"Despite differences in the healthcare systems in the United States and England, there is strong evidence supporting the presence of socioeconomic status disparities with regard to cochlear implantation in both countries."

HEARING THE CLASSES

A Study of Cochlear Implantation and Socioeconomic Status

KATHERINE KONIARES

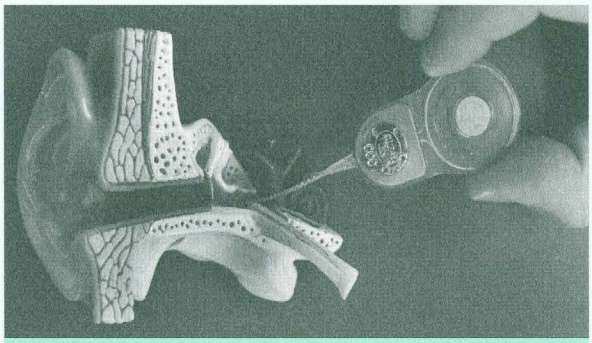
PROFOUND HEARING LOSS AFFECTS THOUSANDS OF PEOPLE IN THE UNITED STATES AND THE UNITED KINGDOM, WITH A HIGHER INCIDENCE AMONG PEOPLE OF LOW SOCIOECONOMIC STATUS. A COCHLEAR IMPLANT IS A SURGICALLY IMPLANTED DEVICE THAT HAS BEEN DEMONSTRATED TO IMPROVE COMMUNICATION AND QUALITY OF LIFE AMONG PROFOUNDLY HEARING-IMPAIRED INDIVIDUALS. THIS REVIEW POSTULATES THAT THE RATE OF COCHLEAR IMPLANTATION AMONG ELIGIBLE CANDIDATES CAN BE USED TO ASSESS QUALITY OF HEALTHCARE, WITH A VIEW TOWARD EXAMINING DISPARITIES IN HEALTHCARE SERVICES BOTH IN AMERICAN FREE-MARKET SYSTEM AND IN THE BRITISH NATIONAL HEALTH SERVICE. A SYSTEMATIC LITERATURE SEARCH WAS PERFORMED FOR PERTINENT ARTICLES INVESTIGATING SOCIOECONOMIC STATUS AND COCHLEAR IMPLANTATION. DATA FROM TWENTY-TWO SOURCES WERE ANALYZED, AND IT WAS SHOWN THAT—DESPITE DIFFERENCES IN THE HEALTHCARE SYSTEMS OF THE UNITED STATES AND ENGLAND—SIMILAR TRENDS ARE APPARENT IN THE TWO COUNTRIES WITH REGARD TO A LOWER RATE OF PEDIATRIC COCHLEAR IMPLANTATION SURGERY IN CHILDREN WITH PROFOUND HEARING LOSS AS FAMILIAL SOCIOECONOMIC STATUS DECREASES.

INTRODUCTION

Hearing loss is one of the most prevalent health conditions in the United States and England, with moderate to profound bilateral hearing loss diagnosed in 2-3 infants per 1,000 births in the United States and 1 per 1,000 births in England.[1] Fifty to ninety percent more children are diagnosed with hearing impairment by 9 years of age.[2] Children from lower income families are twice as likely to be deaf when compared to children from higher income families.[3]

Degrees of hearing loss are measured in decibels, and are defined as moderately severe (66-74 dB), severe (75-90 dB), or profound (>90 dB), according to the 4-frequency (500, 1000, 2000, and 4000 Hz) pure-tone average (PTA).[4] Cochlear implantation (CI) is an option for individuals with severe to profound hearing loss, who receive minimal benefit from hearing aids.[5] A CI is an electronic device surgically embedded in the inner ear, used to stimulate the auditory nerve in response to sound and generate the outcome of hearing.[6] Unlike hearing aids, a CI requires surgery and necessitates considerable costs throughout the patient's lifetime.[7] PCIs differ from their adult equivalents because children depend on CIs to learn spoken language skills and therefore require costly and extensive habilitation. A successful CI may lead to improved academic achievement, superior employment opportunities, and decreased dependence on social services as an adult.[8]

Low SES, which is characterized by minimal education, household income, and accumulated wealth, often curtails the ability of individuals to access crucial healthcare, such as PCIs. Within the domain of PCIs, there is a growing disparity with regard to the rate of cochlear implantations and post-implantation speech and language development for children with hearing loss.[9]



A PEDIATRIC COCHLEAR IMPLANT WITH A MODEL OF THE HUMAN EAR.

METHODS

To examine the effects of SES on cochlear implantation in the United States and England, a literature search was performed using three databases—MEDLINE, PUB MED, and Google Scholar. Articles were restricted to those published between 1999 and 2009. The following keywords were used in random combinations and linked using the 'and' option in advanced searches: cochlear implant, pediatric, SES, socioeconomic status/disparity, Medicaid, US, and UK. Once the results were reviewed and valuable articles identified, their references were combed for pertinent articles.

Further criteria in the selection of articles included a pediatric (age less than 18 years) study population. Additionally, articles examining SES with regard to race/ethnicity and gender were excluded. Fourteen articles were identified using the established criteria and an additional eight sources were used for statistical and background information.

RESULTS

Several studies in the United States and the United King-

FIGURE 1: US INCOME CATEGORY COMPARED TO CI FAMILIES. AFTER SORKIN ET AL. (2008).

Income Category	CI Families, n (%)	U.S. Families in Category, %
Less than $25,000	19 (12.8)	28.7
$25,001 - $50,000	35 (23.6)	29.4
$50,001 - $75,000	35 (23.6)	19.4
$75,001 - $100,000	21 (14.2)	10.2
$100,000+	35 (23.6)	12.3

Affluence Level	Implanted, n (%)
1 (least affluent)	130 (14.9)
2	72 (8.4)
3	73 (8.4)
4	73 (8.4)
5	89 (10.2)
6	75 (8.6)
7	95 (10.9)
8	92 (10.5)
9	79 (9.1)
10 (most affluent)	93 (10.7)

FIGURE 2: UK AFFLUENCE LEVEL COMPARED TO IMPLANTED FAMILIES. AFTER FORTNUM ET AL. (2002).

dom have compared household income with the rate of pediatric cochlear implantation.[10] One study in the United States examined the relationship between household income, the number (and percentage) of families with a child who received a CI, and the percentage of household families in each income category (Figure 1). It was concluded through χ^2 analysis ($p<0.001$) that families of children with a CI were more likely to earn over $100,000 and less likely to earn under $25,000 than families nationwide.[11] A study in the United Kingdom (Figure 2) showed that there was a significant decrease in the percentage of children who received a CI as affluence decreased ($p<0.001$).[12]

Data on cochlear implant procedures performed on children in the United States in 1997 was acquired from a national pediatric hospital discharge database, the Kids' Inpatient Database (KID) from the Health Care Cost and Utilization Project (HCUP), which is a collection of private and state resources and is sponsored by the Agency for Health Care Research and Quality (AHRQ).[13] It was found that 47% of patients in the KID who received a PCI lived in households from the highest KID category (>$35,000), and more than 70% of patients with a PCI came from families with an annual income above the national average. CI manufacturers' data on PCI recipients' household income was similar to that of the KID.[14]

A study performed in the United Kingdom, aimed at determining the out-of-pocket costs for families attending a CI program at Nottingham Pediatric Cochlear Implantation Programme (NPCIP), concluded that the mean total out-of-pocket and time costs for a family per year were £2,462. However, these costs varied significantly depending on the number of years the patient had been in the program, from a mean cost of £3,090 during the first 2 years to £2,159 for those implanted 2–5 years ago, to £1,815 for PCIs carried out over 5 years ago. The change in average cost per year reflects the need for numerous appointments and support for families in the years immediately following implantation.[15]

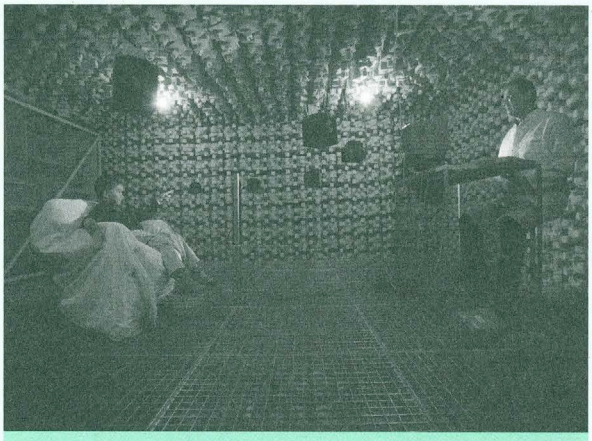
A study in the United Kingdom that evaluated parents' willingness-to-pay (WTP) for a PCI concluded that the mean monetary value parents are willing to pay is £127 per month for 25 years of treatment. If parents paid £127 per month for 25 years, the WTP for PCI per child would sum to £30,349. In 2000/2001, the annual NHS costs for PCI were £9.23 million for a total of 1,527 children (1,290 children with existing CI and 237 newly implanted). If the families of all 1,527 CI patients were WTP £127 per month, the total WTP for 2000/2001 would have only been £2.3 million, leading to a £6.93 million deficit in supply verses demand.[16]

PARENTAL CHARACTERISTICS

The results of a study in the United States in which audiologists were asked to describe specific causes for the poorer outcomes of PCI in children with a low SES identified a lack of parental self-efficacy in low SES families, which makes it challenging for parents to advocate for their children in healthcare settings. Low SES parents also have difficulty adhering to schedules for appointments. In response to a question comparing implant candidacy and adherence, 47% (47 of 101) of audiologists said they would either "never" or "rarely" recommend performing a CI on a child whose parents showed non-adherence during assessment.[17]

FIGURE 3: PAYMENT METHODS OF CHILDREN 0 TO 18 YEARS OF AGE WHO RECEIVED A CI IN 1997. AFTER STERN ET AL. (2005).

Insurance Payment Type	Frequency (%)
Private, including HMO	74.5
Medicaid	21
Self-pay	1
Other	3.5



A SEVEN-YEAR-OLD BOY HAVING HIS COCHLEAR IMPLANTS TUNED IN AN ANECHOIC CHAMBER.

One U.S. study performed an analysis concerning whether or not a referral for a CI was made. Multivariable logistic regression was utilized to observe a relationship between socio-demographics and referrals. Of the 105 patients included in the study, 73 (69%) received a referral. Children who were referred for a CI were more likely to have married parents (91% verses 70%).[18]

PAYMENT METHODS

Several studies have explored the relationship between payment methods used to cover the costs of a CI in the United States and United Kingdom, and reimbursement rates for hospitals. Figure 3 shows that more than 70% of the PCI recipients used private health insurance in the United States as their principal means of payment in 1997, while 21% used Medicaid.[19]

In one study it was found that in at least 18 states Medicaid reimbursement policies did not cover hospitals' costs of buying CI devices. These 18 states comprise 44% of Medicaid enrollment. In at least 8 other states, Medicaid reimbursements usually compensated hospitals for the cost of the CI device, but these states comprise only 8% of Medicaid enrollment. The average purchase price for a CI prosthetic system is $19,745 (n=46 hospitals). Although Medicaid policies for reimbursing hospitals for CIs vary widely from state to state, the median reimbursement rate for Medicaid is $13,800 (n=9 hospitals), while the mean reimbursement rate for private insurers is $15,757 (n=27 hospitals).[20]

It has already been established that CIs are cost effective, independent of the patients' age at the time of implantation, but a study was performed in the United Kingdom to determine the direct cost of implantation per child charged to health authorities by the NPCIP in 1997-1998. [21] The cost for assessment and implantation was estimated to be £27,500 ($44,000, assuming £1= $1.60). Rehabilitation and maintenance for the first two years following implantation cost £4,000 ($6,400) per year. Maintenance for the third year after implantation and each consecutive year was expected to cost £2,300 ($3,680) per year. Therefore, the total cost incurred by the government for the first 4 years including the implantation was estimated to be £37,800 ($60,480).[22]

DISCUSSION

Despite differences in the healthcare systems in the United States and the United Kingdom, there is strong evidence supporting the presence of SES disparities with regard to cochlear implantation in both countries. There are similar patterns of affluence and PCI prevalence in the United States, where the majority of patients have private insurance, and the United Kingdom, where the NHS pays for the complete medical cost of CIs. This implies that variables besides household income and education level affect rates of PCI.[23] There are several possible factors limiting access to CIs, including a lack of knowledge about CIs among families of hearing impaired children, not having insurance, and financial incentives for providers originating in payment policies for public and private insurers.[24]

It has been extensively documented that more children with PCIs are from families with annual incomes higher than the national average.[25] One explanation for this is that affluent individuals are more likely to employ healthcare services in general.[26] This may be because families with a higher SES are more concerned with health and are less discouraged by personal expenses, such as time and travel, incurred for utilizing healthcare facilities. This is particularly pertinent to PCI centers in the United Kingdom because there are only 16 facilities that provide the procedure, and therefore, families must frequently travel extensive distances, especially during the first few years following implantation.[27]

Children of lower SES families often have parents with low levels of education and subsequent low-paying employment, who must work long hours in order to earn an ade-

quate income. Long working hours lead to an inflexible schedule and impair their ability to attend appointments. Low SES families have a shortage of resources such as time and transportation, and are confronted with such challenges as family size, childcare, and single parenthood, which only exacerbate the inability to attend appointments and thus detrimentally affect the likelihood of being considered as a PCI candidate.[28]

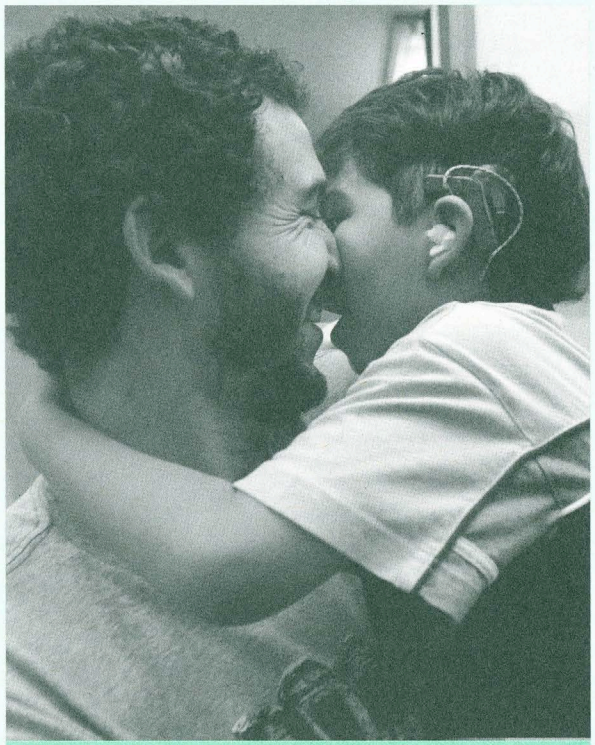
Financial incentives for audiologists may impede low SES patients' access to PCIs because of low reimbursement rates for patients using Medicaid, as compared to private insurance companies.[29] CIs do not replace alternative expensive medical treatments because most CI candidates have hearing impairments that are too severe to be rectified by hearing aids. Rather, savings are encountered outside the healthcare field in such areas as education, communication, and employability, in addition to the psychological and social aspects of the child's well-being.[30]

In England, PCI is capacity-constrained, meaning that only a limited number of facilities receive funding each year; therefore, PCI programs are not heavily advertised. Instead, referral to the program is required from the patient's doctor. Not only are families with a higher SES more likely to visit the doctor, but they are consequently more informed about PCIs and more articulate in advocating for their child.[31]

POSSIBLE STEPS TO ALLEVIATE DISPARITIES

Although rectifying the root cause of unequal access to PCI services would require elimination of global poverty, some less ambitious objectives may be implemented in order to improve access to care for patients in low SES families in the United States and United Kingdom. One such goal is to augment the workforce of CI providers, especially those trained to work in underserved and more culturally diverse communities. This would reduce the transportation and time costs incurred by families who have to travel long distances to attend PCI appointments, and would increase the access low SES children have to PCIs. Additionally, implementing education and counseling programs would improve parents' ability to advocate for their children's healthcare.[32]

The U.S. Medicaid system, which insures 37.5 million people or 12.9% of the population, should be restructured to allow for universal hospital reimbursement standards in every state and reimbursement policies comparable to those of private insurance companies.[33] This would eliminate any propensity for physicians and audiologists to preferentially perform PCIs on privately insured candidates. Rather than pay hospitals and doctors on a procedural basis, payment should be distributed based on the quality of care. Under such circumstances, a patient's insurance status would have no bearing on their level of healthcare. President Barack Obama is taking steps to implement a public health insurance option for those individuals without insurance. This would put pressure on private insurance companies to keep their premiums down and increase low SES patients' access to healthcare.[34]



A FATHER AND HIS SIX YEAR-OLD SON REACT TO THE SON HEARING HIS FIRST SOUNDS THANKS TO A CI.

The NHS has taken steps to aid low SES families' access to healthcare through such programs as the Healthcare Travel Costs Scheme, which provides a refund for travel expenses incurred while traveling to a hospital or other NHS location for NHS funded treatment.[35] Despite efforts to eliminate financial inequalities, the SES disparity remains. The establishment of a self-help support group for low SES parents would improve self-efficacy and adherence to

scheduled appointments. The ideal program would provide medical care for the child in conjunction with education and support for the parents.[36]

LIMITATIONS

SES is difficult to define and is measured by a variety of different scales.[37] Although studies have been conducted in the United States and the United Kingdom to explore disparities between SES and the rate of PCIs, different SES proxies were used in each country. Therefore, trends in SES disparities can be analyzed in each individual country, but it is not currently possible to quantitatively compare the extent of disparity in the United States to that in the United Kingdom. Additionally, the populations of the United States and United Kingdom are not uniform. Thus, even though studies examining disparities between race/ethnicity and gender were not included in this literature review, particular SES categories may be more represented by certain social groups. Also, studies in the United Kingdom did not always have corresponding data for the United Kingdom, and vice versa. Therefore, some aspects of SES disparities were more thoroughly investigated in one country than the other.

FURTHER RESEARCH

After analyzing the current literature on SES disparities and the rate of PCIs, it is essential to suggest topics for further research. A study should be undertaken to compare the SES of families with children with a CI using the same standard of measurement in the United States and United Kingdom, such as the Jarman Score or Hollingshead's Four-Factor Score. Future research should also explore the wait time for PCI in the United States and United Kingdom, and investigate whether or not there is a relationship between SES and wait time. This would allow for a concrete comparison of SES disparities in the two countries. Additionally, research should explore the speech development and long-term educational outcomes of children who received a CI at a young age versus those who were older at the time of implantation.

CONCLUSION

The free-market healthcare system in the United States differs from the NHS in the United Kingdom, but both systems exhibit SES disparities with regard to PCIs. Although the NHS pays for all costs of PCIs, these disparities are still present in the United Kingdom. This should be taken into account by U.S. legislatures when formulating new healthcare plans for the United States. In light of the current healthcare reforms under the Obama administration, which aim to provide healthcare for all Americans, it should be noted that a universal healthcare system does not necessarily eliminate disparities. In addition to providing healthcare payment for all Americans, the U.S. government should focus on educating Americans about their healthcare options through national media campaigns and local workshops specialized for particular medical fields, which would enable individuals to advocate for themselves. Further research is needed to more thoroughly investigate the issues involved in healthcare disparities, but the results of this literature review indicate that neither a free-market nor a universal healthcare system is the ideal method for providing equal healthcare to all.

APPENDIX

SES INDICES

Townsend Material Deprivation Score: The Townsend Score combines the individual scores of four variables to form an overall score that can then be used to rank particular geographical areas relative to others. The average score is zero, and the higher the score, the more deprived the area. The four variables are:[38]

1) Unemployment – Percentage of residents actively seeking employment

2) Car Ownership – Percentage of households that do not possess a car

3) Owner Occupation – Percentage of households that do not own their accommodations

4) Overcrowding – Percentage of households with more than one person per room

Jarman Score: The Jarman Score is used to determine deprivation payments to General Practitioners and consists of the following variables:[39]

1) People over the age of 65 who are living alone

2) Children under the age of 5

3) Single parent households

4) Unskilled workers

5) Unemployment

6) Overcrowded households

7) Address change in the past year

8) Ethnic group

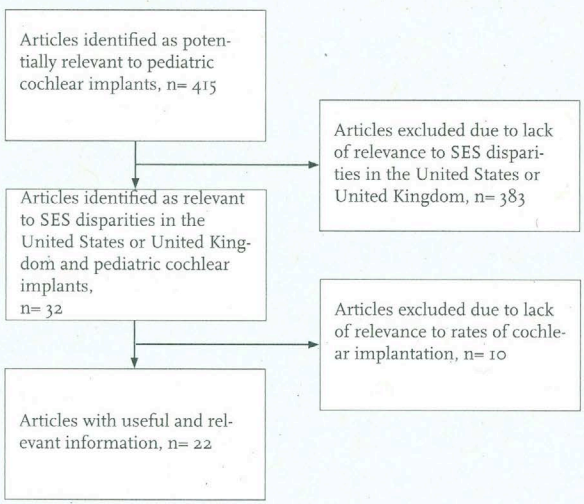
Hollingshead's Four-Factor Score: The Hollingshead Score is derived from education and occupation characteristics of each parent. Individual education and occupation scores are weighted to obtain a single score for each parent that represents 1 of 5 social strata (1 represents unskilled laborers and 5 represents higher professionals). The scores for each parent are then averaged to determine a single score for the household. The education and occupation scores are calculated as follows:[40]

1) Education – Score ranges from 1-7, with 1 equal to less than 7th grade education and 7 equal to graduate level education

2) Occupation – Score ranges from 1-9, with 1 equal to farm laborers/menial service workers and 9 equal to higher executives, owners of large businesses, and major professionals

Medicaid: Medicaid is a government program that provides health insurance for low-income individuals. Eligibility is based on a combination of income and population "category." The populations generally eligible are children, parents of dependent children, pregnant women, the disabled, and the elderly. The income levels at which these groups qualify for Medicaid differ from state to state.[41]

QUORUM FLOW CHART



THE KID

The KID provides data for analysis of national pediatric hospital discharges (for inpatient stays lasting longer than 24 hours) and consists of a random sample of 80% (n=1,905,797) of non-newborn pediatric discharge records from 22 states in 1997. The variables recorded in the KID include age, race, procedure codes, diagnostic codes, length of stay, total charges, and insurance coverage. Children receiving cochlear implants have one of three primary diagnoses—sensorineural hearing loss, sensorineural loss combined type, or hearing loss—and one of three primary procedure codes—electromagnetic hearing device implant, implanted cochlear prosthetic device, or implanted mechanical cochlear prosthetic device. Once the patients were identified, demographic information including age and median household income in the geographic region of the patient's home zip code (categorized as: $0-$25,000; $25,001-$30,000; $30,001-$35,000; and >$35,000) was collected. The average household income in 1997 was $35,145. Demographic information concerning SES and household educational level was provided by the Advanced Bionics and Cochlear Corporations and was then compared with the KID.

OUT-OF-POCKET EXPENSES

Out-of-pocket costs include transportation, overnight accommodation, child-care, and time costs of the children and parents not being able to work while attending appointments. Time costs were calculated as 65% of the parents'/children's weekly wage rate.

ENDNOTES

1. National Institute for Deafness and Communication Disorders 2008
2. Fortnum et al. (2001)
3. National Health Interview Survey
4. Wiley et al. (2009)
5. NHS National Institute for Health and Clinical Experience; Shiomi et al. (1999)
6. O'Neill et al. (2009); Sach et al. (2005)
7. National Institute for Deafness and Communication Disorders (2008)
8. O'Neill et al. (2009)
9. Kirkham et al. (2009)
10. Sorkin et al. (2008); Fortnum et al. (2002)
11. Sorkin et al. (2008)
12. Fortnum et al. (2002)
13. Steiner et al. (2002)
14. Stern et al. (2005)
15. Sach et al. (2005)
16. Sach et al. (2004)
17. Kirkham et al. (2009)

18. Wiley et al. (2009)
19. Stern et al. (2005)
20. Garber et al. (2002)
21. Summerfield et al., 2010
22. O'Neill et al. (2009)
23. Stern et al. (2005)
24. Garber et al. (2002)
25. Sach et al. (2005)
26. Goddard et al. (2001)
27. Sach et al. (2004)
28. Kirkham et al. (2009)
29. Garber et al. (2002)
30. O'Neill et al. (2009)
31. Sach et al. (2004)
32. Kirkham et al. (2009)
33. U.S. Department of Health and Human Services
34. The White House
35. NHS
36. Kirkham et al. (2009)
37. Oakes et al. (2003)
38. NHS Public Health Network
39. Ibid.
40. Cirino et al. (2002)
41. U.S. Department of Health and Human Services

REFERENCES

Cirino, Paul T., Christopher E. Chin, Rose A. Sevcik, Maryanne Wolf, Maureen Lovett and Robin D. Morris. "Measuring Socioeconomic Status: Reliability and Preliminary Validity for Different Approaches." Assessment, 9.2 (2002): 145-155.

Fortnum, Heather M., David H. Marshall, and A. Quentin Summerfield. "Epidemiology of the UK population of hearing-impaired children, including characteristics of those with and without cochlear implants - audiology, aetiology, comorbidity and affluence." International Journal of Audiology, 41.3 (2002): 170-179.

Fortnum, Heather M., A. Quentin Summerfield, David H. Marshall, A.C. Davis, and J.M. Bamford. "Prevalence of permanent childhood hearing impairment in the United Kingdom and implications for universal neonatal hearing screening: questionnaire based ascertainment study." British Medical Journal, 323.7312 (2001): 536-539.

Garber, Steven, Susan Ridgely, Melissa Bradley, and Kenley W. Chin. "Payment Under Public and Private Insurance and Access to Cochlear Implants." Archives of Otolaryngology-Head & Neck Surgery, 128.10 (2002): 1145-1152.

Goddard, M. and P. Smith. "Equity of access to health care services: theory and evidence from the UK." Social Science & Medicine, 53.9 (2001): 1149-1162.

Kirkham, Erin, Chana Sacks, Faud Baroody, Junes Siddique, Mary Ellen Nevins, Audie Woolley, and Dana Suskind. "Health Disparities in Pediatric Cochlear Implantation: An Audiologic Perspective." Ear and Hearing, 30.5 (2009): 515-25.

National Health Interview Survey. National Center for Health Statistics, 1994. Series 10, No.188, Atlanta, GA.

National Institute for Deafness and Communication Disorders 2008. "Statistics about Hearing, Disorders, Ear Infections, and Deafness." 23 November 2009 <http://www.nidcd.nih.gov/health/statistics/quick.htm>.

NHS. "Help with health costs." 28 November 2009 <http://www.nhs.uk/NHSEngland/Healthcosts/Pages /Travelcosts.aspx>.

NHS National Institute for Health and Clinical Experience. "Hearing Impairments – Cochlear Implants." 29 November 2009 <http://www.nice.org.uk/TA166>.

NHS Public Health Network. "Understanding Public Health Data." 6 December 2009 <http://www.avon.nhs.uk/phnet/PHinfo/ understanding.htm>.

O'Neill, Ciaran, Gerard M. O'Donoghue, Susan M. Archbold, and Charles Normand. "A Cost-Utility Analysis of Pediatric Cochlear Implantation." The Laryngoscope, 110.1 (2009): 156-160.

Oakes, J. Michael and Peter H. Rossi. "The measurement of SES in health research: current practice and steps toward a new approach." Social Science & Medicine, 56.4 (2003): 769-784.

Sach, T.H., D.K. Whynes, Susan M. Archbold, and Gerard M. O'Donoghue. "Estimating time and out-of-pocket costs incurred by families attending a pediatric cochlear implant programme." International Journal of Pediatric Otorhinolaryngology, 69.7 (2005): 929-936.

Sach, T.H., D.K. Whynes, Ciaran O'Neill, Gerard M. O'Donoghue, and Susan M. Archbold. "Willingness-to-pay for pediatric cochlear implantation." International Journal of Pediatric Otorhinolaryngology, 68.1 (2004): 91-99.

Shiomi, Yosaku, Yasushi Naito, Iwao Honjo, Nobuya Fujiki, Kenichi Kaneko, Haruo Takahashi, Masaru Yamashita and Michio Kawano. "Cochlear implant in patients with residual hearing." Auris Nasus Laryns, 26.4 (1999): 369-374.

Sorkin, Donna L. and Teresa A. Zwolan. "Parental perspectives regarding early intervention and its role in cochlear implantation in children." Otology & Neurotology, 29.2 (2008): 137-142.

Steiner, C., A. Elixhauser, and J. Schnaier. "The Healthcare Cost and Utilization Project: an overview." Effective Clinical Practice, 5.3 (2002): 143–151.

Stern, Ryan E., Bevan Yueh, Charlotte Lewis, Susan Norton, and Kathleen C. Y. Sie. "Recent Epidemiology of Pediatric

Cochlear Implantation in the United States: Disparity Among Children of Different Ethnicity and Socioeconomic Status." The Laryngoscope, 115.1 (2005): 125-131.

Summerfield, A.Q., R.E. Lovett, H. Bellenger, and G. Batten. "Estimates of the cost-effectiveness of pediatric bilateral cochlear implantation." Ear and Hearing, 30.5 (2010): 611-624.

U.S. Department of Health and Human Services. "Overview of the Uninsured in the United States: An Analysis of the 2005 Current Population Survey." 28 November 2009 <http://aspe.hhs.gov/health/Reports/05 /uninsured- cps/index.htm>.

The White House. "Health Care the President's Plan." 6 December 2009 <http://www.whitehouse.gov/issues/health-care>.

Wiley, Susan and Jareen Meinzen-Derr. "Access to cochlear implant candidacy evaluations: Who is not making it to the team evaluations?" International Journal of Audiology, 48.2 (2009): 74-79.