100 percent hearing aid utilization inflates his estimate of out-of-pocket purchases of hearing aids by uncovered Kaiser enrollees.

To illustrate the degree to which more appropriate assumptions about hearing aid utilization affect Dr. Fox's damages estimate, I adjusted his damages estimate using the utilization rates listed in the two bulleted points immediately above. Applying the larger of these utilization rates – 63 percent, the average of the United Kingdom, Norway, and Denmark – Dr. Fox's damages estimate falls to \$6.06 million, a reduction of 36.8 percent. Applying the smaller of these utilization rates – the 38.2 percent from the study of hearing aid usage among U.S. veterans – reduces Dr. Fox's damages to \$3.66 million, a reduction of 61.8 percent.

Another consideration is Dr. Fox's assumptions about how to measure and categorize hearing loss. Dr. Fox defines unilateral hearing loss using an average hearing loss threshold of at least 35 dB in one ear and less than 20 dB in the other ear. He defines bilateral hearing loss as at least 35 dB in one ear and at least 20 dB in the other ear.<sup>36</sup> According to Dr. Gilham, those

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<sup>36</sup> Fox Updated Report, p. 20.

criteria are not generally applied when assessing hearing loss and the possible usefulness of hearing aids.<sup>37</sup> If I instead apply a threshold for unilateral hearing loss of greater than 40 dB in one ear and 25 dB or less in the other ear and a threshold for bilateral hearing loss of greater than 40 dB in one ear and greater than 25 dB in the other ear, Dr. Fox's damages fall even further. If I change nothing about his analysis except these thresholds (while continuing to apply the UK/Norway/Denmark hearing aid utilization rate), Dr. Fox's damages fall to \$3.96 million, a reduction from his original model of 58.6 percent. If I use these hearing loss thresholds while applying the hearing aid utilization rate from the VA study, Dr. Fox's damages fall to \$2.39 million, a reduction of 75.0 percent.

Additionally, Dr. Fox does not account for those individuals with hearing impairments who may be best treated with a cochlear implant or bone-anchored hearing aid (BAHA) instead of an air conduction hearing aid. Dr. Fox's damages estimate would be further reduced to the extent that such hearing-impaired individuals are included in his analysis.

### **III. Dr. Fox's "Cost Avoidance" Estimate**

In an intermediate step of his damages calculation, Dr. Fox's performs an analysis on "the amount of cost avoidance that the Defendant experienced by not providing coverage of medically necessary hearing aids to the applicable class of insureds."<sup>38</sup> Dr. Fox refers to this analysis as his "Baseline Model" and states that it is an estimate of "cost avoidance *assuming*

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<sup>37</sup> Gilham Declaration, p. 2.

<sup>38</sup> Fox Updated Report, p. 17.

*full and effective coverage of hearing aids.*<sup>39</sup> Dr. Fox's "cost avoidance" estimate is \$37.1 million, of which \$5.2 million is for enrollees with unilateral hearing loss and \$31.9 million is for enrollees with bilateral hearing loss.<sup>40</sup> However, as discussed below, Dr. Fox's "cost avoidance" estimate is both incorrect and irrelevant.

Dr. Fox's "cost avoidance" estimate is irrelevant because it is not a measure of whether Kaiser benefited financially from the hearing aid exclusions, and neither is it a measure of damages experienced by putative class members. Specifically, it does not indicate that Kaiser benefited financially from the hearing aid exclusions because it does not recognize that Kaiser would have charged higher enrollment rates if it had provided hearing aid coverage to the uncovered enrollees. Further, Kaiser would have increased these rates a sufficient amount to cover its expected incremental costs of providing additional hearing aids, including costs of administering the hearing aid benefit and paying the associated taxes.<sup>41</sup>

Moreover, Dr. Fox's estimate is not a measure of damages because: (1) it measures ("but-for") costs *for Kaiser*, not costs for putative class members as would be necessary for it to be a damages estimate; and (2) it includes costs for hypothetical hearing aid purchases that the

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<sup>39</sup> Fox Updated Report, p. 12 (*italics in original*).

<sup>40</sup> See Fox Updated Report at Table 12.

<sup>41</sup> Deposition of Jodi Russell, April 11, 2023, pp. 79-81.

putative class members did not make (allegedly because of the hearing aid exclusions) and Plaintiffs are not seeking damages for such hypothetical purchases.<sup>42</sup>

Dr. Fox's "cost avoidance" estimate is also incorrect – for two additional reasons. First it unrealistically assumes that every person with measured unilateral/bilateral hearing loss (as categorized by Dr. Fox) and who self-assesses as having "moderate hearing trouble" or worse would have purchased a hearing aid but for the Kaiser exclusions. Second, Dr. Fox assumes non-standard hearing loss thresholds for identifying unilateral/bilateral hearing loss.<sup>43</sup> I discussed both these issues in detail in Section II.B of this report in regard to Dr. Fox's damages estimate, and those discussions apply equally to Dr. Fox's "cost avoidance" estimate.

Thus, Dr. Fox's "cost avoidance" is both irrelevant – because it is neither a measure of damages nor an accurate estimate of whether Kaiser benefited financially from the hearing aid exclusions – and inaccurate – because it inappropriately assumes 100 percent hearing aid utilization and relies on non-standard hearing loss thresholds.

#### **IV. Dr. Lin's Report**

Dr. Lin opines that virtually everyone using a hearing aid has a hearing disability. He states, "with only exceedingly rare exceptions, individuals who use hearing aids would be

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<sup>42</sup> Plaintiffs' Second Supplemental Answers and Responses to Defendants' First Interrogatories and Requests for Production. "Plaintiffs do not seek payment of money damages but rather processing and reprocessing of claims for hearing coverage that were excluded improperly by Kaiser's hearing exclusion." See Answer to Interrogatory No. 9.

<sup>43</sup> Gilham Declaration, p.2. par. 4.

considered to have a hearing disability from the medical perspective.”<sup>44</sup> Dr. Lin provides no statistical, quantitative, or other support for this opinion, and he does not propose or apply any statistical definition of disabling hearing loss that would enable one to quantitatively test whether it is true. Further, Dr. Lin’s opinion is apparently contradicted by Dr. Gilham who states, “disability is not a benchmark for determining whether air conduction hearing aids would be of benefit to treat sensorineural hearing loss” and “labelling someone as ‘disabled’ based on whether they decide to pursue hearing aids is not reasonable.”<sup>45</sup>

Moreover, Dr. Lin uses the term “hearing disability” in a manner that equates hearing loss, at virtually any level, to having a disability. That is, he uses the term “hearing disability” to mean *any* measurable hearing loss combined with *any self-reported* “functional restrictions.”<sup>46</sup> In effect, Dr. Lin leaves no room for people to have *mild* hearing loss that is observable but not disabling – a position that is contradicted by the definitions for “hearing disability” used in published statistical analyses of hearing loss (as discussed in Subsection A below). And, he provides no basis to match his definitions of “functional restrictions” to available data compilations of self-reported hearing limitations.

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<sup>44</sup> Lin Report, Executive Summary (the Lin Report does not include page numbers).

<sup>45</sup> Gilham Declaration, pp. 3-4.

<sup>46</sup> Lin Report, Section A.3, stating the definition of hearing disability “is often operationalized as meaning that a patient would be considered to have a hearing disability if (1) they self-report functional restrictions in everyday activities requiring hearing (e.g., verbal communication with others, environmental sound awareness needed for safety, etc.) and (2) there is evidence of objective audiometric hearing loss (e.g., hearing thresholds greater than 20 dB).”

Thus, I tested whether Dr. Lin’s opinion that virtually everyone using a hearing aid has a hearing disability is supported by the published literature and by available data. It is not. As discussed in Subsection A below, Dr. Lin’s opinion is contradicted by his own published research, by other publicly available information, and by the Court in recent litigation. Further, as discussed in Subsection B, Dr. Lin’s opinion is also contradicted by the NHANES data on which Dr. Fox relied.

#### **A. Published Research and Other Publicly Available Information**

To statistically test the relationship between hearing disability and hearing aid use, it is necessary to define a statistical definition of “hearing disability.” That is, it is necessary to have criteria for identifying people who have hearing disabilities within the data being analyzed. For example, the World Health Organization (“WHO”), in statistical analyses of hearing loss prevalence, has equated *disabling* hearing loss with *moderate* hearing loss and distinguished both from *mild* hearing loss. For instance: (1) in 2020, the World Health Organization identified both disabling hearing loss and moderate hearing loss using the same “> 40 dB” hearing loss threshold, and defined mild hearing loss based on a lower “>25 dB” threshold;<sup>47</sup> and (2) in 2023, the WHO again equated *disabling* hearing loss with *moderate* hearing loss and

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<sup>47</sup> Lin Report, Section A.2, stating that the WHO defined moderate hearing loss based on “41-60 dB” hearing loss. World Health Organization fact sheet, *Deafness and Hearing Loss*, March 1, 2020, (“Disabling hearing loss refers to hearing loss greater than 40dB in the better hearing ear in adults.”), archived by the Internet Archive on July 13, 2020, <https://web.archive.org/web/20200713220735/https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss>. Also see American Speech-Language-Hearing Association webpage equating disabling hearing loss with moderate hearing loss based on a >40 dB threshold (“As of 2018, 432 million adults worldwide demonstrated a disabling hearing loss, or a hearing loss greater than 40 decibels (dB), resulting in an overall prevalence rate of 7.6% of adults aged 15 years and older.” (citing WHO, 2018) The website includes a table defining moderate hearing loss based on the >40 dB threshold and mild hearing loss based on the >30 dB threshold.

distinguished both from *mild* hearing loss, but now based on a “≥ 35 dB” threshold, while defining mild hearing loss based on a “≥ 20 dB” threshold.<sup>48</sup> Numerous other hearing loss researchers have also taken this approach of defining disabling hearing loss based on a “> 40 dB” or “≥ 35 dB” threshold.<sup>49</sup>

Dr. Lin, as I discussed in my initial report, co-authored research showing that many people with mild hearing loss – *i.e.*, people who do not have disabling hearing loss under the 2020 WHO approach discussed above – use hearing aids. As I stated,<sup>50</sup>

Many people with mild hearing loss use hearing aids. Based on hearing loss statistics [from two research articles co-authored by Dr. Lin], 120 thousand mildly hearing-impaired people aged 50-59 use hearing aids, which is 46 percent of all hearing aid users in that age group. For the 60-69 age group, 180 thousand mildly hearing-impaired people use hearing aids, which is 24 percent of all hearing aid users in that age group. Across these age groups collectively, 300 thousand mildly hearing-impaired people use hearing aids, which is 30 percent of all hearing aid users aged 50-69.

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<sup>48</sup> Lin Report, Section A.2 stating that the WHO currently defines moderate hearing loss based on “25-49.9 dB” hearing loss. World Health Organization (“WHO”) fact sheet, *Deafness and Hearing Loss* (“‘Disabling’ hearing loss refers to hearing loss greater than 35 decibels (dB) in the better hearing ear”), from current WHO website, <https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss>

<sup>49</sup> *E.g.*, (1) Ting, Hsin-Chen et al., “Sensitivity and specificity of hearing tests for screening hearing loss in older adults.” *Journal of Otology*. 2023. Vol. 18. pp. 1 – 6. (2) Vasconcelos et al. “Prevalence of disabling hearing loss in the elderly.” *Adv Treat ENT Disord*. 2019. Vol. 3. pp. 12 - 13. (3) Jorgensen et al. “Hearing loss, sick leave, and disability pension: findings from the HUNT follow-up study.” *BMC Public Health*. 2022. 22:1340. (4) Garg et al. “A Cross-Sectional Study on Hearing Loss Using World Health Organization Protocol in Delhi.” *Indian Journal of Otology*. Vol. 24. Issue 3. July-September 2018. pp. 184 – 189.

<sup>50</sup> Carr Report, p. 10, citing: (1) Chien W, Lin FR. “Prevalence of Hearing Aid Use Among Older Adults in the United States.” *Arch Internal Medicine*. February 13, 2012. Vol. 172, No. 3, pp 292-293, and (2) Goman A, Lin FR. “Prevalence of Hearing Loss by Severity in the United States.” *AJPH*. October 2016. Vol. 106, No. 10.

Thus, Dr. Lin's opinion that virtually all hearing aid users have a hearing disability is contradicted by his own research showing that many people with mild hearing loss use hearing aids.

Additionally, and again contrary to Dr. Lin's opinion that virtually everyone using a hearing aid has a hearing disability, numerous organizations, governmental agencies, and researchers indicate that hearing aids are appropriate for people with mild hearing loss; and hearing aids are widely marketed to people with mild hearing loss, including over the counter.<sup>51</sup> Similarly, in recent litigation that is similar to this matter, the Court adopted an approach of assuming that people with moderate or worse hearing loss have a hearing disability and that people with mild hearing loss do not.<sup>52</sup> Moreover, in adopting that approach, the Court stated that the approach construes "all inferences in Plaintiffs' favor" while citing Dr. Lin's published research.<sup>53</sup>

## **B. NHANES Data**

In this section of my report, I examine whether the NHANES data used by Dr. Fox supports Dr. Lin's opinion that virtually everyone using a hearing aid has a hearing disability.<sup>54</sup>

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<sup>51</sup> Carr Report, pp. 10-14.

<sup>52</sup> *E.S. v. Regence BlueShield*, 2022 U.S. Dist. LEXIS 17366 (W.D. Wash., January 31, 2022) stating: (1) "The Court assumes that those with 'severe' or 'profound' hearing loss would be disabled"; (2) "Next, the Court assumes that every person with 'moderate' hearing loss would be disabled"; (3) "Finally, the Court assumes that every person with 'mild' hearing loss would not be disabled. People in this category may only have 'some difficulty hearing softly voiced sounds'"; and (4) "the Court assumes that all people with 'moderate' hearing loss would be disabled under the ADA because the Court must construe all inferences in Plaintiffs' favor." (citations omitted).

<sup>53</sup> *Ibid.*

<sup>54</sup> Lin Report, Executive Summary.



In Subsection 1 below, I test whether hearing aid usage is synonymous with having a hearing disability, as Dr. Lin’s opinion suggests. To do so, I use “correlation coefficients” (or, for brevity, just “correlations”), to statistically measure whether hearing aid usage closely corresponds to hearing disability within the NHANES survey data. I find that it does not; instead, the correlation between hearing aid usage and hearing disability is low. Subsections 2 and 3 show two primary reasons why hearing aid usage and hearing disability do not closely correspond. First (Subsection 2), people with mild hearing loss are much more prevalent among people with some degree of hearing loss than people with disabling hearing loss. Thus, people with mild hearing loss make up a substantial portion of the people using hearing aids even though they are individually less likely to use hearing aids. Second (Subsection 3), most people with disabling hearing loss do not use hearing aids – despite their substantial and disabling hearing loss.

The statistical analyses I present below are based on NHANES survey data for individuals aged 20-64 for the 2015-2016 survey years, which is data on which Dr. Fox relied.<sup>55</sup> In these analyses, I compute relevant statistical measures using four different definitions of disabling and mild hearing loss (which ensures that the results are robust across different definitions of hearing loss). These definitions are:

**Hearing Loss Definition 1:** Disabling hearing loss defined as hearing loss of greater than 40 dB in both ears; mild hearing loss defined as hearing loss of greater than 25 dB in both ears.

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<sup>55</sup>Dr. Fox also used data for the 2017-2018 survey years, but I omit the 2017-2018 data because the respondents were asked somewhat different questions for some of the relevant variables during 2017-2018 compared to 2015-2016. I also limit my analysis to respondents at least 20 years old, because younger respondents were not asked some of the relevant questions, and to respondents 64 years old or younger for consistency with Dr. Fox’s analysis.

**Hearing Loss Definition 2:** Disabling hearing loss identified by hearing loss of at least 35 dB in both ears; mild hearing loss identified by hearing loss of at least 20 dB in both ears.

**Hearing Loss Definition 3:** Disabling hearing loss identified by respondents' self-assessment of "moderate hearing trouble" or worse; mild hearing loss identified by self-assessment of "a little trouble."

**Hearing Loss Definition 4:** Disabling and mild hearing loss identified by the unilateral/bilateral hearing loss criteria used by Dr. Fox in his damages analysis.

### 1. Correlation between Hearing Aid Usage and Hearing Disability

Dr. Lin's opinion that virtually everyone using a hearing aid has a hearing disability suggests that there is a one-to-one correspondence between hearing aid usage and hearing disability, and the "correlation coefficient" (or, for brevity, just "correlation") is a standard measure of whether such a correspondence exists. More specifically, as used herein, it measures the degree to which two variables or attributes – here, hearing aid usage and hearing disability – coincide or "are one and the same." Mathematically, correlations always fall between negative one and positive one, with positive values indicating that two variables are positively related. Additionally, correlations close to zero indicate a low level of correspondence between the two variables and correlations close to one indicate a high level of correspondence.<sup>56</sup>

In Tables 1a and 1b below, I calculate the correlation between hearing aid usage and disabling hearing loss (among people with some degree of hearing loss) for the four statistical definitions of disabling hearing loss above – and I do so for two different ways of identifying

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<sup>56</sup> For positive correlations. For negative correlations, correlations close to negative one indicate high levels of *negative* or *inverse* correspondence.

which respondents use hearing aids. In Table 1a, hearing aid users are identified as people who have *ever* used a hearing aid; specifically, the respondents answered “yes” to a question of whether they have *ever* worn a hearing aid, and then responded in another question that they’ve used a hearing aid rather than a cochlear implant.<sup>57</sup> In Table 1b, hearing aid users are identified as people who *frequently* use a hearing aid; that is, respondents that answered “always,” “usually,” or “about half the time” to the question “Past year, how often worn hearing aid?” The other possible answers to that question are “seldom” and “never.”

**Table 1a**  
**Correlation Between Any Hearing Aid Usage and Disabling Hearing Loss**

Hearing Loss Definition	Definition of Disabling Hearing Loss	Correlation
1	>40 dB hearing loss in both ears	0.42
2	≥35 dB hearing loss in both ears	0.35
3	Self-reported "moderate hearing trouble" or worse	0.31
4	Respondents satisfying Dr. Fox's two criteria <sup>1</sup>	0.47

<sup>1</sup>Both unilateral and bilateral hearing loss included.

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<sup>57</sup> While the NHANES survey question distinguishes between a hearing aid and a cochlear implant, it does not ask respondents to make a distinction between air conduction hearing aids and bone-anchored hearing aids (BAHA) in their responses.

**Table 1b**  
**Correlation Between *Frequent* Hearing Aid Usage and Disabling Hearing Loss**

Hearing Loss Definition	Definition of Disabling Hearing Loss	Correlation
1	>40 dB hearing loss in both ears	0.45
2	≥35 dB hearing loss in both ears	0.35
3	Self-reported "moderate hearing trouble" or worse	0.31
4	Respondents satisfying Dr. Fox's two criteria <sup>1</sup>	0.43

<sup>1</sup>Both unilateral and bilateral hearing loss included.

The correlation coefficients in Tables 1a and 1b are all “low” (less than 0.5) based on a published rule of thumb.<sup>58</sup> In fact, several of these correlation coefficients (in the second and third rows of both tables), are barely above 0.30, a level that indicates “little, if any, relationship between the variables.”<sup>59</sup> Thus, these correlation coefficients indicate that there is only a low level of correspondence between hearing aid usage and disabling hearing loss.<sup>60</sup> In other words, using a hearing aid is far from synonymous with having a hearing disability.

## 2. Prevalence of Mild Hearing Loss

Unsurprisingly, a person is more likely to use a hearing aid if they have disabling hearing loss than if they have mild hearing loss. However, there are many more people with mild

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<sup>58</sup> Hinkle, Dennis E., *et al.*, *Applied Statistics for the Behavioral Sciences*, Fifth Edition, 2003, p. 109, Table 5.6 showing the following “Rule of Thumb [Ranges] for Interpreting the Size of a Correlation Coefficient” for positive values: .9 to 1.0, very high; .7 to .9, high; .5 to .7, moderate; .3 to .5, low; and 0 to .3, little if any correlation.

<sup>59</sup> Hinkle et al., *op. cit.*, p. 110 (“as a rule of thumb, we can say that correlations of less than .30 indicate little, if any, relationship between the variables.”).

<sup>60</sup> When one also considers that “hearing aid usage” in the NHANES data includes the use of Bone Anchored Hearing Aids, the correlation is even weaker.

hearing loss than people with disabling hearing loss. As a result, a substantial portion of hearing aid users have mild hearing loss, not disabling hearing loss.

These observations are shown in Tables 2, 3a, and 3b below. Table 2 shows the breakdown between mild hearing loss and disabling hearing loss within the NHANES data using each of the four hearing loss definitions presented earlier. For example, with mild and disabling hearing loss defined using “>25 dB” and “>40 dB” thresholds, respectively (first row of Table 2), the breakdown is 81.6 percent with mild hearing loss and 18.4 percent with disabling hearing loss (among the survey respondents having some level of hearing loss). The table shows that, regardless of the hearing loss definition used, many more people have non-disabling hearing loss than disabling hearing loss.

**Table 2**  
**Percentage of Mild Versus Disabling Hearing Loss**  
**Among Hearing-Impaired People**

Hearing Loss Definition	Threshold for Mild Hearing Loss <sup>1</sup>	Threshold for Disabling Hearing Loss	Percentage with Mild Hearing Loss	Percentage with Disabling Hearing Loss
1	>25 dB hearing loss in both ears	>40 dB hearing loss in both ears	81.6%	18.4%
2	≥20 dB hearing loss in both ears	≥35 dB hearing loss in both ears	84.4%	15.6%
3	Self-reported "a little trouble" hearing	Self-reported "moderate hearing trouble" or worse	71.9%	28.1%
4	≥20 dB hearing loss in both ears	Respondents satisfying Dr. Fox's two criteria <sup>2</sup>	83.3%	16.7%

<sup>1</sup>People with disabling hearing loss are not additionally counted as having mild hearing loss.

<sup>2</sup>Both unilateral and bilateral hearing loss included.

Tables 3a and 3b below show that a substantial portion of *hearing aid users* have mild (non-disabling) hearing loss, in part due to the disparity in the Table 2 percentages above. Table 3a shows the percentage of *all* hearing aid users that have mild hearing loss, and Table 3b shows the percentage of *frequent* hearing aid users that have mild hearing loss. For example,

with mild and disabling hearing loss defined using “≥20 dB” and “≥35 dB” thresholds, respectively (second row of both tables), nearly half (46.8 percent) of all hearing aid users and 40.0 percent of frequent hearing aid users have mild hearing loss.

**Table 3a**  
**Percentage of Hearing Aid Users with Mild Hearing Loss**

Hearing Loss Definition	Definition of Mild Hearing Loss <sup>1</sup>	Definition of Disabling Hearing Loss	Percentage with Mild Hearing Loss
1	>25 dB hearing loss in both ears	>40 dB hearing loss in both ears	42.2%
2	≥20 dB hearing loss in both ears	≥35 dB hearing loss in both ears	46.8%
3	Self-reported "a little trouble" hearing	Self-reported "moderate hearing trouble" or worse	30.0%
4	≥20 dB hearing loss in both ears	Respondents satisfying Dr. Fox's two criteria <sup>2</sup>	33.0%

<sup>1</sup>People with disabling hearing loss are not additionally counted as having mild hearing loss.

<sup>2</sup>Both unilateral and bilateral hearing loss included.

**Table 3b**  
**Percentage of Frequent Hearing Aid Users with Mild Hearing Loss**

Hearing Loss Definition	Definition of Mild Hearing Loss <sup>1</sup>	Definition of Disabling Hearing Loss	Percentage with Mild Hearing Loss
1	>25 dB hearing loss in both ears	>40 dB hearing loss in both ears	35.5%
2	≥20 dB hearing loss in both ears	≥35 dB hearing loss in both ears	40.0%
3	Self-reported "a little trouble" hearing	Self-reported "moderate hearing trouble" or worse	21.8%
4	≥20 dB hearing loss in both ears	Respondents satisfying Dr. Fox's two criteria <sup>2</sup>	28.1%

<sup>1</sup>People with disabling hearing loss are not additionally counted as having mild hearing loss.

<sup>2</sup>Both unilateral and bilateral hearing loss included.

The high percentage of hearing aid users who have mild hearing loss – not disabling hearing loss – within the NHANES data directly contradicts Dr. Lin’s opinion that “with only

exceedingly rare exceptions, individuals who use hearing aids would be considered to have a hearing disability from the medical perspective.”<sup>61</sup>

### **3. Hearing Aid Usage Among People with a Hearing Disability**

A majority of people with disabling hearing loss do not use hearing aids. This observation is shown using the NHANES data in Tables 4a and 4b below for the four statistical definitions of disabling hearing loss. Table 4a is the percentage of people with disabling hearing loss who have *never* used a hearing aid; that is, they answered “no” to a question of whether they have ever worn a hearing aid. Table 4b is the percentage of people with disabling hearing loss who *seldom or never* use hearing aids; that is, they answered “no” to the question of whether they have ever used a hearing aid or answered “seldom” or “never” to a question about how frequently they had used a hearing aid in the past 12 months. All percentages in these tables are above 50 percent indicating that a majority of people with hearing disabilities do not use hearing aids.

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<sup>61</sup> Lin Report, Executive Summary.

**Table 4a**  
**Percentage of People With Hearing Disability Who Never Use Hearing Aids**

<b>Hearing Loss Definition</b>	<b>Definition of Disabling Hearing Loss</b>	<b>Percentage Not Using Hearing Aids</b>
1	>40 dB hearing loss in both ears	53.6%
2	≥35 dB hearing loss in both ears	65.8%
3	Self-reported "moderate hearing trouble" or worse	74.6%
4	Respondents satisfying Dr. Fox's two criteria <sup>1</sup>	57.1%

<sup>1</sup>Both unilateral and bilateral hearing loss included.

**Table 4b**  
**Percentage of People With Hearing Disability Who Seldom or Never Use Hearing Aids**

<b>Hearing Loss Definition</b>	<b>Definition of Disabling Hearing Loss</b>	<b>Non-Users and Infrequent Users</b>
1	>40 dB hearing loss in both ears	55.5%
2	≥35 dB hearing loss in both ears	70.5%
3	Self-reported "moderate hearing trouble" or worse	79.7%
4	Respondents satisfying Dr. Fox's two criteria <sup>1</sup>	67.0%

<sup>1</sup>Both unilateral and bilateral hearing loss included.

In sum, the analyses presented in the tables show that having a hearing disability is far from synonymous with using a hearing aid and contradict Dr. Lin's opinion that virtually everyone using a hearing aid has a hearing disability.

## **V. Conclusions**

In this report, I discussed the flaws in Dr. Fox's methodology and concluded that his damages estimate is inaccurate and unreliable because he failed to account for the fact that many people with both mild and disabling hearing loss do not use hearing aids, even when cost is not a factor, and because he applied audiometric criteria that are not "standard



classifications that audiologists are taught in school and that are used by most audiologists”<sup>62</sup> to define hearing thresholds. I discussed Dr. Fox’s “cost avoidance” estimate which he presented as an intermediate step in his damages analysis and concluded that this estimate is irrelevant, incorrect, and unreliable because it suffers from the same flaws as his damages estimate and because it is not a measure of whether Kaiser benefited financially from the hearing aid exclusions.

I also discussed Dr. Lin’s opinion that “with only exceedingly rare exceptions, individuals who use hearing aids would be considered to have a hearing disability from the medical perspective,”<sup>63</sup> and concluded that this opinion is contradicted by Dr. Lin’s own research and other information indicating that hearing aids are used by and marketed to people with mild (non-disabling) hearing loss. Dr. Lin’s opinion is also contradicted by the same data that Dr. Fox used. Specifically, using the NHANES data, I showed that there is only a low level of correspondence between hearing aid usage and disabling hearing loss (with correlation coefficients ranging between 0.31 and 0.47 depending on the definition of “disability” used). I showed that many more people have non-disabling hearing loss than disabling hearing loss, a substantial portion of *hearing aid users* have non-disabling hearing loss and, amongst the population with a hearing disability, the majority do not use hearing aids.

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<sup>62</sup> Gilham Declaration, p. 2.

<sup>63</sup> Lin Report at Executive Summary.

A handwritten signature in blue ink, appearing to read "scott carr", written on a light-colored rectangular background.

Scott Carr, Ph.D.

**Exhibit 1**  
**Materials Relied Upon**

<b>Legal Filings</b>
Declaration of Dr. Benjamin Gilham, Au.D. Dated June 2, 2023. Submitted June 12, 2023.
Deposition of Jessica Hamp, 30(b)(6). December 23, 2022.
Deposition of Susan Porter. April 5, 2023.
Deposition of Jodi Russell. April 11, 2023.
Expert Report and Workpapers of Frank Fox, PhD. Submitted on May 12, 2023 and updated on May 23, 2023.
Expert Report and Source Documents of Frank R. Lin, MD, PhD. Submitted on May 12, 2023.
Fourth Amended Complaint, Andrea Schmitt; Elizabeth Mohondro; and O.L. by and through her parents, J.L. and K.L., each on their own behalf, and on behalf of all similarly situated individuals, v. Kaiser Foundation Health Plan of Washington; Kaiser Foundation Health Plan of Washington Options, Inc.; Kaiser Foundation Health Plan of the Northwest; and Kaiser Foundation Health Plan, Inc. No. 2:17-cv-01611-RSL. December 15, 2020.
NATIVE CONFIDENTIAL KAISER_002110-KAISER_002110.
Plaintiffs' Second Supplemental Answers and Responses to Defendants' First Interrogatories and Requests for Production. May 17, 2023.
<b>Public Documents and Data</b>
"About the National Health and Nutrition Examination Survey." Centers for Disease Control and Prevention. <a href="https://www.cdc.gov/nchs/nhanes/about_nhanes.htm">https://www.cdc.gov/nchs/nhanes/about_nhanes.htm</a> .
Chien W, Lin FR. "Prevalence of Hearing Aid Use Among Older Adults in the United States." <i>Arch Internal Medicine</i> . February 13, 2012. Vol. 172, No. 3.
<i>E.S. v. Regence BlueShield, 2022 U.S. Dist. LEXIS 17366</i> (W.D. Wash., January 31, 2022)
European Hearing Instrument Manufacturers Association: EuroTrak Country Market Surveys (UK 2022, Denmark 2022, and Norway 2019). Downloaded from <a href="https://www.ehima.com/surveys">https://www.ehima.com/surveys</a> .
Garg et al. "A Cross-Sectional Study on Hearing Loss Using World Health Organization Protocol in Delhi." <i>Indian Journal of Otology</i> . Vol. 24. Issue 3. July-September 2018.
Goman A, Lin FR. "Prevalence of Hearing Loss by Severity in the United States." <i>AJPH</i> . October 2016. Vol. 106, No. 10.
Hinkle, Dennis E., et al., <i>Applied Statistics for the Behavioral Sciences</i> , Fifth Edition, 2003. Chapters 5 and 20.
Jorgensen et al. "Hearing loss, sick leave, and disability pension: findings from the HUNT follow-up study." <i>BMC Public Health</i> . 2022. 22:1340.
NHANES Audiometry Examination Data and Supporting Documents, 2015 - 2016. <a href="https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Examination&amp;Cycle=2015-2016">https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Examination&amp;Cycle=2015-2016</a> .
NHANES Audiometry Questionnaire Data and Supporting Documents, 2015 - 2016. <a href="https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Questionnaire&amp;Cycle=2015-2016">https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Questionnaire&amp;Cycle=2015-2016</a>
NHANES Demographic Data and Supporting Documents, 2015 - 2016. <a href="https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Demographics&amp;Cycle=2015-2016">https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Demographics&amp;Cycle=2015-2016</a>

**Exhibit 1**  
**Materials Relied Upon**

NHANES Audiometry Examination Data and Supporting Documents, 2017 - 2018. <a href="https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Examination&amp;Cycle=2017-2018">https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Examination&amp;Cycle=2017-2018</a>
NHANES Audiometry Questionnaire Data and Supporting Documents, 2017 - 2018. <a href="https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Questionnaire&amp;Cycle=2017-2018">https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Questionnaire&amp;Cycle=2017-2018</a>
NHANES Demographic Data and Supporting Documents, 2017 - 2018. <a href="https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Demographics&amp;Cycle=2017-2018">https://wwwn.cdc.gov/nchs/nhanes/search/datapage.aspx?Component=Demographics&amp;Cycle=2017-2018</a>
Ting, Hsin-Chen et al., "Sensitivity and specificity of hearing tests for screening hearing loss in older adults." <i>Journal of Otology</i> . 2023. Vol. 18.
Vasconcelos et al. "Prevalence of disabling hearing loss in the elderly." <i>Adv Treat ENT Disord</i> . 2019. Vol. 3.
"What is the Most Efficient Reimbursement System in Europe?" <i>The Hearing Review</i> . December 30, 2015. <a href="https://hearingreview.com/practice-building/practice-management/continuing-education/efficient-reimbursement-system-europe">https://hearingreview.com/practice-building/practice-management/continuing-education/efficient-reimbursement-system-europe</a> .
Yueh, B et al. "Long-Term Effectiveness of Screening for Hearing Loss: The Screening for Auditory Impairment – Which Hearing Assessment Test (SAI-WHAT) Randomized Trial." <i>Journal of the American Geriatrics Society</i> . 2010. Vol. 58