# PUBLIC HEALTH IMPACT ANALYSIS AND RESEARCH APPROACH

## Background

California Health Benefits Review Program (CHBRP) reports present three types of information about proposed health benefit mandates or repeals: (1) the medical effectiveness of screening, diagnostic, treatment, and other health services addressed in the legislation; (2) the financial impacts of the legislation; and (3) the impact on public health. This document describes the research approach used to analyze the impact on public health. In 2006, CHBRP's public health methodology was published in the *Health Services Research Journal*. Since then, additional refinements—including analysis of long-term impacts—have been incorporated into the public health methodology. Details of these methods are found in the following sections below:

  I. Relevant baseline incidence and prevalence information

 II. Estimating public health impacts of a mandate

III. Estimating the impact on gender and racial disparities

 IV. Estimating the impact on premature death and economic loss

  V. Criteria and guidelines for estimating short- and long-term public health impacts

The public health team conducts literature reviews on the topics covered in the public health analysis. Keywords and search terms used in these reviews are included in *Appendix B: Literature Review Methods* of every report.

### I. Baseline Incidence and Prevalence and Related Health Outcomes

Information on the baseline prevalence and incidence of the disease or condition as well as health outcomes (e.g., morbidity or mortality) provides an overview of the portion of the California population potentially affected by the mandate. Additionally, it provides the overall context for the medical effectiveness, cost and utilization, and public health sections of CHBRP analyses.

CHBRP's public health team uses a five-tiered hierarchy of evidence to prioritize sources of incidence and prevalence data. Using the following sources, the public health team conducts primary and secondary research depending on the availability of the data and ability to meet the 60-day report deadline imposed by CHBRP's authorizing statute. The following outlines the hierarchy of evidence for incidence and prevalence data:

- Tier 1. Registries with California-specific census counts
- Tier 2. Surveys with California-specific estimates
- Tier 3. Surveys with national estimates only, peer-reviewed, or grey literature
- Tier 4. Actuarial contractor database
- Tier 5. Content experts

**Figure 1.** Hierarchy of Evidence for Public Health Impact Analyses

| Tier 1 Registries | • **Registries with California-specific census counts**: California Cancer Registry; HIV/AIDS Case Registry; Surveillance, Epidemiology, and End Results Registry; CDC WONDER Mortality, etc. |
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| **Tier 2 California-specific surveys** | • **Surveys with California-specific estimates**: California Health Interview Survey: California Tobacco Survey; Department of Developmental Services data on persons with autism; National Immunization Survey (CDC), etc. |
| **Tier 3 National estimates, Peer-reviewed/grey literature** | •**Surveys with national estimates only**<br>• **Peer-reviewed literature**<br>• **Grey literature** (e.g., government reports, FDA) |
| **Tier 4 Acutarial contractor database** | • **Data** (obtained from CHBRP's actuarial contractor) |
| **Tier 5 Content experts** | •**Content experts** relevant to bill topic |

Registries reporting California-specific data (Tier 1) are the preferred source for prevalence and incidence data as they represent the entire population of persons with a disease or condition in the state. These sources may be located within a California agency (e.g., California's Cancer Registry, newborn and prenatal screening program registry, and HIV/AIDS Case Registry) or at the federal level (e.g., CDC WONDER Mortality Database and SEER Registry).

CHBRP's second choice for data (Tier 2) is population-based surveys with California-specific estimates. The main source of estimates of health conditions and illnesses is the California Health Interview Survey (CHIS). CHIS, a statewide survey of approximately 50,000 households, is conducted every two years by the UCLA Center for Health Policy Research and includes questions addressing the health status, health-related behaviors, insurance coverage, access to

health care, and use of health care services of California children, adolescents, and adults. Data from CHIS can be stratified by gender, age, race, and ethnicity, and by insurance status. When data on a specific condition or disease are unavailable in the CHIS dataset, CHBRP searches for other relevant population- or telephone-based surveys (e.g., the National Center for Health Statistics' NHANES or National Immunization Survey [NIS]) that capture the California population. For example, CHBRP's analysis of Assembly Bill 2064 (CHBRP, 2012) used the NIS to determine the number of California children and adolescents who received immunizations.

Tier 3 includes national estimates from population- or telephone-based surveys that are used for conditions or illnesses where no California-specific data exist. Summary data maintained by the National Center for Health Statistics such as the National Health Interview Survey and the National Health and Nutrition Examination Survey are examples of sources that may be reviewed. In addition, the Centers for Disease Control and Prevention (CDC) and National Institutes of Health websites may be searched for potential sources of data, as are websites of national associations affiliated with the disease or condition of interest. Also, literature searches may be conducted to find studies of California-specific or national incidence and prevalence rates published in peer-reviewed journals or in the grey literature. For example, in its analyses of Assembly Bill 171 and Senate Bill TBD-1 (CHBRP, 2011), CHBRP estimated the prevalence of autism and related disorders based on a report issued by the California Department of Developmental Services.

Tier 4 includes data obtained from the actuarial contractor. To date, CHBRP rarely uses these data. However, the Assembly Bill 214 report on durable medical equipment (DME) (CHBRP, 2009) is one example where CHBRP found that no sources ably captured the use of all types of DME. The claims data from CHBRP's actuarial contractor provided a proxy for total DME use in California's insured population.

CHBRP strives to provide the legislature with the best evidence-based estimates possible, but in rare instances where no data can be found—perhaps because it has never been studied formally— CHBRP relies on content experts (Tier 5) to advise staff on reasonable assumptions. In the case of Assembly Bill 428 (CHBRP, 2011), CHBRP consulted with experts about the use of fertility preservation services to determine the best possible assumptions given the limited literature available.

The report also includes data on health outcomes associated with the disease such as morbidity and mortality. In consultation with the medical effectiveness team and a content expert, a list of relevant health outcomes for each disease is developed. Morbidity data are searched using the same procedure outlined above for incidence and prevalence data. Cancer-specific mortality rates are available from the California Cancer Registry. Data on other mortality rates can be found through CDC's WONDER database query system, which contains mortality data from all death certificates filed in the United States for the years 1979 through 2009. Annual data on the number of deaths and death rates are available by underlying cause of death and can be stratified by state, age, race, and gender. CDC WONDER also offers links to multiple public health reports and data systems sponsored by government and nongovernment organizations.

## II. Estimating the Public Health Impacts of a Mandate

CHBRP's authorizing statute requires the public health impact analysis to estimate "the impact on the health of the community, including the reduction of communicable disease and the benefits of prevention such as those provided by childhood immunizations and prenatal care." The data elements needed to estimate the public health impact on the overall health of the community are the medical effectiveness of the mandated health benefit, the impact on coverage and utilization due to the mandate, and baseline incidence and health outcomes of the relevant condition(s).

The medical effectiveness team bases its conclusions regarding the medical impact of the health benefit mandate on thorough literature reviews conducted with medical librarians and in consultation with content experts. The methods used to conduct the literature search are presented in the Medical Effectiveness Analysis summary.

The cost and utilization team estimates changes in the insured population that would be directly affected by the mandate, including those who currently have coverage for the health benefit mandate and the number of Californians who would be newly covered as a result of the mandate. Additionally, the cost team estimates the utilization impacts for insured Californians who are presently covered for the proposed health insurance benefit and for those who will be newly covered for the benefit in the first year postmandate. (Details on the methodology used to make these adjustments can be found in the Cost Impact Analysis summary.) These estimates are critical to the public health impact analysis.

If all these data elements are available, the overall change in health outcomes in the affected population can be estimated. The public health impact calculations combine the estimated change in coverage and/or utilization of the health benefit mandate for the relevant population and the rate of effectiveness derived from the medical effectiveness literature review. The results for each health outcome are compiled to produce an overall mean estimate that can be used to calculate the health effects of the benefit mandate. For each specific health outcome reviewed in the literature for which there are baseline data available and a mean effect calculated, the estimated impact on each health outcome is applied to the population of new users to determine the overall change in outcomes resulting from the mandate.

Summary data and estimates are presented in every report's public health section and detailed calculations are included in an appendix when impacts can be quantified. Figure 2 below explains the logic supporting the calculations.

**Figure 2.** Appendix in CHBRP Reports: Calculations of Estimated Public Health Impacts
(Short-Term)

<u>Premandate</u>
**Step 1**. *Calculate baseline population of interest*:
- Total population already covered for service/treatment in proposed health benefit
  mandate (CHBRP/actuarial data)
  - o Of the total covered population, the number with relevant disease/condition
    (registries, state or national surveys, medical or public health literature)

**Step 2**. *Calculate baseline expected outcome estimates without mandate for a one-year period*:
- Use of services/treatment by this population (CHBRP/actuarial data/literature)
  - o Medical effectiveness of the service/treatment (literature)
    - ▪ Total number of persons with averted (or improved) health outcomes

<u>Postmandate</u>
**Step 3.** *Calculate estimate of newly covered population in the first postmandate year:*
- Total population, with no or partial coverage, who would be covered for
  service/treatment by the proposed health benefit mandate.
  - o Of the total newly covered population, the number with relevant
    disease/condition (registries, state or national surveys, medical or public health
    literature)

**Step 4**. *Calculate baseline expected outcome estimates with mandate for a one-year period*:
- Use of services/treatment by this population (CHBRP/actuarial data/literature)
  - o Medical effectiveness of the service/treatment (literature)
    - ▪ Total number of persons with averted (or improved) health outcomes

**Step 5**. *Calculate expected difference(s) in outcome(s) between premandate and postmandate in
the first postmandate year:*
- Report the difference between the total number of persons with averted (or improved)
  health outcomes premandate (Step 2) and the total number of persons with averted (or
  improved) health outcomes postmandate (Step 4).

Conclusions about the public health impacts of a mandate are categorized as follows:

- *Quantitative or qualitative public health impacts are estimated* when the following
  conditions are met:
  - o The medical effectiveness team finds "clear and convincing" or a "preponderance
    of" evidence that the service or treatment is effective, AND
  - o The cost team estimates a change in number of persons covered and/or a change
    in utilization of the relevant service or treatment.

When estimates of changes in coverage or utilization are considered too uncertain for a single point estimate, public health impacts may be estimated with an upper and/or lower bound (quantitative) or directionally (qualitative).

- *"Zero or no public health impacts" are estimated* when "clear and convincing" or "a preponderance of" evidence suggests that no improvement in health outcomes occur due to the service or treatment or when insurance coverage or utilization is not expected to change.
- *"Unknown public health impacts" are estimated* if medical effectiveness evidence is insufficient, conflicting, or ambiguous; if the cost team cannot estimate a change in utilization (i.e., some parity laws, unknown response by insurance market); or if no sufficient prevalence or incidence data are available.

*Harms*

When relevant evidence exists, the public health team also reports a service or treatment's potential harms. These potential adverse outcomes from a public health perspective are weighed against the overall potential benefits, and include both long-term and short-term harms to physical and psychological health, and well as adverse financial effects. Harms reported in the medical effectiveness section focus primarily on short-term adverse health effects of a service or treatment.


## III. Estimating the Impact on Gender and Racial/Ethnic Disparities

CHBRP's authorizing statute specifically requests that analyses assess the extent to which a mandated benefit will have an "impact on the health of the community, including diseases and conditions where gender and racial disparities in outcomes are established in peer-reviewed and scientific literature." Several competing definitions of "health disparities" exist and CHBRP relies on the definition proposed by Braveman (2006):

"A health disparity/inequality is a particular type of difference in health or in the most important influences of health that could potentially be shaped by policies; it is a difference in which disadvantaged social groups (such as the poor, racial/ethnic minorities, women, or other groups that have persistently experienced social disadvantage or discrimination) systematically experience worse health or greater health risks than more advantaged groups."

Because health benefit mandates affect the insured population, it is important to examine whether health disparities exist within the insured population. Although insurance status (insured vs. uninsured) has been found to be an important factor in health disparities, particularly in explaining racial health disparities (Kirby et al., 2006; Lillie-Blanton and Hoffman, 2005), there is less research addressing disparities within the insured population. CHIS data provide one indication that disparities among the insured population persist. Among the insured population (2009) of Californians aged 18 to 64, blacks, Hispanics, and other minorities reported worse overall health status compared with non-Hispanic whites (CHIS, 2009). This finding is consistent with much of the academic literature and policy reports that document racial and ethnic disparities in overall health status and disparities within specific health conditions (e.g., CDC, 2007; Ren and Amick, 1996).

When possible, the CHBRP reports detail differences in disease prevalence, health services utilization, and health outcomes by gender and race/ethnicity, preferably in the insured population. Four steps are used to assess whether disparities exist and whether the proposed mandate will have an impact on gender and/or racial disparities:

1. *Conduct literature review*: Using keywords, the public health team searches the academic literature for gender and racial/ethnic differences by: (a) prevalence of relevant health conditions or diseases; (b) utilization of relevant health services; and (c) relevant health outcomes. The medical effectiveness literature is also reviewed for any relevant gender or racial disparity information.

2. *Review data sources*: The team also identifies sources that contain relevant prevalence/incidence, health care utilization, and outcomes data by gender and race/ethnicity, preferably in California's insured population. The public health team applies the same hierarchy of evidence for disparities as that used to search for general incidence and prevalence data.

3. *Determine whether a mandate will impact disparities*: There are four main conclusions regarding the potential for mandates to impact gender or racial/ethnic disparities:
   - Evidence suggests that no disparities exist for the disease/condition/health outcome;
   - Impact is unknown due to a lack of evidence of disparities;
   - The mandate may increase disparities; or
   - The mandate may decrease disparities.

4. *Determine whether a change in disparities can be quantified*: Ideally, when a change in disparities is deemed possible, CHBRP attempts to quantify the marginal effect of the proposed mandate on gender and racial/ethnic disparities in the insured population. In order to accomplish this, the following information is needed:
   - Baseline incidence or prevalence of a condition by gender and/or race within the insured population;
   - Coverage impacts by gender and/or race (the gender and/or racial breakdown of the population affected by the specific mandate);
   - Utilization impacts by gender and/or race (the gender and/or racial breakdown of increased use of the benefit due to the mandate); and
   - Medical impacts by gender and/or race (gender- and/or race-specific calculations of the medical effectiveness of the mandate in improving health outcomes).

The public health team remains challenged by the limited data regarding the racial/ethnic breakdown of the California insured population and the lack of utilization data by gender or race. Therefore, in cases where baseline data and medical effectiveness information are available, CHBRP indicates direction of effect on existing disparities (qualitative assessment). CHBRP continues to explore alternatives to providing quantitative estimates of a health benefit mandate's impact on disparities in the insured population.

## IV. Estimating Impacts on Premature Death and Economic Loss Associated with Disease

CHBRP's public health team is also tasked with analyzing "the extent to which the proposed service reduces premature death and the economic loss associated with disease." Economists and

public health experts use the following measures, which expand beyond direct medical care costs, to assess societal costs and quality of life impacts (indirect costs) of a health care service or treatment on the community.

*Premature death*

Premature death is often defined as death before age 75 (Cox, 2006). The overall impact of premature death due to a particular disease can be measured in years of potential life lost (YPLL) (Cox, 2006; Gardner and Sanborn, 1990). This is a common measure used by public health researchers that essentially weights deaths occurring at younger ages more heavily than deaths in the older population. This measure complements crude and age-adjusted mortality rates, which are usually dominated by the underlying disease process in the elderly (CDC, 1986). To measure the impact of premature death across the population impacted by a proposed mandate, CHBRP first collects baseline mortality rates, usually from state or national vital statistics data sets. Medical effectiveness literature is also examined to determine if the proposed mandated benefit reduces mortality. If so, the public health team conducts a literature review to determine if the YPLL has been established for that condition. The analysis may conclude one of the following:

- Premature death is not relevant to the disease (disease does not result in death);
- The impact of the mandate on premature death is unknown due to insufficient/ambiguous evidence or because CHBRP is unable to estimate a change in utilization;
- Mandate would have no impact (per evidence); or
- Mandate would likely impact premature death (per evidence).


In order to calculate an expected impact on premature death, the following criteria must be met:

- Mortality must be a relevant health outcome (per peer-reviewed literature);
- Treatment/service must be medically effective at reducing mortality (per peer-reviewed literature); and
- The mandate would increase coverage or utilization of the benefit (estimates from the CHBRP cost team)

*Economic loss*

Economic loss associated with disease is commonly presented in the literature as an estimation of the value of the YPLL in a dollar amount (e.g., valuation of years of work life lost). In addition, morbidity associated with the disease can be quantified as lost productivity, absenteeism, and quality of life (e.g., lost days of work due to illness for patient or caregiver). Similar to the process used to estimate the premature death impact, the public health team conducts a literature review to determine if societal costs of illness (indirect costs) have been established and uses the evidence to support one of four conclusions:

- Disease/condition is not relevant to economic loss.
- Impact of mandate on economic loss is unknown due to insufficient/ambiguous evidence or because CHBRP is unable to estimate a change in utilization.
- Mandate has no impact on economic loss (per evidence).
- Mandate is estimated to decrease/increase economic loss (per evidence).

CHBRP presents the indirect cost of illness when available, but also notes where data on the economic loss associated with a disease are not published. This economic loss analysis is separate from the cost analysis, which calculates the direct, incremental cost of a mandate that expands (or rescinds) coverage of a health benefit.

In order to carry out a calculation of a mandate's affect on economic loss associated with disease, the following must be true:

- The mandate would increase coverage or utilization of the benefit; and
- The economic loss associated with disease can be calculated with either California or national data.

## V. Criteria and Guidelines for the Analysis of Short-Term and Long-Term Impacts

CHBRP must report on the cost and public health impacts of a health benefit mandate per statute; however, the law does not specify a time period in which to consider the impacts. When estimating the public health impacts of a mandate, the public health team focuses on the short term (1 year) timeframe in parallel with the cost team estimates (see *Short-Term Analysis* below). For those mandates with benefits that manifest beyond 12 months (i.e., preventive services such as screenings or vaccinations), CHBRP includes long-term estimates based on literature reviews and actuarial data. Additionally, the public health team reports the estimated number of uninsured in cases where a proposed mandate could result in a change in the number of uninsured as a result of an increase in annual premiums. Losing health insurance has many harmful consequences including reduced access to needed health care and increased stress due to lack of insurance (and possible financial instability if health problems arise) (Hadley, 2003; Kasper et al., 2000; Lave et al., 1998).

*Short-term analysis*
In the past, CHBRP limited its postmandate cost and public health impact analysis to one-year time horizon for several reasons:

1. The CHBRP cost impact model for premium and total expenditure estimates mimics most insurers' internal processes for determining premium changes in a given year and provides the legislature with the "real world" perspective on how decisions are made by health insurers.
2. The 60-day timeframe limits CHBRP's capacity for modeling the long-term cost and health consequences of benefit mandates, which requires sophisticated, disease-specific simulation models.
3. Given the specific nature of most mandates analyzed by CHBRP, the long-term cost impacts or public health impacts attributable to the mandate are not necessarily addressed in the literature.
4. The longer the time horizon, the greater the uncertainty due to compounding factors including changes in the practice, organization, and delivery of medical care, and changes

in technology, demographics, and the economy; therefore, estimates beyond the 12-month timeframe may be unstable.

*Long-term analysis*
Nevertheless, some health benefit mandates involve diseases or conditions with significant long-term health consequences and costs that are well-documented in the literature—screening (e.g., breast cancer) and other preventive (e.g., immunizations, tobacco cessation treatments) or disease management services are good examples. Ignoring these long-term consequences may result in analyses that substantially underreport the health benefits and possible cost savings associated with a proposed mandate. Therefore, CHBRP now follows these guidelines and criteria when examining the potential long-term impacts of a proposed mandate:

1. During the initial assessment of a proposed mandate, the CHBRP analytic team determines whether there are likely to be long-term health impacts and cost savings based on consultation with content experts.
2. The faculty lead for the mandate analysis works with the medical effectiveness, public health, and cost teams, as well as the medical librarian, to determine search terms and parameters that identify key literature on the possible long-term cost and public health impacts of the proposed mandate. This includes economic loss associated with the disease and cost-effectiveness studies (which typically analyze lifetime health benefits and costs, as well as longitudinal epidemiological cohort studies).
3. The cost team reviews relevant literature, including cost-effectiveness studies that may have modeled long-term costs. The literature on cost-effectiveness analysis is summarized by the public health team to inform the reader as to what are the costs associated with a life saved (or a "quality-adjusted life year" saved).
4. The public health team quantifies the effect of a mandate on lifetime morbidity and mortality, if data are available. As mentioned, if sufficient information is not available to quantify impacts, the public health team may indicate a direction of effect based on qualitative information.

*Examples of Long-Term Impact Analyses in CHBRP Reports*
CHBRP analyzed the long-term cost and health outcomes for Senate Bill 1245 (CHBRP, 2006), a bill enacted in September 2006. This bill required insurers and health plans to cover the test for the human papillomavirus (HPV) for cervical cancer screening. Although CHBRP did not estimate any cost or public health impact attributable to the mandate, the analysis offered an alternative scenario in the case that the mandate would indirectly increase utilization (by 1 percentage point) as a result of a public awareness campaign and more providers adopting the new guidelines regarding HPV testing and Pap screenings.

Based on existing cost-effectiveness models, CHBRP reported the following:

"It is estimated that 7.6 million women are in health insurance plans affected by this mandate. Therefore, a hypothesized 1 percentage point increase in HPV triage screening would result in 76,000 more women shifting from lifetime conventional Pap tests to lifetime HPV triage screening. A shift from lifetime conventional Pap screening to HPV triage would result in a 29% reduction in lifetime cervical cancer risk and a 9% increase in lifetime costs.

In this scenario, for each increase by 1 percentage point in the rate of women screened for cervical cancer using the HPV triage screening strategy (compared to lifetime conventional Pap tests), over the lifetime of the 76,000 women newly subject to this screening strategy, this would result in a reduction in cervical cancer cases from 290 to 205 with an associated cost increase of 14.3 million dollars.

It is estimated that 6.0 million women age 30 or older are in health plans affected by this mandate. Therefore, a hypothesized 1 percentage point increase in HPV primary screening would result in 60,000 more women shifting from lifetime conventional Pap tests to HPV/Pap primary screen at age 30 and older. A shift in the rate of HPV/Pap primary screening in women ages 30 and older (compared to lifetime conventional Pap tests) would result in a 39% reduction in lifetime cervical cancer risk and a 45% increase in lifetime costs. For each increase by 1 percentage point in the rate of women screened for cervical cancer with Pap and HPV concurrent screening (compared to lifetime conventional Pap tests) over the lifetime of the 60,000 women newly subject to this screening strategy, this would result in a reduction in cervical cancer cases from 224 to 137 with an associated cost increase of 57.6 million dollars."

Taking the total lifetime projected costs, the public health team included an expected present day value in an alternative estimate on impacts to premiums and total expenditures. Details of the analysis were presented in Appendix C of the report.

CHBRP also considered long-term costs and health outcomes in its report on Assembly Bill 1429 (CHBRP, 2007), a bill that passed the Legislature and was vetoed by the Governor in 2008. In that analysis, CHBRP provided the following information regarding long-term costs and benefits:

"HPV vaccination will likely produce several important health benefits, including reductions in CIN 2 and 3 [pre-cancerous lesions], cases of cervical cancer, and cervical cancer deaths. Several cost-effectiveness studies have been published recently examining both the long-terms costs of vaccination as well as the long-term savings associated with reductions in these adverse health events (Goldie et al., 2004; Sanders and Taira, 2003). These studies found that the lifetime costs and benefits of HPV vaccination for a hypothetical cohort of females aged 12 years, where the vaccine is most effective, produces incremental cost-effectiveness ratios (ICERs) of $22,755 and $20,600 per quality-adjusted life-year (QALY) saved. These estimates mean that the net cost, after accounting for all savings associated with the reductions in adverse health events, ranges from about $20,600 to $22,755 per additional QALY saved, using different assumptions on length of immunity and other such details. Although there is no consensus about the most appropriate threshold, policy makers have routinely accepted technologies with estimated ICERs much higher than these." In addition, CHBRP estimated that the new mandate would add coverage for a subset of the insured population and "…approximately 1,000 cases of HPV could be averted over the lifetime of the women impacted by Assembly Bill 1429, thereby preventing almost 30 cases of cervical cancer and 10 cervical cancer-related deaths."

## Conclusion

Understanding the scope of the public health impacts of health insurance benefit mandates through evidence-based analysis is critical to public policymaking; inclusion of the community

health perspective in these reports helps capture the potential value of a mandate (what is achieved at what cost). The public health team continually works with its CHBRP colleagues to refine the research methods and apply relevant, evidence-based data sources to support the California legislature with the most timely, accurate, non-partisan estimates of the impacts of proposed health benefit mandates.

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