

# Paths to Prevention

The California Breast Cancer Primary Prevention Plan

## Executive Summary



Breast cancer risk is not simply about the individual; it is about a society that has the potential to function in a way that not only protects people's health but also builds resilience.

# Intro

## Background

*Paths to Prevention: The California Breast Cancer Primary Prevention Plan* (the Plan) is the first of its kind; compiling an in depth and comprehensive review of the factors that increase the risk, and therefore the incidence, of breast cancer. After reviewing the science on 23 distinct factors, the Plan recommends systemic policy actions and/or further research to better understand and reduce those risks. The Executive Summary provides a first look at the goals, methods, and top line findings of this extensive Plan, which can be found here: [www.bcpp.org/resource/california-breast-cancer-primary-prevention-plan](http://www.bcpp.org/resource/california-breast-cancer-primary-prevention-plan). Breast Cancer Prevention Partners hopes *Paths to Prevention* will provide options and stimulate action by a wide range of stakeholders at the local, municipal, and state levels to reduce breast cancer throughout California. The ultimate goal: fewer women hearing the words “you have breast cancer.”

Breast cancer has touched us all, whether we've been diagnosed ourselves or have a friend, family member, or coworker facing this complex and devastating disease. Today, a U.S. woman's lifetime risk of breast cancer is 1 in 8.<sup>1</sup> After skin cancer, cancer of the female breast is the most common type of cancer in the U.S. According to estimates, breast cancer will cause more deaths of U.S. women under the age of 45 than any other cancer in 2020.<sup>2</sup> In California alone, an estimated 30,650 women will be diagnosed and more than 4,000 will die.<sup>3</sup> Across racial and ethnic groups, Black women have the highest breast cancer mortality rate, 42% higher than the comparable rate for White women;<sup>4</sup> and among women younger than 45, breast cancer incidence is higher among Black women than White women.<sup>5</sup>



Breast cancer affects women of all ages, ethnicities, and races.<sup>6</sup> Yet according to the American Cancer Society, eight out of 10 women who are diagnosed with breast cancer do not have a family history of the disease.<sup>7</sup> And the incidence of breast cancer is on the rise, up 40% over the last four decades. Every year in the U.S., nearly a quarter of a million women and about 2,000 men are told they have breast cancer. This begs the questions: What is causing this disease? Why is it on the rise? And what can be done to prevent breast cancer before it starts?

*Paths to Prevention: The California Breast Cancer Primary Prevention Plan* starts to answer these questions by identifying key actions that can be taken in California and elsewhere to reduce breast cancer. By combining a comprehensive review of the science on breast cancer risk with an inclusive process for community input into potential steps to reduce that risk, Breast Cancer Prevention Partners (BCPP) has developed an action plan of local, regional, and statewide measures that can reduce breast cancer risk while also addressing a wide range of societal issues.

*Paths to Prevention* reflects the synthesis of what was learned over a three-year process of analyzing the science, engaging a diverse Advisory Committee, and listening to the community wisdom of advocates across the state. All aspects of this plan were developed using the following five Guiding Principles:

**01.** Breast cancer is a societal issue. Reducing risk requires systemic change.

**02.** To create a healthy society, we must address discrimination, racism, and inequities in power and access.

**03.** Community wisdom is a valuable source of information and often highlights areas that scientific research has not yet investigated.

**04.** Breast cancer risk is multi-factorial. Interventions to reduce risk should be multi-factorial.

**05.** We do not need 100% certainty to act.

Certain recommendations made in *Paths to Prevention* are new and unique, and others reinforce existing recommendations from a large and varied network of advocates working across California to build a healthier society. Our recommendations have been made in solidarity with—and in support of—the many existing movements for environmental, health, economic, racial, gender, and climate justice. Breast cancer prevention provides another justification for supporting efforts to address California’s pressing problems, but with the same end goal: to build a stronger, safer, healthier state for everyone.



# How This Plan Is Different

Since 1998, the Centers for Disease Control and Prevention (CDC) have helped states, U.S. territories, and tribes or tribal organizations create and implement cancer control plans. In regard to breast cancer, these state plans emphasize early detection, treatment, and access to services. Where they do address primary prevention, the plans tend to focus on recommending ways for individuals to change their behavior, without significant consideration of social, environmental, and/or situational factors or obstacles that enhance or limit individual efforts.

*Paths to Prevention* is distinct and unique from other cancer plans in several important ways, including its:

- Focus on Primary Prevention
- Focus on Systemic Interventions
- Social Justice Lens
- Weaving Together Science and Community Wisdom



## Definitions

\* **Primary Prevention**—Preventing the onset of disease by eliminating or reducing exposures to risk factors. This is distinct from early detection, which is sometimes referred to as “secondary prevention.”

\* **Systemic Change**—Addressing society-level issues, rather than focusing on individual behaviors, to reduce breast cancer risk at a population level.

The Plan focuses exclusively on primary prevention of this disease: reducing risk rather than early detection. Early detection, for instance from mammograms, is sometimes referred to as “secondary prevention.” While vitally important, early detection is not our focus here; rather, we seek to stop the disease before it starts.

This Plan also shifts the focus from decreasing and eliminating an individual’s risk to changes we can make as a society. The recommended interventions address systemic, society-level issues that increase risks for breast cancer. For example, recommendations for individuals to eat more fruits and vegetables lack meaning if we don’t also encourage zoning and planning practices that ensure easier access to fresh foods instead of fast food. Telling people to get more exercise does not mean much if they do not have safe and accessible green spaces and community-gathering spaces for children and adults to play and move. While it is important for individuals to strive for a healthier lifestyle, we should not shame or blame individuals who do not or cannot make those changes. Rather, we should work collectively to support healthy communities for everyone in California by making the healthy choice the easy choice.

The authors of *Paths to Prevention* committed to incorporating a social justice lens into every aspect of its development and recommendations, seeking to represent the needs and realities of California’s diverse communities and population. We actively sought the limited science available on how marginalized communities are impacted by breast cancer risk factors. In developing recommendations, we considered actions that would benefit all Californians and tried to be cognizant of potential unintended negative consequences, for instance how improving neighborhoods, such as increased walkability and access to green space, can lead to gentrification.

The first two chapters in the Plan, “Race, Power and Inequities” and “Social and Built Environment,” both influence and provide a context and lens for our discussion of all the other risk factors presented. For each of the risk factors, we began with an evaluation and discussion of the relevant peer-reviewed science. However, we know that far too many communities are not represented adequately, or at all, in that science. Therefore, throughout the course of this project, we spent significant effort and resources to ensure that community wisdom was represented in *Paths to Prevention’s* recommended interventions. The weaving together of the science and community wisdom has given this Plan a richness and relevance to those most impacted that would have been lost without those community voices. We are deeply grateful to the community members who shared their time and knowledge.



# How This Plan Was Developed

Breast Cancer Prevention Partners sought input from a wide range of sources in the development of *Paths to Prevention*. We assembled a top-notch Advisory Committee, reviewed thousands of scientific journal articles, hosted a series of webinar-based study groups, and learned from highly impacted communities across the state. Our Advisory Committee—composed of 18 experts from academia, government agencies, labor, and non-profit organizations—advised us on all aspects of the project, ranging from research areas to the process of engaging local community members. In gathering the most up-to-date science, we reviewed thousands of journal articles covering 23 different potential risk factors for breast cancer. Our series of webinar-based study groups covered nine major topics and engaged experts and community activists from both within and outside California. Our engagement of community members from across the state was a critical component of the project.

Communities hold valuable information about the issues relevant to their local context.

## Community Engagement

California is a large, diverse state that is home to a wide range of communities that have been impacted by breast cancer. One of the most unique and key sources of input for *Paths to Prevention* was hearing from people on the ground about challenges they face related to breast cancer risk. Communities hold valuable information about the issues relevant to their local context; this community wisdom is often not reflected in the scientific research. They also often have experience developing interventions to address local needs, as well as an intimate understanding of the community's strengths, challenges and barriers to effective change.

To access this community wisdom, BCPP met with more the 125 community members during 11 listening sessions across the state in areas representing rural and urban communities; major cities and small towns; and in the



Central Valley, Sierra foothills, and coastal communities. Sessions were held in Delano, Fresno, Los Angeles, Nevada City, Oakland, Pacoima, Richmond, Sacramento, San Francisco, Seville, and Tracy. The extensive notes collected at these events provided local perspectives on actions needed to reduce breast cancer risk, as well as barriers to be overcome. Many examples of the local or regional organizing efforts were included in the Plan's recommendations. While each community was unique, key themes emerged.







## Themes Emerging from *Paths to Prevention* Listening Sessions

After conducting community listening sessions across California, the following 10 themes emerged as most relevant to shaping the Plan:

1. **Prevention efforts must benefit everyone** regardless of race, economic status, immigration status, and other characteristics that generally marginalize and oppress people.
2. **Stop blaming individuals for structural inequities.** Address structural barriers such as lack of access to healthy food and lack of safe spaces for physical activity.
3. **Work with existing communities and structures to address needs.** Look to churches, spiritual groups, schools, and community groups for education, outreach, and organizing opportunities.
4. **Support and develop community centers.** These centers can be a critical resource in areas that are underserved.
5. **Improve air quality.** Air quality is a critical concern throughout California, in both rural and urban areas.
6. **Improve both water quality and access to water** across the state, with a special focus on unincorporated areas that are especially underserved.
7. **Address food deserts, food access, and food cost.** Lack of access to healthy foods, both in terms of location and expense; ready availability and affordability of unhealthy fast foods; and lack of time to prepare, knowledge of, or cultural familiarity with healthy foods all add to the challenge of maintaining a healthy diet.
8. **Explore significant updates in the way planning and zoning is done.** Reduce multiple stressors and unhealthy exposures and provide additional support to rural and unincorporated areas, which have been intentionally marginalized in the past.
9. **Create more equitable cities (and towns).** Almost everywhere BCPP went, we saw stark contrasts in services and resources available in different parts of the same city.
10. **Reduce pesticide exposure.** Both urban and rural areas are exposed to pesticides, but effects may be most profound in rural areas, especially agricultural areas.

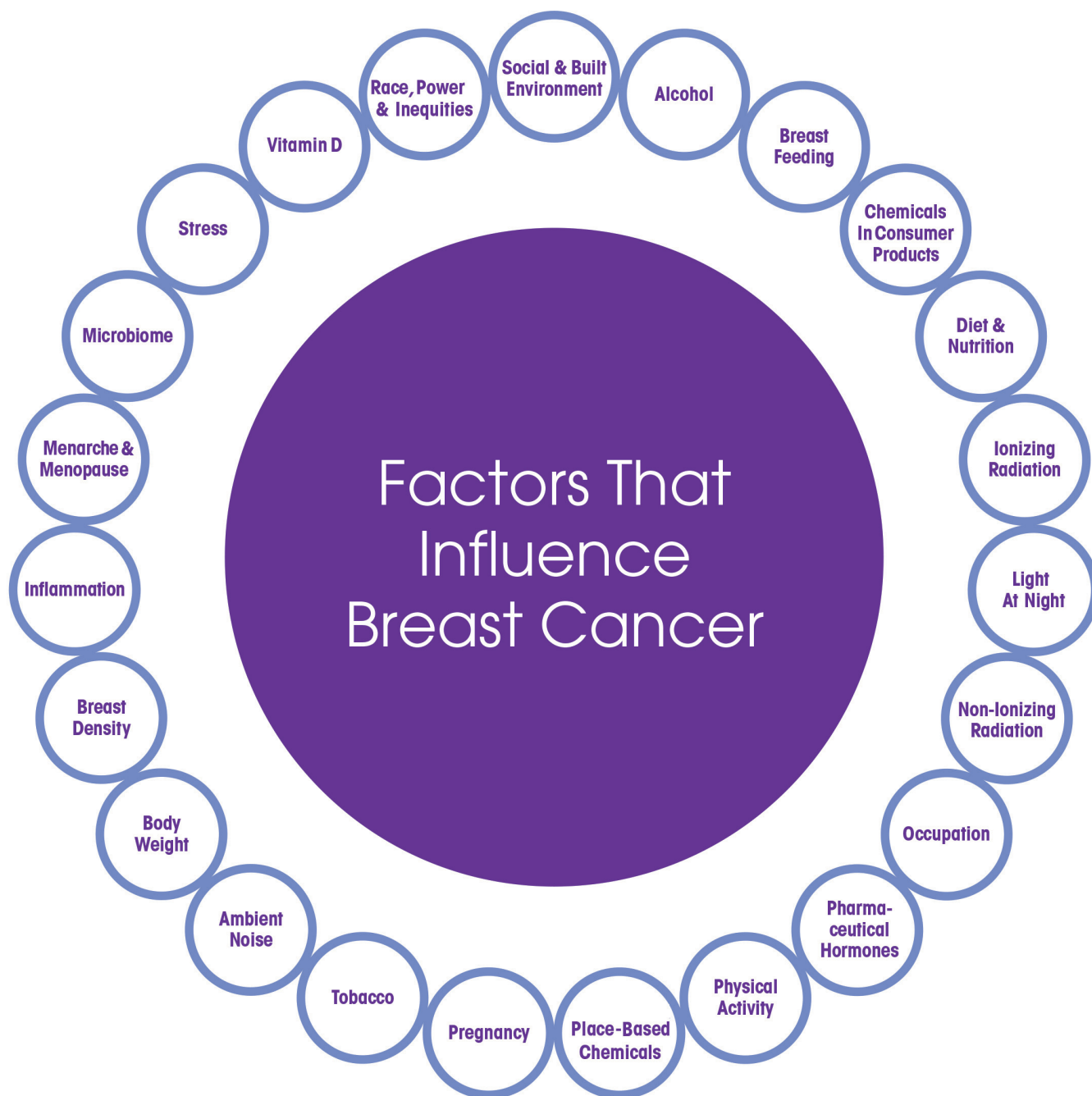
# Breast Cancer Risk Factors

Breast cancer risk is a complex web of inter-related factors. *Paths to Prevention* synthesizes the science regarding 23 risk and protective factors impacting breast cancer, as well as potential interventions for those risk factors.(Figure 1). Some factors are better established, such as radiation exposure, tobacco smoke (first- and second-hand), alcohol consumption, and lack of physical activity. Other risk factors are still not well understood but are no less compelling: environmental exposures, the stress of poverty and racism, immigrating to the U.S. from countries with lower breast cancer rates, and others. These 23 factors were identified using previous reports on breast cancer risks, current scientific literature, and input from our Advisory Committee and community voices.

All communities face multiple risk factors simultaneously; however, marginalized communities often have increased exposure to risk factors, with fewer resources or opportunities to mitigate those factors. It is not uncommon to see the same communities facing higher exposure to industrial pollution, poor air quality, lack of access to healthy food, limited opportunities for physical activity, and other concerns. Due to historically racist policies, these problems are often concentrated in communities where people of color live.

There is still much to be discovered about what causes breast cancer. Yet there is enough evidence on modifiable risk factors that now is the time to act preventatively. Minimizing these risk factors at a societal level can not only reduce breast cancer burden across the state; it also promotes a healthier society overall.

Figure 1.  
Breast Cancer Risk Factors





# Linking Science to Prevention Recommendations

The scientific understanding of breast cancer risks has grown significantly in recent years and continues to increase rapidly. Many experts agree that at least 50% of all breast cancer cases are preventable by using risk-reduction strategies.<sup>9</sup> However, simply informing individuals of their potential breast cancer risk is rarely sufficient to change behavior.<sup>10</sup> A family history of cancer may lead to a higher chance of pursuing screening, but not necessarily to changes in behavior.<sup>11</sup> Many of the risk factors that individuals may be able to mitigate personally have systemic barriers. Therefore, the greatest potential for impact lies in interventions addressing the systemic root of the problem.

As mentioned above, *Paths to Prevention* covers 23 different categories of breast cancer risk factors, and both summarizes key scientific themes and suggests potential interventions to reduce those risks. All risk factors included in this plan were chosen because scientific literature indicates enough evidence to warrant taking action and/or conducting more research. Significant effort was made to ensure that the science used to determine and describe breast cancer risk factors was comprehensive and up-to-date. However, not all risk factors are equally well-established or understood, and the level of available scientific evidence varies considerably. This plan does not weigh factors against one another; rather, it assesses whether adequate evidence exists to suggest concern.







Don't do  
anything  
about me,  
without me.

- Common theme from  
Listening Sessions

# How Recommendations Were Made

The recommendations presented in *Paths to Prevention* are an extensive, but not exhaustive, compilation of interventions from a variety of sources. Intervention ideas suggested during the community listening sessions and study groups, as well as literature reviews on effective risk reduction efforts, were all considered and incorporated. The BCPP team also conducted extensive Internet research to assess potential intervention ideas highlighted by non-profit organizations; community groups; school districts; and local, regional, and state governments. Where appropriate, interventions were considered that were not designed specifically to address breast cancer but were relevant to other health outcomes for a particular risk factor. All the interventions identified here highlight some of the best examples we encountered, and all were considered for their alignment with our Guiding Principles.

All the information gathered from the above steps was then synthesized and woven together to form the recommendations in the Plan. Where possible, we tried to include recommendations that could be adopted and implemented by a wide range of decision-makers, including not only the California State Legislature but also cities, school districts, counties, companies, and other institutions. Our hope is that a wide range of organizations across the state, including BCPP, will collaboratively lead efforts to implement the pieces of this Plan that speak most to their stakeholders. We also fully expect and hope these recommendations will serve as a springboard for people to develop their own proposals that address the specific needs of their communities.



# Key Themes for Action

Several themes emerged as key to reducing breast cancer risk:

**Upstream interventions may have the greatest impact, even though they may take a long time to implement.**

For example, California's requirement to include health and equity standards in General Plans (broad planning guidelines for a city's or county's future development goals) is a critical step in protecting vulnerable communities in future development. It will not solve the entrenched problems of the past that facilitated the targeting of certain communities, especially low-income communities and communities of color, for multiple, simultaneous assaults on their health. However, it can serve to make great improvements moving forward.

**Community-level efforts that address multiple needs can support short- and long-term improvements in health.**

Across the state, successful community efforts exist outside of the policy realm that support people's health across their lifespan. For example, community centers that provide diverse services show great potential to address multiple needs. They often offer physical activity, food, and nutrition options; community building and health education; and can be a hub for community organizing. These are especially important in under-resourced communities, should be strongly considered in areas that lack existing structure and support, and should be well-subsidized to allow everyone, regardless of income, to take advantage of their services.





### **Honest and effective education is needed on under-publicized breast cancer risk factors.**

Some well-established breast cancer risk factors require not only systemic interventions, but also much greater public education. In particular, the link between breast cancer risk and alcohol consumption is nearly indisputable, yet very few people we met in building this Plan understood the strength of the link or even that a link existed.

### **Health education and protection needs to start early in life.**

Breast cancer risk can start before birth, so the lens on when and how to intervene needs to consider the full lifespan. One area that could significantly improve long-term breast cancer risk reduction is ensuring K-12 education and programs invest in girls' life-long healthy habits.

### **We are stronger together.**

The issues addressed in *Paths to Prevention* intersect with many other concerns related to health, equity, and justice. The strongest response to breast cancer risk will come from diverse people, organizations, coalitions, and movements coming together to address common challenges. Policies protecting only a small portion of California's diverse population are unacceptable. All humans deserve respect, dignity, and compassion, and our policies and actions need to reflect this principle.



# Risk Factors and Interventions

The following table lists the Science Summary, Overarching Goal, and Intervention Goals for each of the 23 risk and protective factors covered in *Paths to Prevention: The California Breast Cancer Primary Prevention Plan*. In the full document, these goals are further articulated and defined with specific strategies that could be used to achieve them.

Table 1.  
Summary of Science and Intervention Goals to Reduce Breast Cancer Risk In California

| RISK FACTORS FOR BREAST CANCER THAT INFLUENCE AND PROVIDE A CONTEXT FOR ALL OTHERS. |  |
|---|--|
| Risk Factor   | Science Summary and Intervention Goals   |
| Race, Power and Inequities  | <p><b>Science Summary:</b> Breast cancer incidence is not distributed equally among different ethnic or racial communities or groups, due to a number of complex, often inter-related factors. For example, Black women are twice as likely as White women to be diagnosed with triple-negative breast cancer, a more aggressive subtype of the disease. In addition, elevated risk among some groups may be misrepresented, such as when rates are reported as lower for all women of Asian and Pacific Islander descent, ignoring potentially elevated breast cancer risk among young Japanese and Filipina women.</p> <p><b>Overarching Goal:</b> Build power and create accountability to address the historical roots and ongoing trauma of discrimination and systemic oppression based on race, ethnicity, income status, gender identity and orientation, sexual orientation, immigration status, disability, or other factors that may increase breast cancer risk.</p> |

## RISK FACTORS FOR BREAST CANCER THAT INFLUENCE AND PROVIDE A CONTEXT FOR ALL OTHERS.

| Risk Factor  | Science Summary and Intervention Goals   |
|--|--|
| <p><b>Race, Power and Inequities (continued)</b></p> | <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Create accountability to address historical harm and trauma, which have lasting effects on the opportunities and structures that shape many aspects of breast cancer risk today.</li> <li>• <b>Intervention Goal 2:</b> Build power and capacity for women in California to drive societal change that reduces breast cancer risk.</li> <li>• <b>Intervention Goal 3:</b> Expand culturally appropriate education and awareness efforts related to breast cancer prevention.</li> <li>• <b>Intervention Goal 4:</b> Endorse and support movements that address discrimination, marginalization, and oppression that can underlie and exacerbate breast cancer risk factors.</li> <li>• <b>Intervention Goal 5:</b> Expand research to better understand how various social determinants of health (SDOH) impact breast cancer incidence and risk.</li> </ul>  |
| <p><b>Social and Built Environment</b></p>           | <p><b>Science Summary:</b> Aspects of the social and built environment have far-reaching impacts on a wide range of health and societal issues. Addressing these negative features of the social and built environment may reduce breast cancer risk and other negative health concerns in two major ways: (1) by reducing pollution, improving transportation, increasing access to clean water and healthy food, and expanding opportunity for physical activity; and (2) by improving health by allowing those living in problematic conditions to move safely through their neighborhoods and communities and interact with others to increase social affiliation and decrease isolation.</p> <p><b>Overarching Goal:</b> Design, redesign, and build communities to maximize health, minimize inequities, prevent displacement of existing communities, and offer the best opportunities to reduce the risk of breast cancer and other health problems.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Update state, city, and county zoning and permitting laws, as well as city and county General Plans, to prevent polluting industries from being located near schools or concentrated in communities of color or low-income communities.</li> <li>• <b>Intervention Goal 2:</b> Develop safe walk-, bike-, and public transit-friendly cities to enhance physical activity opportunities and reduce pollution, both of which impact breast cancer risk and health in general.</li> <li>• <b>Intervention Goal 3:</b> Ensure adequate housing, especially focusing on expanding access to affordable housing options, and to ensure that housing is free from pollutants linked to breast cancer and other diseases</li> <li>• <b>Intervention Goal 4:</b> Build accessible, safe, affordable, and beautiful indoor and outdoor spaces where people can participate in physical activity and healthy activities.</li> <li>• <b>Intervention Goal 5:</b> Update and expand building codes to maximize healthy building requirements, reduce exposures to chemicals linked to breast cancer, encourage exposure to natural light, and improve options for physical activity.</li> <li>• <b>Intervention Goal 6:</b> Invest in research to better understand the role of the social and built environment on breast cancer risk.</li> </ul> |

## RISK FACTORS FOR BREAST CANCER FOR WHICH WE PROVIDE INTERVENTIONS TO REDUCE RISK.

| Risk Factor         | Science Summary and Intervention Goals  |
|---------------------|---|
| Alcohol Consumption | <p><b>Science Summary:</b> Alcohol consumption increases risk for breast cancer, as demonstrated by a large body of research. The more you drink, the higher your risk; even light drinking increases risk. Very little research has specifically examined whether this finding is consistent across all racial and ethnic groups, although one study found that the risk associated with drinking was higher for Black women than for White women.</p> <p><b>Overarching Goal:</b> Significantly expand public education on the link between breast cancer risk and alcohol consumption, and expand support and incentives to reduce consumption of alcoholic beverages for girls and women.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Greatly improve public knowledge of the link between alcohol and breast cancer risk.</li> <li>• <b>Intervention Goal 2:</b> Strengthen, fully implement, and, where appropriate, enforce measures to reduce alcohol consumption.</li> <li>• <b>Intervention Goal 3:</b> Expand research on the effectiveness of interventions to reduce alcohol consumption.</li> </ul>  |
| Breastfeeding       | <p><b>Science Summary:</b> Breastfeeding is a protective factor for breast cancer, with lower risk associated with longer duration of breastfeeding in most studies. Social and cultural barriers lead to lower rates of breastfeeding for U.S. Black babies.</p> <p><b>Overarching Goal:</b> Remove all legal and cultural barriers to maximizing women's ability to breastfeed their babies.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Create public education campaigns that promote breastfeeding, discourage use of infant formula, and include information on the health benefits of breastfeeding to both the child and the mother, including reduced breast cancer risk.</li> <li>• <b>Intervention Goal 2:</b> Pass and implement policies that support pregnant women and new mothers and that offer optimal health benefits for the mother and baby.</li> <li>• <b>Intervention Goal 3:</b> Create breastfeeding-supportive workplaces for all workers, regardless of employment classification or status.</li> <li>• <b>Intervention Goal 4:</b> Improve breastfeeding-supportive maternity care practices in healthcare facilities.</li> <li>• <b>Intervention Goal 5:</b> Increase new mothers' access to support for breastfeeding after leaving the birthing center.</li> <li>• <b>Intervention Goal 6:</b> Expand research on ways to increase women's commitment and participation in breastfeeding and reduce cultural barriers and challenges to breastfeeding.</li> </ul> |

## RISK FACTORS FOR BREAST CANCER FOR WHICH WE PROVIDE INTERVENTIONS TO REDUCE RISK.

| Risk Factor                    | Science Summary and Intervention Goals   |
|--------------------------------|--|
| Chemicals in Consumer Products | <p><b>Science Summary:</b> Everyday consumer products can contain chemicals linked to hormone disruption and breast cancer. Use of these products can lead to exposures across the lifespan linked to later-life disease, with some of these chemicals having the most profound effects when exposures occur prenatally or early in life.</p> <p><b>Overarching Goal:</b> Ensure that consumer products in California do not contain chemicals linked to breast cancer, and that existing products containing toxic chemicals are disposed of in a safe and equitable way.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Regulate consumer products to disclose, restrict, and/or remove chemicals linked to harm to humans or the environment, particularly chemicals linked to breast cancer.</li> <li>• <b>Intervention Goal 2:</b> Consider the impact of the full life cycle of products—production, use and disposal—particularly on highly impacted communities and workers who manufacture or use the products.</li> <li>• <b>Intervention Goal 3:</b> Promote programs and media images to counteract discriminatory concepts of beauty that lead women to use more beauty products containing chemicals linked to breast cancer or other health issues.</li> <li>• <b>Intervention Goal 4:</b> Support research to identify harmful chemicals linked to breast cancer, and design intrinsically safer chemicals through green chemistry.</li> </ul>                         |
| Diet and Nutrition             | <p><b>Science Summary:</b> The relationship between diet and breast cancer is complex and still not well understood, as the vast majority of the studies were conducted based on dietary practices later in life. Despite inconsistencies, the existing scientific evidence suggests overall healthy dietary patterns may be protective against breast cancer.</p> <p><b>Overarching Goal:</b> Ensure access to safe, nutritious foods, which can help reduce the risk of breast cancer for all Californians by increasing access to culturally appropriate, nutritious, affordable food, while also providing economic opportunities so people can afford food.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Eliminate intentionally food-deprived areas and junk food-abundant areas by following affected communities' leadership in building healthy food communities.</li> <li>• <b>Intervention Goal 2:</b> Invest in early-life nutrition and life-long healthy eating habits.</li> <li>• <b>Intervention Goal 3:</b> Expand understanding and support for nutritious traditional diets of Native Californians.</li> <li>• <b>Intervention Goal 4:</b> Encourage or require institutions to provide—and ensure universal access to—healthy food that can reduce breast cancer risk.</li> <li>• <b>Intervention Goal 5:</b> Support research on the connection between diet, breast cancer risk, and systemic changes that result in people eating healthier diets.</li> </ul> |



## RISK FACTORS FOR BREAST CANCER FOR WHICH WE PROVIDE INTERVENTIONS TO REDUCE RISK.

| Risk Factor            | Science Summary and Intervention Goals   |
|------------------------|--|
| Ionizing Radiation     | <p><b>Science Summary:</b> Ionizing radiation is an established risk factor for breast cancer, and minimizing radiation dose to breast tissue is critically important, particularly in girls and young women.</p> <p><b>Overarching Goal:</b> Minimize, and where appropriate eliminate, exposure to all ionizing radiation, particularly in girls and young women.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Minimize exposure to ionizing radiation from medical imaging.</li> <li>• <b>Intervention Goal 2:</b> Establish standards and best practices for all occupations where workers might be exposed to ionizing radiation. While each profession may have specific needs, some guidelines that apply to multiple occupations are listed here.</li> <li>• <b>Intervention Goal 3:</b> Clean up current or former military or industrial sites that are contaminated with radioactive waste.</li> <li>• <b>Intervention Goal 4:</b> Expand research to identify ways to reduce exposures to ionizing radiation.</li> </ul> |
| Light at Night         | <p><b>Science Summary:</b> Light at night may affect breast cancer risk through circadian rhythm disruption and/or reduced melatonin production, which are influenced by shiftwork, exposure to artificial light at night, and sleep duration.</p> <p><b>Overarching Goal:</b> Reduce breast cancer risk by eliminating all unnecessary exposure to circadian rhythm-disrupting light at night and promote action to mitigate the impact when it cannot be avoided.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Increase worker awareness of these issues. Develop workplace policies, with worker involvement, to reduce, eliminate, or mitigate unnecessary exposures to light at night.</li> <li>• <b>Intervention Goal 2:</b> Reduce or, where possible, eliminate light at night where people live.</li> <li>• <b>Intervention Goal 3:</b> Expand research on the connection between light at night and breast cancer, as well as possible interventions and their effectiveness.</li> </ul>                                   |
| Non-Ionizing Radiation | <p><b>Science Summary:</b> Research on non-ionizing radiation and breast cancer has yielded mixed results. Currently radiofrequency (RF cellphone) radiation does not appear to be linked to breast cancer, although more research is needed on modern 4G and 5G technologies. High chronic occupational exposures to extremely low-frequency electromagnetic fields (ELF-EMF, from power lines and electrical appliances) may be associated with increased risk of male breast cancer. Exposure to high ELF-EMF may be linked to increased risk of pre-menopausal breast cancer, but more studies are needed that directly measure radiation exposure.</p> <p><b>Overarching Goal:</b> Reduce and where possible eliminate ELF-EMF exposure linked to breast cancer and expand research on the link between non-ionizing radiation (both ELF-ELM and RF) and breast cancer risk.</p>  |

## RISK FACTORS FOR BREAST CANCER FOR WHICH WE PROVIDE INTERVENTIONS TO REDUCE RISK.

| Risk Factor  | Science Summary and Intervention Goals   |
|--|--|
| <p><b>Non-Ionizing Radiation</b><br/>(continued)</p> | <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Reduce occupational exposures to ELF-EMF linked to breast cancer in both men and women.</li> <li>• <b>Intervention Goal 2:</b> Reduce environmental exposures to ELF-EMF around homes, schools, public spaces, and workplaces.</li> <li>• <b>Intervention Goal 3:</b> Expand research on the connection between non-ionizing radiation and breast cancer risk.</li> </ul>   |
| <p><b>Occupational Factors</b></p>                   | <p><b>Science Summary:</b> Work in specific occupations and some workplace exposures has been linked to increased risk of breast cancer, and research in this area continues to grow more sophisticated.</p> <p><b>Overarching Goal:</b> Support workers' right to a healthy livelihood by reducing exposures and conditions that increase risk for breast cancer.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Implement workplace policies and practices, following the Hierarchy of Controls, to protect workers and reduce breast cancer risk.</li> <li>• <b>Intervention Goal 2:</b> Strengthen the institutions and laws that protect workers from on-the-job health hazards that can increase risk for breast cancer.</li> <li>• <b>Intervention Goal 3:</b> Support workplace equity to ensure all women have economic security and the ability to advocate for workplace safety.</li> <li>• <b>Intervention Goal 4:</b> Support research to better understand women's occupational breast cancer risk and how to reduce that risk.</li> </ul>   |
| <p><b>Pharmaceutical Hormones</b></p>                | <p><b>Science Summary:</b> Use of combined estrogen plus synthetic progestin (E+P) hormone replacement therapy for post-menopausal women has been found to be a risk factor for breast cancer, while estrogen-only therapy for women who have had a hysterectomy is seen as protective. The relationship between use of oral contraceptive (OC) pills and breast cancer risk is nuanced regarding duration and timing of use and formula preparation, but the consensus is that OCs should be taken for the shortest duration of time possible to avoid increased risk of breast cancer.</p> <p><b>Overarching Goal:</b> Better understand how various forms of pharmaceutical hormone treatments impact breast cancer risk and provide clear public education and healthcare provider guidelines on how to minimize breast cancer risk while using hormone treatments.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Create comprehensive educational materials for California that incorporate current balanced research on hormonally active medications, including the potential risks such as breast cancer.</li> <li>• <b>Intervention Goal 2:</b> Provide ongoing education to healthcare providers who prescribe hormones and ensure they provide accurate patient counseling regarding hormone therapies and the use of oral contraceptives, including discussing the benefits and potential risks, such as breast cancer risk.</li> <li>• <b>Intervention Goal 3:</b> Fund and support research that expands our understanding of menopause and the effects of hormone therapies for different populations and in different contexts, particularly as it pertains to breast cancer risk.</li> </ul> |

## RISK FACTORS FOR BREAST CANCER FOR WHICH WE PROVIDE INTERVENTIONS TO REDUCE RISK.

| Risk Factor           | Science Summary and Intervention Goals   |
|-----------------------|--|
| Physical Activity     | <p><b>Science Summary:</b> Physical activity reduces risk of both pre- and post-menopausal breast cancer, with vigorous physical activity being the most protective.</p> <p><b>Overarching Goal:</b> Encourage and support regular physical activity throughout the life course by addressing personal, cultural, and systemic barriers.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Develop strong habits in children to support a life-long practice of physical activity.</li> <li>• <b>Intervention Goal 2:</b> Design workplaces to support more physical activity and provide access and incentives for physical activity, particularly for sedentary jobs. Ensure all programs are designed in conjunction with workers.</li> <li>• <b>Intervention Goal 3:</b> Support accessible, affordable, and culturally relevant community opportunities for physical activity.</li> <li>• <b>Intervention Goal 4:</b> Conduct more research on the benefits of physical activity, including impacts on breast cancer risk and effective interventions to increase physical education and activity in all populations.</li> </ul>   |
| Place-Based Chemicals | <p><b>Science Summary:</b> : Place-based chemical exposures refer to air pollutants, pesticides, water and soil contamination, and industrial pollutants; many of those exposures have been linked to increased risk of breast cancer.</p> <p><b>Overarching Goal:</b> Reduce exposures to chemicals linked to breast cancer in air, water, food, and soil, especially focusing on disproportionately impacted communities.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Build capacity for people to win greater protection from chemical exposures linked to breast cancer.</li> <li>• <b>Intervention Goal 2:</b> Strengthen California’s institutions that can and should protect people from exposures linked to breast cancer and other diseases.</li> <li>• <b>Intervention Goal 3:</b> In accordance with California’s recognition of the human right to water, expand the state’s capacity to ensure safe (free from chemicals linked to breast cancer), adequate, and affordable water for all California residents, regardless of whether they live in cities, towns, or unincorporated areas.</li> <li>• <b>Intervention Goal 4:</b> Improve air quality and air quality protections to reduce exposures to air pollutants linked to breast cancer (see “Social and Built Environment” section for more details).</li> <li>• <b>Intervention Goal 5:</b> Reduce exposure to harmful chemicals and pesticides in public areas.</li> <li>• <b>Intervention Goal 6:</b> Support public planning processes that strengthen long-term development with a health and equity lens by using the newly revised California General Plan Guidelines as a foundational document for local and regional planning decisions (see “Social and Built Environment” section for more details).</li> <li>• <b>Intervention Goal 7:</b> Support research to identify harmful chemicals linked to breast cancer, and design intrinsically safer chemicals through green chemistry.</li> </ul> |

## RISK FACTORS FOR BREAST CANCER FOR WHICH WE PROVIDE INTERVENTIONS TO REDUCE RISK.

| Risk Factor               | Science Summary and Intervention Goals   |
|---------------------------|--|
| Pregnancy-Related Factors | <p><b>Science Summary:</b> Giving birth and having children at a younger age is protective against ER+ breast cancer but not against other subtypes. There is a suggestion of increased risk of triple-negative breast cancer with parity, although breastfeeding is protective against this risk. No well-established association exists between miscarriages or abortions and breast cancer.</p> <p><b>Overarching Goal:</b> Minimize the effect of pregnancy-related breast cancer risk by providing support for women's choices around childbearing.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Remove systemic barriers to having children for women who wish to do so.</li> <li>• <b>Intervention Goal 2:</b> Encourage women to breastfeed their babies for as long as they are able (see "Breastfeeding" section for more detail).</li> <li>• <b>Intervention Goal 3:</b> Expand research into pregnancy-related breast cancer risk, stratifying by race, ethnicity, and hormone receptor status.</li> </ul> |
| Tobacco                   | <p><b>Science Summary:</b> Tobacco smoke contains a multitude of chemicals that have been linked with increased risk of breast cancer. In addition, evidence suggests both active smoking and passive smoking may lead to increased breast cancer risk.</p> <p><b>Overarching Goal:</b> End tobacco use in California, with an accelerated commitment to prevent children and young adults from starting to use tobacco.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Reduce the number of people who use tobacco products.</li> <li>• <b>Intervention Goal 2:</b> Protect people from second-hand smoke. Smoke-free policies can reduce people's exposure to second-hand smoke by 50%, reduce indoor air pollution by 88%, and reduce tobacco use overall.</li> <li>• <b>Intervention Goal 3:</b> Expand research into the link between breast cancer risk and tobacco use, including vaping.</li> </ul>  |



**RISK FACTORS WHICH REQUIRE ADDITIONAL RESEARCH TO BETTER UNDERSTAND THEIR CONNECTION TO BREAST CANCER AND EFFECTIVE INTERVENTIONS.**

| Risk Factor                    | Science Summary and Intervention Goals   |
|--------------------------------|--|
| Ambient Noise                  | <p><b>Science Summary:</b> Evidence of the impact of ambient noise on breast cancer incidence is inconsistent and more research is needed.</p> <p><b>Overarching Goal:</b> Expand research on the link between ambient noise and breast cancer risk.</p>   |
| Body Weight Over the Life Span | <p><b>Science Summary:</b> The breast cancer risk association with body fat, as measured by BMI, differs by menopausal status. Higher BMI after menopause increases breast cancer risk, while higher BMI in youth, adolescence, and young adulthood may reduce breast cancer risk. Risks may be further influenced by distribution of body fat, hormone replacement therapy use, breast cancer subtypes, and race and ethnicity.</p> <p><b>Overarching Goal:</b> Expand research to better understand the link between body weight and breast cancer risk at various life stages and the most effective interventions to reduce risk.</p>                              |
| Breast Density                 | <p><b>Science Summary:</b> Increased breast density is considered one of the strongest risk factors for breast cancer after female sex, age, family history, and/or specific gene mutations. Various factors can influence breast density, either increasing or reducing density, including ionizing radiation, pharmaceutical hormones, parity, menopause, air pollution, smoking, and body weight; although more research is needed on these factors and the role of genetics.</p> <p><b>Overarching Goal:</b> Improve research on understanding the role of breast density in breast cancer risk and the factors that impact breast density.</p>                    |
| Inflammation                   | <p><b>Science Summary:</b> Inflammation plays a critical role in tumorigenesis (tumor formation). It is one of the mechanisms by which environmental factors may increase risk for breast cancer. Chronic inflammation should, where possible, be reduced and controlled. The promotion of less inflammatory diets and physical activity may contribute to breast cancer prevention. The use of anti-inflammatory drugs as a potential intervention should be further investigated.</p> <p><b>Overarching Goal:</b> Better understand the link between breast cancer &amp; inflammation and identify effective options to control and reduce chronic inflammation.</p> |
| Menarche & Menopause           | <p><b>Science Summary:</b> The timing of menarche (first menstruation) and menopause, as well as the length of time between menarche and one's first full-term pregnancy, have been shown to influence a woman's risk of developing breast cancer.</p> <p><b>Overarching Goal:</b> Expand research into potential causes of early menarche and extended duration of menses, their impact on breast cancer risk, and interventions to mitigate those impacts.</p>   |

**RISK FACTORS WHICH REQUIRE ADDITIONAL RESEARCH TO BETTER UNDERSTAND THEIR CONNECTION TO BREAST CANCER AND EFFECTIVE INTERVENTIONS.**

| Risk Factor                         | Science Summary and Intervention Goals  |
|-------------------------------------|---|
| Menarche & Menopause<br>(continued) | <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Expand and extend research on early menarche and pubertal sequencing to better understand factors that affect breast development and breast cancer risk.</li> <li>• <b>Intervention Goal 2:</b> Expand research on the physiology, diversity of experiences, and needs of women in their late reproductive years, perimenopause, and menopause.</li> </ul>   |
| Microbiome                          | <p><b>Science Summary:</b> Science is beginning to explore the health effects of the vast collection of microbes residing in and on the body, termed the microbiome. Across people, microbiome differences exist in breast tissue and the digestive tract, and these differences can influence levels of estrogen and other hormonally active agents, immune function, and inflammation. Microbial diversity in the breast may be protective against breast cancer, and a healthy gut microbiome may support immune function, which may help protect against breast cancer.</p> <p><b>Overarching Goal:</b> Improve research on understanding the role of the microbiome in breast cancer risk.</p>   |
| Stress                              | <p><b>Science Summary:</b> Several studies have found associations between stress and breast cancer risk, but other studies find no relationship. Theoretical models propose that racial discrimination, economic deprivation, and other socio-environmental stressors may disrupt biological processes and lead to increased risk of breast cancer.</p> <p><b>Overarching Goal:</b> Understand and ameliorate the effects of stress, especially those that contribute to later-life adverse health outcomes, including breast cancer.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Expand research to understand the links between early-life stress and breast cancer.</li> <li>• <b>Intervention Goal 2:</b> Establish California's leadership in addressing Adverse Childhood Experiences (ACEs) through work with the California Surgeon General.</li> <li>• <b>Intervention Goal 3:</b> De-stigmatize use of mental health services and increase their availability.</li> </ul>   |
| Vitamin D                           | <p><b>Science Summary:</b> The literature linking vitamin D status and breast cancer risk is complex and inconsistent, but overall provides some evidence to suggest that higher levels of vitamin D may be protective for at least some women. Factors such as menopausal status, race/ethnicity, genetics, and other risk factors may interact with vitamin D. Since many women have lower-than-optimal levels of 25(OH)D (a metabolite of vitamin D), supplementation may be warranted.</p> <p><b>Overarching Goal:</b> Achieve optimal vitamin D status across the California population to reduce breast cancer risks potentially associated with vitamin D deficiency and to support other health outcomes.</p> <ul style="list-style-type: none"> <li>• <b>Intervention Goal 1:</b> Expand research to understand the links between vitamin D and breast cancer.</li> <li>• <b>Intervention Goal 2:</b> Refine and implement practice guidelines related to vitamin D, considering effects on breast cancer as well as other health outcomes.</li> </ul> |

# Conclusion

As one of the biggest, most populous, and most diverse states in the country, California has a rich history of community leadership and advocacy, a world-class research community, and an innovative legislative body. We have great potential to develop interventions and policy solutions at the local, county, and state levels to reduce breast cancer risk. We in California have a unique opportunity—with our people and at this moment in time—to take on this challenge.

*Paths to Prevention: The California Breast Cancer Primary Prevention Plan* would not have been possible without the generous time and energy of the many people we encountered over the three years of its development. We are especially grateful to the community members who gave their time, energy, and wisdom to help us understand the problems and opportunities across the state, and to see the clear potential for unintended consequences in making recommendations that do not adequately incorporate community perspectives.

This plan is the people's plan. It is a road map with a menu of options for how to address reducing breast cancer risk, support women's health generally, and confront a wide range of societal problems. Whether you are a community activist or healthcare professional, city councilperson or county supervisor, worker or business owner, school board member or teacher, funder or state legislator; whether you are acting to improve conditions locally or state-wide, there is a role for you in making *Paths to Prevention* a reality. Breast Cancer Prevention Partners invites Californians from across the state and from diverse backgrounds and interests to join us in bringing this plan to life—making real change to reduce the incidence of breast cancer while impacting so many other societal challenges.





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Breast Cancer Prevention Partners (BCPP) is the leading science-based policy and advocacy organization working to prevent breast cancer by eliminating our exposure to toxic chemicals and radiation.

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