

# Reproductive Health and the Environment Consumer Education Materials: Aiming for Action amongst Low Income and Low Literacy Populations

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**Keywords** Endocrine-disrupting chemicals; Chemical exposures; Reproductive health; Health education materials

**Abbreviations** RHE: Reproductive Health and the Environment; EDCs: Endocrine-Disrupting Chemicals; IQ: Intelligence Quotient; ADHD: Attention Deficit Hyperactivity Disorder; BPA: Bis-Phenol A; PBDEs: Polybrominated Diphenyl Ethers; WHERC: Iris Cantor – UCLA Women's Health Education & Research Center; SAM: Suitability Assessment of Materials

## Abstract

**Background:** To identify effective methods of developing and delivering consumer health education materials related to reproductive health and the environment.

**Methods:** One focus group (n=58). Inclusion criteria were self-selected attendees from the 2014 Reproductive Health and the Environment conference held in Los Angeles. The focus group was divided into eight groups with seven to ten participants. A table facilitator and note taker were assigned to each group. The same four reproductive health and the environment consumer education publications were reviewed by each group and were selected because of their widespread availability and/or were developed by noted health professionals. The identical questions were posed to the participants by the table facilitator and related to the readability level, format, target audience, and content.

**Results and discussion:** The reoccurring themes identified in the publications were focused on readability levels being too high for a low literacy population, and content too complex and presented in hard to follow formats. Additionally, the fear levels were considered at a level that could immobilize action instead of motivating change. The font styles and sizes, along with a cluttered design, were other variables that limited the impact of some of the publications reviewed. A wallet card format was the recommendation for a future publication. Surveys with drafts of the wallet card were distributed to 20 women in the target audience soliciting their responses to the information and format.

**Conclusion:** A community participatory process for developing the wallet card and translating it into Spanish translation was essential for individuals and communities to take action in reducing exposure. Affordable and easy to adopt recommendations for actions are essential when targeting low income women.

## Introduction

There is mounting evidence regarding the hazards of chemical exposure on reproductive health. Consumer education materials targeting women before and during their pregnancy about the links between the environment and birth outcomes have multiplied. Reproductive Health and the Environment (RHE) encompass a broad range of topics with prevention strategies that have economic, social, and cultural implications. Creating brief and easy to understand materials that are educational and motivational is not simple. Formulating materials with appropriate readability levels for women with low literacy skills that are linguistically and culturally relevant is challenging.

## Background

Short-lived exposures to Endocrine-Disrupting Chemicals (EDCs) and other noxious substances from the environment during preconception, prenatal and postnatal phases of physiological sensitivity can have lifelong consequences for future generations. The International Federation of Gynecology and Obstetrics found that elevated incidence rates of preterm birth and low birth weight, neurobehavioral disorders, and type 2 diabetes have "...occurred in a timeframe inconsistent with a much slower pace of changes in the genome, indicating that the environment has shaped these disease patterns" [1]. The Endocrine Society identifies a compilation of serious health complications linked to EDCs including cognitive deficits and diminished IQ, obesity, and hormone-sensitive cancers [2,3].

Over the past several decades, there has been a decline in fertility, full term pregnancy, and healthy births rates in the United States. Simultaneously, there has been a significant rise in reproductive disorders such as early onset of puberty, low sperm counts, and birth defects like

cryptorchidism and hypospadias [1-3]. Emerging evidence suggests EDCs can have detrimental reproductive effects. EDCs are exogenous substances that alter normal functioning of the endocrine system and potentially cause adverse health effects in an intact organism and its progeny [2-5].

Lead exposure in utero and during early childhood can lead to cognitive delays in children as it negatively impacts development of the central nervous system [6,7]. Lead exposure is directly correlated to the underdevelopment of vital cognitive functions and a heightened likelihood of developing learning disabilities, autism, ADHD, aggression, delinquency and lower reading readiness [6]. This places the child at a disadvantage throughout their future academic performance. Both low and elevated lead levels result in negative educational outcomes, concerning for children with even minimal lead exposure [6].

Children from low socioeconomic households are disproportionately more likely to be exposed to lead. Due to the detrimental educational outcomes caused by lead exposure, children affected often remain trapped into the cycle of poverty [7]. Environmental factors such as toxic chemicals serve as a glass ceiling in the academic careers of exposed children. Lead exposure accompanied by other confounders and comorbidities can lead to more detrimental impact [7].

While EDCs are ubiquitous in the environment, they are commonly found in products used in everyday living: foods, water, air, house dust, and pest control [2,8]. As a result, women of child bearing age and pregnant women frequently come in contact with EDCs. The Fourth National Report on Human Exposure to Environmental Chemicals, conducted by CDC in 2009, found that nearly all pregnant women in the U.S. have detectable serum levels of EDCs including Bis-Phenol A (BPA), perchlorate, phthalates, Polybrominated Diphenyl Ethers (PBDEs), and pesticides [9].

New research suggests that the placenta, once thought to be a highly effective barrier from chemical exposures, may magnify maternal exposures [10]. Moreover, fetal exposure can occur from preconceptional exposures [11]. Thus, exposure to EDCs is associated with infertility, pregnancy complications, poor birth outcomes, and child development abnormalities. Manufactured and naturally occurring EDCs are known to affect sex steroid hormone pathways. However, some EDCs can affect adrenal, thyroid, and other endocrine pathways. In addition, EDCs can affect enzymatic activity involved in steroid biosynthesis and metabolism, and disrupt centralized endocrine pathways via positive and negative feedback [3].

## Methods

In determining where information is lacking in RHE education materials and their appeal to patients and consumers, the Iris Cantor – UCLA Women's Health Education & Research Center (WHERC) conducted a focus group with 58 health professionals, community activists, academicians, government officials, and policy experts in 2014. The focus group was held immediately following WHERC's 2014 Reproductive Health and the Environment: Best Practices Conference. The focus group format involved reviewing and commenting on publications selected for review covering varying

aspects of RHE. They were chosen based upon their seemingly widespread availability and/or because the organization that developed them was highly regarded by health professionals.

The focus group consisted of eight tables with approximately seven to ten participants, one facilitator, and one note-taker per table. Upon arriving, participants filled out a short questionnaire regarding the organization they represented and whether or not they used RHE materials in their education programs. Facilitators then asked the participants to briefly review four different publications and were asked questions regarding each publication. All notes taken were then reviewed and categorized by reoccurring themes. Based on these themes, recommendations were constructed to guide the development of future RHE materials. This study was approved by the UCLA Institutional Review Board, # 14-001237.

## Results

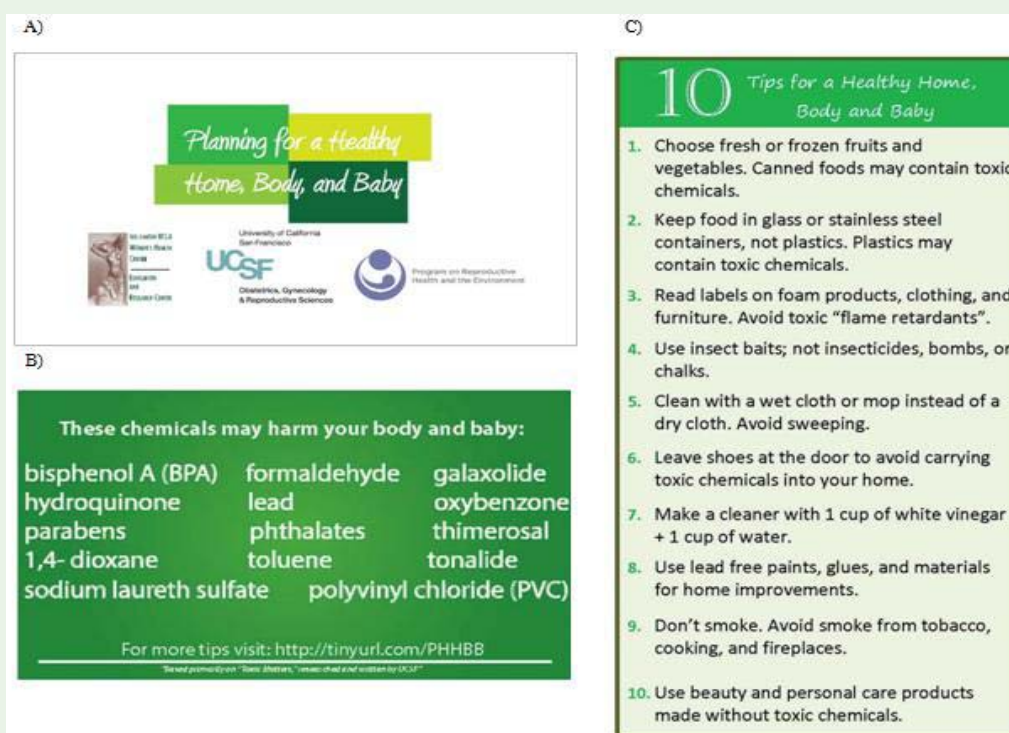
Overall, the materials presented were well received. The main concern was the reading level and format of the materials. Many of the organizations expressed concern that some of the current materials could be overwhelming for the low literacy level constituencies they work with. With too much information in hard to follow formats, the recommendations for avoiding exposure may be difficult to understand. Many materials targeted health professionals; redesigning them as direct patient education materials was felt to be more effective. To address the formatting concerns raised in the focus group, the consensus was to break down information into smaller, more concise phrases that would fit on a "post card" type handout.

Many of the participants addressing RHE issues in their work were not familiar with some materials reviewed at the focus group. Finding new avenues for publicizing and distributing them was encouraged to help increase their availability to the general public.

Based upon the focus group recommendations, a follow-up survey was developed for participants to respond to specific issues related to the development of new RHE materials. The survey results demonstrated that designing a wallet card format to include RHE tips for avoiding exposure to environmental toxins written at a 4<sup>th</sup>-6<sup>th</sup> reading level would be most accessible to a wider audience. A wallet card was developed based upon information from the Toxic Matters brochure produced by the University of California San Francisco's Program on Reproductive Health and the Environment.

After consolidating the input and recommendations for the new wallet card publication, a draft was pilot tested with the assistance of community organizations serving women that read either Spanish or English and were of low to-moderate income backgrounds.

Feedback from over 20 women who receive services from three diverse community organizations in Los Angeles County assessed the wallet card's visual appeal, relevancy of content, and readability level. The results indicated that the content had to be concise with easy and affordable recommendations. Ongoing discussions on simple steps and minor, yet significant editing on word choices were critical for perfecting the language and layout of the wallet card. Based on these comments, the wallet card was printed and made available free of charge to local community agencies (Figure 1).



**Figure 1:** Planning for a Healthy Home, Body, and Baby wallet card.

A) Logos on the card identify the key organizations involved in the development of the card.

B) List of 14 harmful chemicals most commonly found in household and beauty products. Website links to additional information about toxins.

C) List of 10 tips to avoid harmful chemicals in everyday items and simple suggestions for reducing exposure.

## Discussion

It is estimated that 8<sup>th</sup> grade is the average reading level in the United States. However, many individuals have even lower reading levels [12]. Therefore, it is suggested that materials be written at the 6<sup>th</sup> grade reading level, or lower, to ensure more individuals are able to comprehend the messages being conveyed. To aid in assessing the reading level of materials, several readability assessment tools exist. Some tools available are Fry readability graph, SMOG, Gunning FOG, SAM (Suitability Assessment of Materials), and Flesch-Kincaid Grade Level [13,14]. The Flesch-Kincaid Grade Level tool should be used with caution because it tends to score 2-3 grades lower than other tools [13]. The assessments are based on factors including syllables per word and number of words per sentence [12]. Almost all of these resources are available online or through Microsoft Office. Using the Gunning FOG test, the average reading level of the materials reviewed in the focus group was approximately 13, meaning they were mostly written at the college level [15]. The discrepancy in the reading level of the existing materials and the reading level of the low literacy target audience can be addressed by modifying existing materials.

In addition, the fear created when learning about the potential impact on reproductive health from environmental hazards needs to be motivational in changing lifestyle behaviors rather than immobilizing action. Health messages need to provide realistic solutions to minimizing and avoiding exposure to environmental risks rather than leave consumers feeling hopeless and overwhelmed by an onslaught of risks they are unable to control. Focusing on the

positive changes that can be made rather than eliciting fear is a more constructive approach to environmental risk reduction [16].

Besides lowering the reading level of materials, changing the format would also make the content easier to follow and understand. This includes using readable font styles and sizes and avoiding a cluttered design. The use of a footed font in 12-point size or larger is advised. For good contrast, text should not be printed on patterned or shaded background. Finally, use of ample white space makes it easier for the reader to follow by avoidance of clutter [17].

Additionally, visuals help to better communicate messages to the audience, especially when they are clearly labeled and easy to understand. Captions should be placed near pictures and contain key messages as some individuals may only read these [18]. They can also be used to give specific actions for the audience to adopt [13]. Images should be culturally relevant and sensitive and should also be familiar to the audience [18].

Finally, more condensed materials are ideal for most audiences. It is easier for people to focus on two or three key concepts [13]. An abundance of information given at once can be overwhelming to the reader. Being told what to do instead of what not to do is better received by audiences. It also allows the positive to be highlighted [18], which in turn helps to create self-efficacy. By utilizing these recommendations, the wallet card provides basic chemical terminology, practical tips for plastics, food use and personal care products, simple recipes to reduce chemical exposures at home, and a useful website for further recommendations in a low literacy format.

## Conclusion

Balancing the content of what RHE information to include in publications in an engaging format that meets the readability level of consumers was not a simple or quick process. Being cognizant of the fear appeal level of the RHE messages is crucial as well as offering a few simple and easily adoptable changes. Recognizing the financial limitations for the audience in choosing to switch to products that are chemical free is also important. The limitations they may have at home and at work in avoiding exposure also need to be factored in.

The process of bringing together stakeholders to initially provide an analysis of existing consumer education materials in a focus group was critical to not only solicit their opinions, but for them to gain ownership of the final wallet card publication. Including women who are the target audience of the wallet cards in providing comments on the draft offered further expert recommendations.

Once the text and layout was agreed upon, the process of translating it into Spanish was the next step. Within Los Angeles County, the Spanish language has variants or dialects based upon the county of origin where people are from and the diverse zones where it is spoken because of regional, historical, and cultural differences. Determining which pronouns to use, tenses, and other linguistic choices required reaching consensus on word choices common to the majority of Spanish speakers.

This community participatory process was instrumental in ensuring the wallet card would be effective in helping women reduce and eliminate exposure to environmental hazards. The messages were persuasive with easy and immediate actionable steps and provided essential information. Although the focus was on individual action, the hope is that through educating women in groups, a community consciousness will emerge to shape new group norms to advocate for building communities where environmental exposures are eliminated to improve the overall health of individuals, families, and the community at large.

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