

## **Baltimore City Infant Mortality: Leading Causes, Risk Factors, and Policy Solutions**

### **Introduction**

The infant mortality rate (IMR)<sup>1</sup> is an important health statistic used by health agencies, economists, government officials, media, and many others as a key indicator of a nation, region, or city's overall health and standard of living. In addition, the causes of infant mortality contribute, per-person, more "years-of-potential-life-lost" [YPLL]<sup>2</sup> (Gardner 1990) than mortality in any other age group.

Baltimore's IMR is particularly troubling. Baltimore had an almost 60 percent higher IMR than the Maryland state average in 2000 (MDHMH-Vital Statistics 2000), a 70 percent higher rate than US average in 2000 (MacDorman 2002), and possibly even an estimated 80-90 percent higher rate than nationwide averages this year (Ding Intern 2003). While the United States overall IMR is hitting an all-time low (Yee 2003; Mathews 2003), Baltimore City in 2003 is currently experiencing an increase in infant mortality (Dambita 2003). Additionally, it can be inferred and estimated that Baltimore has a higher IMR than even third world countries with GDP per capita of under \$500 (Megawangi 1993).

Highlighted with concern even by city Health Commissioner Peter Beilenson (Dambita 2003), an upturn in infant mortality is a very big dilemma in Baltimore. Thus, it is important to not only identify major causes and risk factors of infant mortality, but also

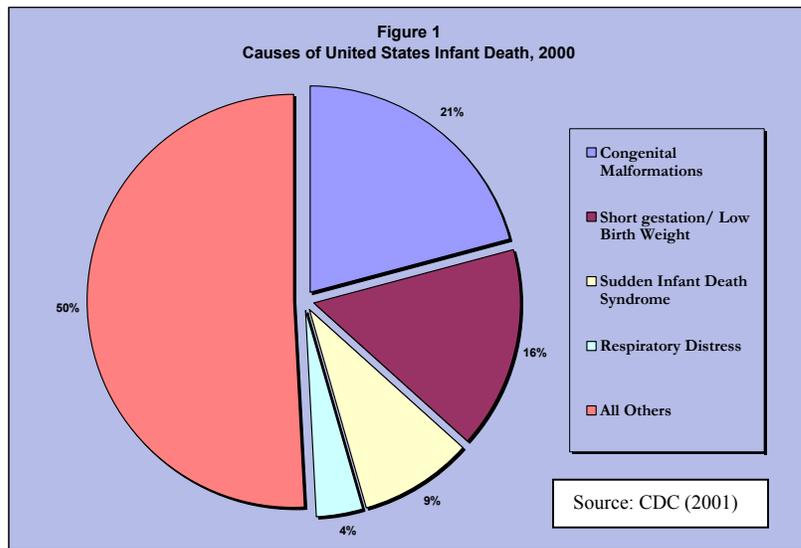
<sup>1</sup>. IMR is specifically defined as:  $[(\text{number of deaths infants } < 1 \text{ year old}) / (\text{number of live births in given year})]$ . "Live births" is used as the denominator since it's more accurate and reliable than an annual estimate of the population  $< 1$  year old.

<sup>2</sup>. YPLL is a measure of productive human years lost from premature death by approximating the average number of years the person would have lived (life expectancy) had the condition not brought about early mortality. It is commonly used by epidemiologists as an index to emphasize the human loss in society, especially from childhood diseases.

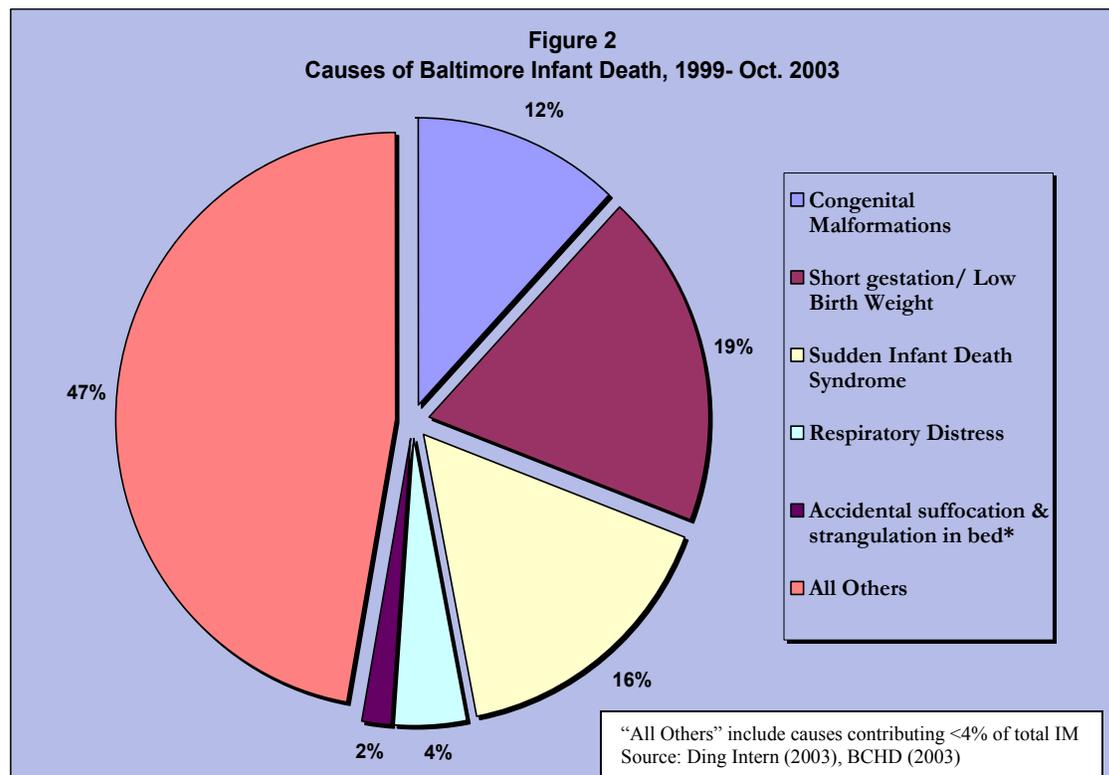
to assess the current conditions in the city, to present policy perspectives, and to derive policy priorities that are needed to adequately address this disturbing problem.

### Scope of the Problem

To begin to solve the problem of infant mortality (IM) in Baltimore, one must first examine the epidemiology of major causes of IM in the City, and compare its rates



and proportions to the rest of the US. The latest data on the leading causes of death in the US and Baltimore are presented in figures 1 and 2, respectively.



As one can see, short gestation / low birth weight (LBW), Sudden Infant Death Syndrome (SIDS), congenital malformations, and respiratory distress are the 4 leading causes of infant death in Baltimore (BCHD 2003), and Table 1 shows that the rates of most of these causes in Baltimore is significantly higher than national rates.

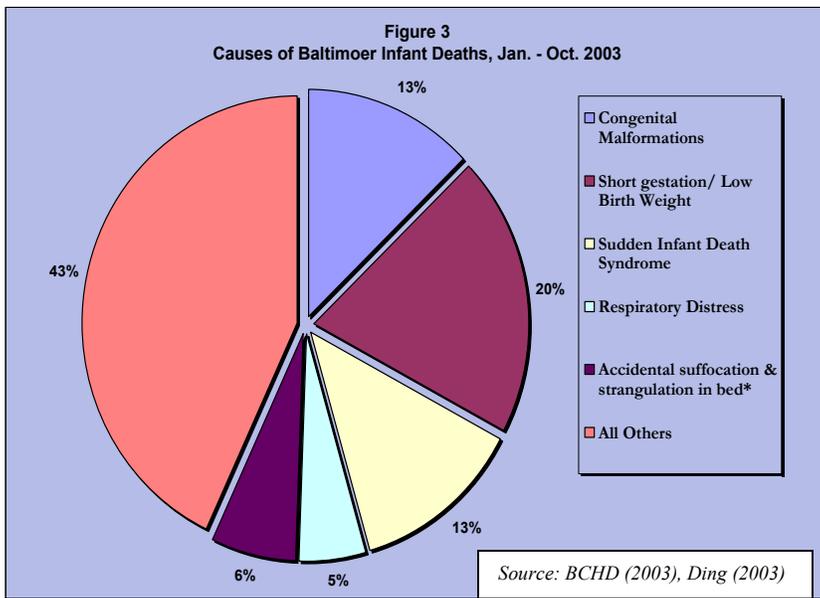
**Table 1**  
**IM Standard Mortality Ratio: Baltimore 2003 vs. US 2001**

Cause of Infant Mortality	SMR: Baltimore vs. US	Pvalue
Overall	2.22	<u>&lt;0.0001</u>
Congenital Malformations	0.93	0.8149
Short gestation/ Low Birth Weight	1.95	<u>0.0028</u>
Sudden Infant Death Syndrome	2.13	<u>0.0076</u>
Respiratory Distress	2.15	0.0856
Accidental suffocation & strangulation in bed	>9.18	<u>&lt;0.0001</u>

Note: [Bold Red denotes strong statistical significance; light red denotes marginal statistical significance]  
Sources: Ding Intern (2003); BCHD (2003); CDC (2001)

Included in the Baltimore chart (figure 2) is also the category “accidental suffocation and strangulation in bed” (ASSB), which has recently grown in magnitude in

Baltimore. While there were only 3 cases in all of 1999-2002, there have been 5 cases within a span 5 months alone in 2003 (BCHD 2003). This sizable increase, seen in figure 3, outpaces even respiratory distress, thus qualifying ASSB as a significant cause of IM.



It is also important to emphasize that 90 percent of all IM cases in Baltimore are among African American (AA) infants (BCHD 2003), while AAs constitute a smaller percentage of the population and also only contribute 72 percent of total annual births (MDHMH 2002). Therefore, AA residents are more likely to experience IM than whites.

This analysis will present the major risk factors, current conditions, and policy perspectives of each leading cause of IM in Baltimore. It will include a relatively detailed description of an important public health policy and program to address one particularly alarming cause of IM. Finally, it will present some of the author's views on the dynamics of how to better solve infant mortality.

## **Infant Mortality from Short Gestation and Low Birth Weight**

### **Risk Factors**

Short gestation, or premature birth, is strongly associated with the low birth weight of infants, hence they are aggregated together in the same category under the ICD10 cause of death coding system. Research has found that a 100g increase in birth weight may reduce risk of neonatal mortality by 30-50 percent (Shrimpton 2003). Commonly referred to as just "low birth weight" (LBW), this significant cause of infant mortality has a longer list of risk factors than any other cause of infant death.

In addition to premature birth, other factors that elevate the risk for LBW include: AA race (Eberhardt 2001); adolescent mother (Chang 2003); low-education of mother (Eberhardt 2001); single mother (Phung 2003); little or no prenatal care (Herbst 2003); maternal smoking (Phung 2003), alcohol consumption (Mill 1984; Whitehead 2003), or drug use (Chang 2003); short inter-pregnancy interval (Smith 2003); maternal malnutrition (Kramer 2003); residence in polychlorinated biphenyl (PCB) -contaminated

areas (Baibergenova 2003); residing in areas of higher air pollution (Woodruff 2003); and certain other chemicals exposures (to be discussed later in birth defects section).

### **Baltimore Situation and Policy Perspectives**

Such risk factors are highly relevant to Baltimore and likely contribute substantially to LBW-induced infant mortality in the city. First of all, AAs not only comprise 90 percent of IM deaths, but also comprise a majority of residents (65 percent) in Baltimore (MDHMH 2002). Secondly, low education, low socioeconomic status (SES), inadequate prenatal care, drug use, teen mothers, malnutrition, and Baltimore high fertility rates all have higher incidence and prevalence within the City's AA population (Chang 2003; Eberhardt 2001; MDHMH 2002; Bialostosky 2002). In addition, there are associations between drug use and prenatal care (Shankaran 2003), and linkage between SES and education.

Nutritional factors may also underlie the disparity between white and AA infant mortality. Though it is found that calcium consumption during pregnancy lowers the risk of LBW outcome (Merialdi 2003), AA females consume less calcium than white females (Bialostosky 2002). So too with iron, which has been found to help prevent preterm birth (Cogswell & Parvanta 2003), yet is consumed less by AA women (Bialostosky 2002). Additionally, LBW infants have higher likelihood of survival if they are breast-fed by their mothers (Boo 2000), yet unfortunately AAs are less likely to breast-feed their infants (Forste 2001).

There is a grave need for public health interventions to reduce the incidence of LBW, and LBW-induced infant mortality. The translation of previous research into practice can stimulate policy initiatives that can improve the LBW situation.

For instance, the impact of drug use in Baltimore, described as a “crisis that’s killing our city” by Mayor Martin O’Malley, on LBW infant mortality may be improved by targeting expectant or pregnant mothers with drug treatment interventions. Past studies have shown that mothers enrolled in drug treatment programs have better birth outcomes (Kyei-Aboagye 1998; Armstrong 2003). One may potentially propose factor-by-factor programs of treatment, monetary assistance, and nutritional interventions to be carried out one after another. However, since LBW has so many different risk factors, designing hands-on programs for almost every risk component would likely be very costly and burdensome to the health infrastructure.

On the other hand, mass-education and awareness programs emphasizing more “upstream” social factors have been more neglected compared to clinical- and community-based interventions (Misra 2003) in reducing infant mortality. Advocacy-based programs that teach kids the dangers of drugs at a younger age may have better long-term cost-effectiveness and broader reach than short-term, practice-based, individualized post-addiction treatment programs.

For example, labor-intensive clinical programs providing iron and calcium supplements may be less effective or miss many at-risk women when compared to mass-campaigns to educate women about the importance of taking a two cent iron and calcium supplement every day. Education of women for many of the LBW risk factors can be more streamlined through broader school-based education, television, radio, billboard, and grocery store campaigns. This also has the advantage of not only educating current pregnant mothers, but also future mothers, their spouses, family, and friends who can all contribute in the promotion of the fetus’s and infant’s health.

Additionally, there are behavioral factors such as breast-feeding that can only be changed via breast-feeding advocacy and education, since no practice-intervention can ever force breast-feeding, nor will baby formula ever replace the myriad of important nutrients in breast-milk. Implementing breast-feeding advocacy programs in the city and reaching full compliance, by estimates published in Pediatrics (Forste 2001), may further close the white-AA IMR disparity as much as eliminating LBW among AAs itself!

However, education for LBW should continue to be promoted in clinical settings and family planning centers. This debate between “upstream” mass-education efforts and clinical intervention applies towards other causes of IM as well. However, there are other risk factors such as residing in polluted areas that cannot easily be remedied by either of these methods.

## **Infant Mortality from Congenital Malformations, Deformations, and Anomalies**

### **Risk Factors**

The impact of congenital malformations, deformations, and chromosomal anomalies, or congenital birth defects (CBD) for short, on infant mortality is not quite as large as LBW. Though Baltimore’s CBD rate is comparable to the US average, CBD is still tied as the #2 cause of IM, accounting for 13 percent of total infant deaths in the preliminary 2003 data (Ding Intern 2003; BCHD 2003). Evidence suggests that, CBD risk is highly dependent on environmental contaminants, and many of these toxins affect LBW in addition to CBD.

Related to LBW, air pollution is also a risk factor for birth defects (Ritz 2002; “Urban air pollution...” 2002), as well as respiratory distress (to be discussed later). In addition, direct chemical exposures by parents increase the risk of chromosome mutations

in newborns (Kucerova 1985), though residence near contaminated sites is still subject to debate (Drummer 2003; Vrijheid 2002).

In addition, many types of metals increase the risk of CBD, including cadmium (Hovland 2000), arsenic (Hopenhayn-Rich 2000), lead and mercury (VincetiL 2001; WinderL 1993; Gardella 2000), and magnesium (Caddell 2000), which facilitates lead buildup under low Mg conditions. Cadmium has even also been linked to preterm birth (hence LBW) (Cogswell & Weisberg 2003; Salpietro 2002). Preterm birth has also been linked to arsenic (Ahmad 2001; Hopenhayn 2003), lead (Hernandez-Avila 2002) as well as possibly chromium (Bougle 1992). Thus, this further compounds the effects of some of these chemicals and exacerbates their impact on IM outcomes.

### **Baltimore Situation and Policy Perspectives**

Exposure to cadmium, chromium, arsenic, lead, and mercury are especially troubling to Baltimore for several reasons. All four elements have recently been detected in Chesapeake Bay sediments, with the highest excess concentrations in the areas nearest to Baltimore harbor stations (Hall 2002). This is dangerous in many ways. According to the Chesapeake Bay Program of the EPA (“Sediment Pollution” 2001), sediment pollution not only can contaminate Chesapeake waterways overall, but also smother Chesapeake Bay creatures such as fish and shellfish with the polluted toxins. Additionally, upwelling, a marine phenomenon in which water surges upwards from the ocean or bay seafloor (Lounder 1997) especially after recent hurricanes like Agnes, can bring toxic sediments to the surface where diatoms, algae, and plankton can absorb and later accumulate the toxins up the food chain.

Baltimore is lucky in that city drinking water does not come from the Chesapeake area (BCDPW 2003). However, considering that seafood is a popular food choice around Baltimore, and that 75 percent of all arsenic intake is from fish and shellfish, and not from drinking water (Hubbard 1982), it becomes an especially pressing public health issue to reduce such pollution in the Chesapeake Bay.

Though the Chesapeake Bay Program has agreed to set sediment pollution runoff reduction goals for the first time ever (Conner 2003), there are bay researchers who believe that sediment reduction should be further accelerated (Jasinski 2003). Moreover, actual cleanup efforts of the Chesapeake in the past few years have been described as “toothless” and “faltered” (Unger 2001). It’s also disappointing that George W. Bush further reduced funding for Chesapeake Bay cleanup in fiscal year 2002 (Huslin 2001). New policy push and staunch lobbying for cleanup need to be directed at the EPA, or the next presidential administration, which would hopefully be more environmentally friendly than the Bush Administration.

Additionally, just as the March of Dimes Foundation states and recommends (“Environmental Risks and Pregnancy” 2003), the dangers to pregnant and potentially-pregnant future mothers of consuming fish and other seafood should be more publicly advertised. Therefore, until more systematic cleanup of Chesapeake waters from all these toxins is complete, public health policy in Baltimore should be driven towards educational campaigns of maternal avoidance of such potentially toxin-laced seafood, a stance endorsed by the March of Dimes.

Since so many of the risk factors above are the result of environmental pollution from industry, other policy goals for CBD may be to focus further on brownfield

revitalization, as well as shifting the economic base of Baltimore to a more service-based economy. The Baltimore City Development Corporation already has a specific Brownfield Initiative project aimed at renewing the potentially-contaminated and vacant industry sites (“Brownfield Initiative” 2003; Ding “Brownfield...” 2003), though issues discussed in the Ding analysis include concerns that the initiative may not have environmental health as the primary priority. Additionally, in terms of shifting the economic base, this policy priority has been pushed by the city and Mayor O’Malley (Snyder 2000; Harlan 2000), but difficulty in attracting high tech businesses still remains an issue (“Is a digital harbor in Baltimore's future?” 2000). Nevertheless, for the near-term, the prospects for these policy initiatives seem better than that of a massive-environmental cleanup of the Chesapeake Bay under the Bush Administration, though economic change is not as targeted a policy as anti-seafood consumption advocacy for pregnant mothers.

Turning to the lead situation in Baltimore, it would be an understatement to say that there is a problem. Lead has been a rampant problem in the city for decades (LeadStat 2002) and there have been many Baltimore City Health Dept programs aimed at reducing lead exposure and rehabilitating contaminated buildings (“Mayor Martin O'Malley...” 2003). However, most current programs are targeted at non-infant children and they do not target issues of maternal lead exposure. Though adults possess a blood-brain barrier and are not affected neurologically, mothers’ circulating blood lead levels can still affect fetal growth (LBW) and CBD outcomes of infants (Hackley 2003; Hernandez-Avila 2002). Additionally, lead exposure does not just come from residing in lead-contaminated housing. Research carried out in Baltimore has shown that increased

inhalation exposure is also possible from the generation of airborne lead dust during demolition of old buildings in the city (Farfel 2003).

Thus, a lack of targeted lead programs for vulnerable prospective and expecting mothers, and extra airborne lead dust dissemination during demolition and housing revitalization, may be two more potential factors responsible for LBW and CBD infant mortality in Baltimore. Possible policy options may include expansion of Baltimore lead programs to also focus on reducing maternal exposures, such as additional relocation of pregnant mothers from dangerous housing, as well as more careful environmental and human safety controls during demolition.

Finally, there is good news that certain micronutrients can reduce the risk of CBD. As mentioned before, lead buildup and subsequent lead poisoning can be accelerated by low magnesium levels in the blood. According to the CDC, AA females consume significantly less magnesium in their diet than white females (Bialostosky 2002), thus increasing their susceptibility to lead and in turn LBW and CBD. Another nutrient, folate, or folic acid, is also proven to be beneficial in preventing neural tube defects (a type of CBD) (Kurtzweil 1999; Gross 2001; Velie 1999). Yet again, AAs consume less folic acid than whites (Chacko 2003; Bialostosky 2002). No explanations for such disparities were offered in the CDC publication.

In terms of the policy perspective of how to implement these research findings—it seems obvious to persuade women to consume more magnesium and folic acid. However, as discussed before, the question boils down to the option of either small-scale community and clinical interventions or public advocacy awareness via mass media and educational campaigns. And as before, I believe in the latter for it is more likely to be

cost-effective and has broader-reaching potential. This continuous debate in regards to such social and behavioral factors, and why one method is better than another, will be analyzed in the final discussions.

However, most of the risk factor issues of CBD are related to environmental exposure to pollution and toxic chemicals in one way or another. And most of these issues are not solvable using conventional educational advocacy aimed at individuals. They require more upper-level policy changes in state and federal government as well as the municipal economy in order to have the necessary power to implement the needed changes to ameliorate the risk factors and improve CBD outcomes and lower IM.

## **Infant Mortality from Respiratory Distress**

### **Risk Factors**

Though IM from respiratory distress (RD) is the #4 cause of infant mortality overall in the past 5 years, it is important to highlight this problem not only due to its attributable proportion of infant deaths, but also because its risk factors are so closely related to many other leading causes of IM.

Respiratory distress is inherently related to the lung, specifically problems with poor air quality. Among a host of potential respiratory distress irritants, carbon monoxides, oxides of nitrogen, volatile organic compounds, sulfur dioxide, ozone, and particulate matter are the primary air pollutants (“Air pollution info” 1999; Schwartz 1996; Brunekreef 2002). It is worth mentioning again that air pollution is associated not only with RD, but also with LBW as well as CBD. Because the major risk factors of respiratory distress affect two other major causes of infant mortality, the IMR is further

exacerbated by the compounding of the negative air pollution effects, perhaps even acting in synergy.

### **Burden and Policy Perspectives in Baltimore**

In Baltimore, the problem is very thorny. Baltimore City is not only ranked the 7<sup>th</sup> worst for air pollution in the nation (Atlas 2003), but it has also consistently failed ozone clean air standards (“Air Quality 101” 2003). This may partly be attributable to industry, but it is more likely due to the city’s inadequate mass-transportation system. This linkage is plausible from past research demonstrating the association between traffic pollution and respiratory diseases (Brauer 2002), as well as the fact that most of the above listed air pollution compounds are derived from motor vehicle exhaust (“Air pollution info” 1999). Additionally, poor indoor air quality from particulate matter is a further problem in respiratory health (Lai 2002).

Not only does Baltimore have a less than perfect mass transit system, mostly reliant on city buses, but ridership of the system by commuters has decreased 38 percent in Baltimore over the past two decades, despite employment growth of 250,000 jobs over the same period of time (Cox 2002). Thus, not only is MTA inadequate in Baltimore, but also unpopular. Policy plans for construction of a more comprehensive rail system need to be pushed closer to the present, campaigns need to be implemented to improve the image and operation of MTA to promote ridership, and environmental pollution and vehicle emissions policies must be tightened—on top of existing car-pooling programs in the city.

In addition, past research in Baltimore has demonstrated that demolition of old buildings in the city can result in significantly elevated levels of lead dust and particulate air pollution (Farfel 2003; Beck 2003). Besides pollution from demolition of housing,

inner city housing has been shown to be high in allergens and dust (Perry 2003), this having even been validated in a study in Baltimore (Williams 2000).

Therefore, urban housing renewal should be expanded to the revitalization of aging houses in the city, though additional funding might be difficult to obtain under conservative state and federal administrations. As for relocation of pregnant mothers for the advocated health reasons, it may be slightly easier to argue for since similar relocation programs already exist under Baltimore lead programs. However, the enormous costs associated with relocation of families with infants would not likely receive much support from the legislature, especially since indoor air pollution does not incite nearly as much emotion and cause as much devastation to children as lead poisoning. Perhaps, the most cost effective, promotable, and employable short-term strategy might be to provide subsidies for indoor air filter machines to families with either pregnant mothers or infants.

Overall, though LBW and CBD outcomes may benefit from exposure avoidance by pregnant mothers, more attention needs to be focused on infant air pollution avoidance if we are to target RD infant mortality. As for types of air pollution reduction policies, short term indoor pollution programs may be more immediately implementable, but long term outdoor pollution strategies of reducing emissions and increasing public transportation riderships will be more efficacious in the long run, both in impact and long term cost savings.

## **Infant Mortality from SIDS and Accidental Bed Suffocation**

### **Risk Factors**

Sudden Infant Death Syndrome (SIDS) is a default classification of sudden infant death with no apparent cause. Accidental Bed Suffocation (ASSB) is a subcategory of a broader category of explainable sudden IM called Sudden Unexpected Death of an Infant (SUDI) (with many different cause-of-death codings) (Wisdom 2003). SIDS and SUDI-ASSB share the common risk factor of dangerous sleeping arrangements, such as sharing a bed with an older sibling or adult (“Health commissioner...” 2002; “Back to sleep” 2001).

Recommendations derived from the Association of SIDS and Infant Mortality Programs (Wisdom 2003) and from case-reviews of Baltimore City ASSB in the past 5 years (Ding Intern 2003) show the specific risk factors for accidental bed strangulation (ASSB) include: overlay suffocation while sharing bed with an adult, mattress entrapment and suffocation while sleeping in adult bed, soft bedding (e.g. waterbed, mattress, couches, pillows, loose bedding, etc), thick blankets/sheets, and faulty cribs. Accepted potential risk factors for SIDS are somewhat related, in that they include: soft mattress, loose bedding, smoking environment, overheating, prone sleeping (“Back to sleep” 2001), AA race (NICHD 2000), low SES (Blakely 2003), maternal anemia (Klonoff-Cohen 2002), and possibly low magnesium intake (Caddell 2000). One should also note, though, that many of these factors are related, especially AA  $\leftrightarrow$  low SES (Eberhardt 2001), anemia (Sickle cell and AA 2000), prone sleeping (NICHD 2000), and low magnesium intake (Bialostosky 2002).

### **Burden and Policy Perspectives in Baltimore**

With so many factors related to AAs and low SES, it is easy to understand why SIDS is such a problem in Baltimore. While SIDS has been decreasing nationwide (Yee

2003), this decrease was mostly due to the drop in SIDS rate among whites, while AA rates saw little or no decline (Mathews 2003). This troubling disparity is also seen in Baltimore, where the proportion of SIDS death among whites has declined from 15.8 percent in 1999 to 10 percent in 2003 (through late October), yet there has been little change in AA SIDS death rate (Ding Intern 2003).

According to the CDC, the “success” of the nationwide *Back to Sleep* awareness program teaching parents not to let their infants sleep in a prone position has been credited with the decrease in the number of SIDS deaths (Mathews 2003). Prone sleeping behavior is indeed an important factor for SIDS, responsible for a 30 percent overall attributable risk of SIDS (Hauck 2002). Apparently the *Back to Sleep* program isn’t reaching enough AA parents, who research has shown need even more prone sleeping advice (Hauck 2002). The city’s racial SIDS trends do demonstrate the need for increased outreach and advocacy to AAs in Baltimore, which ironically is home to the SIDS Alliance, the organization that co-sponsored of the nationwide *Back to Sleep* program with HHS.

In addition to perhaps certain organizations refocusing their geographic priorities, educational programs about the dangers of prone sleeping targeting AAs is absolutely essential. In Washington DC, SIDS advertisements on metrobuses have been a popular method of publicity (NICHD 2000). This mass media strategy can be extended to television, radio, billboards, as well as other places, such as the baby aisle in stores, furniture stores, plus of course health care clinics.

Another tactic proven successful against IM in the District of Columbia (“The IMR Continues to Decline” 2003) is a policy of targeting local wards (districts) with

increased rates of certain diseases and risk factors for heightened interventions and advocacy. Additionally, DC Dept of Health also conducts “aggressive” citywide home visitation programs to target mothers with high risk for various IM outcomes.

These are just a few ways Baltimore can learn, target, and be further aggressive in its advocacy programs if conventional mass-media and advertisement campaigns do not work. This methodology, of course, can be applied not just to SIDS, but to virtually every other major IM risk factor and cause of death as well.

### **Proposal of Local and National Crib Subsidy**

Moreover, poverty solutions are always needed when fighting SIDS, SUDI-ASSB, LBW, and other IM causes related to low SES. However, rather than discuss the myriad of policy ideas and proposals regarding raising SES and solving poverty, there is one particular policy proposal regarding a crib-subsidy that I would like to elucidate.

#### **Current Dangerous Sleeping Arrangements**

First though, it is important to highlight the magnitude of certain risk factors in SIDS and SUDI deaths in Baltimore. In a review of all SIDS and SUDI deaths from 1998-2001, the Baltimore City Health Dept found that 57 percent of all such infant deaths involved dangerous sleeping arrangements (“Health commissioner...” 2002). The Consumer Product Safety Commission concurred in its independent research that dangerous sleeping situations in adult beds contributed significantly to overlay suffocation and bed-structure suffocation of the infant (Nakamura 1999). More startling is the exponential increase of Baltimore’s ASSB-related infant mortality rate. From 1999-2002, there were only three total cases in the city, an average rate of 0.75 infant cases per

year. However, in a period of only five months in 2003, there were five cases (four overlay, one bed wedging)— a projected rate almost 7 time greater than the previous four years (Tracy 2003; Ding Intern 2003; BCHD 2003)!

### **Crib Subsidy Solution**

Such a dramatic trend immediately demands the attention and intervention of city officials. A city that decided to tackle this dilemma early on was Pittsburgh and the surrounding area of Allegheny County, Pennsylvania (“Cribs for Kids” 2003; Bannon 2003). Important research (funded by SIDS Alliance) had recently found that most low-income mothers had infants in dangerous sleeping conditions due to their inability to afford a safe crib. In response, the non-profit organization *SIDS of Pennsylvania*, along with the District Attorney’s Office and Pittsburgh Police Department, began a campaign to provide free cribs for needy families who cannot afford a crib. Since the program’s implementation, none of the 2,500 recipient families of a crib or bassinet experienced any infant mortality whatsoever!

Following Pittsburgh’s lead, I recommend that Baltimore City adopt similar policy and develop a program to help low-income families in the city obtain a safe crib or bassinet. Obviously funding would be an issue, especially since the BCHD budget has been cut again and again, most recently another \$1.2 million reduction in early December 2003 (Dambita 2003). However, we can learn from Pittsburgh’s strategy of not only building relationships with retailers and manufacturers for discounts, but also seeking grant funding from non-profit organizations, as well as obtaining funding from ingenious sources like money from law enforcement drug raids and seizures (which was how Pittsburgh started (Bannon 2003)). If Pittsburgh can do it—then so can Baltimore!

Additionally, I believe there is potential in this specific crib program to even obtain state or federal funding! The Department of Health and Human Services is always seeking to reduce IM and improve national health statistics. Additionally, their previous campaigns such as *Back to Sleep* have mostly focused on prone sleeping conditions, and seem to have neglected campaigns directed specifically against dangerous-sleep-situations (“Cribs for Kids” 2003; NICHD 2000). And because the infant mortality issue is very humanistic and non-partisan in nature, there is potential for the current administration to support such a plan.

Specifically, my proposal to HHS would consist of three aspects. First, HHS must expand their previous SIDS education campaigns to additionally include the awareness of dangerous sleeping arrangements. Second, HHS should offer a subsidy for the explicit purpose of helping low-income families with new infants afford a crib or basinet, with subsidies disbursed via existing infant-health programs such as the federally funded Healthy Start offices of each state, through federal departments as a tax credit, or a voucher system through manufacturers.

Third, HHS needs to redouble its efforts to close the gap of white and minority incidence of SIDS by further targeting African Americans, who suffer the highest SIDS incidence. And finally, the NIH research subdivisions of HHS needs to further fund research aimed at discovering the full etiology of this enigmatic infant mortality problem.

Opponents to such expansion of DHHS programs might argue that it is unnecessary for the government, and that a nonprofit organization can implement used-crib exchange/donation programs instead. However, while some durable goods can be exchanged in such ways, safety cribs designed for infants cannot simply be swapped—

due to strict federal standards on crib safety, the fears of potential damage from a previous owner, and the resulting legal liabilities.

Additionally, some would also argue that there are already plenty of assistance programs to the poor, though in reality such existing programs are calculated only for other basic cost of living needs for low-income families and not the extra budget of an expensive child-safe crib. Others may argue that inter-federal-state logistics and cross-agency tax credit incentives might be too bureaucratically complex and wasteful; however, one does not currently see that in other intra-federal programs and large federal-state programs such as Healthy Start, which operate fine.

Can one place a price on human life, especially that of an infant? Infant death is the epitome of innocent and unfortunate human loss of life. If food stamps can help thousands of hungry people a day, then why can't "crib stamps" help save hundreds of infant lives a year? Are all the future years of life saved from infant death not worth a measly \$50 crib subsidy?

With the demonstrated successes against SIDS and SUDI-ASSB in Pittsburgh, there is extraordinary potential for a free-crib program to work and succeed in Baltimore. And if the municipal programs succeed—there would be little reason not to adopt the life-saving strategy on a nationwide scale.

Finally, it is again important to reiterate that dangerous sleeping conditions and prenatal care behaviors are often not free-preference-based, since they derive from forced decisions stemming from low SES. Therefore, in such cases where personal inclinations do not drive healthier and safer behavior, macro-scale citywide or nationwide public

policy, like this proposed crib subsidy, is needed to help ensure the health of our population and our posterity.

## **Discussions and Conclusions**

### **Advocacy versus action intervention philosophy**

Throughout the infant mortality analysis of the leading significant causes, there has been a tug-of-war between the competing philosophies of advocacy/education interventions versus local action intervention. Sometimes one method works in certain risk factor scenarios, sometimes it does not. This dynamic exists in virtually every policy debate regarding IM.

The general policy perspectives I have presented for behavioral epidemiology risk factors have been steered more towards solutions via early education and mass advocacy. I support primary advocacy intervention methodology for such public policy because I believe education has broader population reach per dollar invested and helps to permanently change social perception and ideology within a society as a whole. Even if 100 percent of the people don't get the message, the general trend of the masses who do receive the message will sway the entire "school of fish" towards the healthier behavior.

Implementing a local action intervention may indeed have deeper immediate impact than mass-advocacy, but its outreach is not broad, and the individualized small-scale intervention is not likely to be able to be conducted everywhere due to labor and funding. Thus, permanently changing social fabric and ideology will not be likely, nor will the behavioral "herd effect" sway the masses.

Additionally, educating about the importance of taking calcium is more permanent than providing or supplementing daily calcium or other vitamins and minerals. The person will not only understand the reasoning behind the advocated behavioral change when taught, but he/she will also hopefully appreciate the knowledge, and not take a hand-out for granted.

I believe macro-advocacy will always be more broad-reaching, cost-effective, sustainable, and longer lasting than local action interventions. As I say, “An ounce of education is worth a pound of interventions.” Alternatively, Confucius also once said, “You can *give* a man a fish and feed him for a day, or you can *teach* a man how to fish and feed him for a lifetime.” Such is the reasoning behind the policy methodologies I advocate in this analysis.

### **Final Perspectives on Baltimore IM Strategies**

As delineated, I believe long-term awareness and education strategies overall work best for solving IM dilemmas. Many professionals who have worked in fields closely related to infant mortality have expressed similar sentiments.

Nkossi Dambita (2003), the BCHD director who oversees the mortality registry and chairs the health dept’s institutional review board, has seen countless research proposals come across his desk seeking to test new local interventions with one group of pregnant mothers or another. In all his years at the Baltimore City Health Department, Dambita believes in the philosophy of more mass-education and sees the need for health policy to focus in that area rather than implementing innumerable local interventions.

Additionally, Donna Strobino (2002), Professor of Population and Family Health Sciences (PFHS) at Johns Hopkins School of Public Health, also notes that most perinatal

initiatives are very community intervention oriented, engaged in little policy development, limited in the number of IM risk factors they address, and are not focused on macro-perspective methods to reduce IM citywide.

In addition, Bernard Guyer, department chair of PFHS at JHSPH, expresses in an analysis (Misra 2003) that current interventions are sometimes too focused on direct risk factors for poor perinatal outcomes, and that inadequate programs and education exist for women prior to conception due to neglect of more upstream social factors and health education.

The sentiments of this analysis and these experts' opinions appear to go against many of the latest recommendations of the *Baltimore City Perinatal Systems Review (BCPSR)*, the city's fetal and infant mortality review board made up of a coalition of members from the Baltimore City Health Dept, Maryland Dept of Health and Mental Hygiene, and the Maryland State Medical Society. *BCPSR* (Abraham 2002) stratified its sections by several risk factors, presented some case findings, and made lists of recommendations. However, not only was this review limited in the number of risk factors examined compared to the overall number of risk factors for IM, but also very limited to mostly LBW risk factors. Additionally, many of the recommendations the BCPSR promoted were exactly the micro-interventions that the experts cited above agree are of limited utility.

Overall, I agree with Guyer that more long-term upstream factors need to be addressed. Infant mortality is a unique problem in that it touches upon virtually every major dilemma facing Baltimore as a whole, from drugs to pollution to housing to poor educational attainment to low SES—all of which influence IM risk factors in one way or

another. It appears that if we simultaneously focus energy on improving the overall economic and social poverty situation so that citizens can have the ability to afford health insurance, prenatal care, proper nutrition, and proper living conditions—then I believe Baltimore will have solved many of its social issues along with improving its infant mortality problems.

Proposal for Baltimore Free Crib Subsidy		
Defining Problem and Needs	Basic Proposal	Possible Problems
<p>*Baltimore has <b>2x the SIDS rate and &gt;9x the ASSB rate</b> of US</p> <p>-Baltimore has <b>not seen SIDS rates drop</b>, while US has</p> <p>-Baltimore <b>AA SIDS rate no drop</b>, while Whites have</p> <p>-ASSB rates have <b>increased 7 fold</b> in past 4 years!</p> <p>-Almost <b>60%</b> of SIDS and SUDI [ASSB] deaths in Baltimore involved <b>dangerous sleeping arrangements</b>, such as overlays, bed/mattress entrapment, etc</p> <p>-Crib exchanges not advisable due to safety concerns from previous wear and tear, as well as potential legal liabilities</p> <p>-Other low income gov't support only calculated for cost of living, not for expensive crib</p> <p>-Low SES individuals often forsake cribs due to inability to afford them, not by preference</p>	<p>-Provide one \$50 subsidy to low income family with new infant (only 1 subsidy per family)</p> <p>-Subsidy to be only used for purchase of a infant-safe crib or bassinet</p> <p>-With approximately 1000 annual births in Baltimore and conservative assumption of 33% to 50% of families needing subsidy, overhead, publicity → estimated annual cost between \$30,000 to \$40,000.</p> <p>-Disbursement via either tax credit, retail store redeemable voucher, or rebate through manufacturer</p> <p>-Internal funding via BCHD if available, or from city gov't collaboration with district attorney and police department to use funds from city drug busts, and other misc funds</p> <p>-External funding via nonprofit, state, and federal grants, donated solicitations from companies, etc</p> <p>-Administration via Healthy Start, BCHD's Division of Maternal and Child Health, or nonprofit org.</p>	<p>-Drying up/ lack of funding from BCHD, other city government sources, or external grants (→ hence need executive mayoral support and collaboration)</p> <p>-Low income families difficulty in obtaining rebates, traveling to stores, or filling out tax forms</p> <p>-One crib/family rule bad if twins are born to a low income family at once, but no limit on cribs per family induces minor incentive encouraging more children (→ hence maybe exception of 2 cribs for twins )</p> <p>-Difficulty in perhaps determining "actual-need", and thus possible scams to obtain free crib to resell</p> <p>-Possible liability for infant death if occurred in the subsidized crib (→ hence need liability waiver form)</p>

Baltimore City Infant Mortality – Problem to Solution Paradigm Matrix			
Cause of Infant Death	Risk Factors	Baltimore City Risk Factor Situation	Policy Solutions
<p><u>Short Gestation &amp; Low Birth Weight (LBW)</u></p> <p><i>*Baltimore has a 2x higher LBW-related infant mortality rate than the US average.</i></p>	<p>AA race, adolescent, low education, single mother, lack prenatal care, smoking, alcohol, drugs, short inter-pregnancy interval (higher fertility rate), malnutrition, PCB pollution, air pollution, arsenic, lead, chromium, cadmium</p>	<p>-Baltimore IM mostly AA burden AA → low SES, inadequate prenatal, drug use, teen moms, high fertility rate, poorer nutritional intake, low breast-feeding prevalence -Poor city air quality</p>	<p>-Mass awareness campaigns for the behavioral risks, especially for calcium, iron, breast feeding, etc -Enact grocery store campaigns in addition to mass media -Make accessible/ establish more grocery stores in Baltimore City -Breakdown barriers against teenage sex education -Target upstream social awareness and mass-education -Continue economic development</p>
<p><u>Congenital Malformations/ Birth Defects (CBD)</u></p> <p><i>*CBD rates have not fallen significantly in recent years</i></p>	<p>Air pollution (ozone, particulates), parental chemical exposures, brownfields, cadmium, arsenic, lead, mercury, low intake of magnesium and folic acid -Dust from demolition of old buildings</p>	<p>-Poor city air quality -Dangerous heavy metals highest in concentrations in Ches.-Bay area closest to Baltimore -Ches.-Bay cleanup funding greatly cut -B'more has high lead contamination -demolition of old city buildings have lead -1000 acres of brownfields in city</p>	<p>-Expansion of lead-housing relocation programs for pregnant mothers -More stringent environmental safety during old housing demolition -Grocery store advocacy -Mass-education/advocacy for consuming foods containing more magnesium and folic acid -Advocating against pregnant mothers consuming seafood -further Chesapeake Bay cleanup -lobby of legislators to increase/ reinstitute funding for cleanup</p>
<p><u>Respiratory Distress (RD)</u></p> <p><i>*Baltimore likely has a 2x higher rate of RD infant mortality than US</i></p>	<p><b>**AIR POLLUTION**</b> -mostly from vehicle exhaust -tied in also with LBW and CBD</p>	<p>-Baltimore has 7<sup>th</sup> worst city air in US -city has consistently failed ozone clean air standards -Lack of adequate mass-transportation -decreasing MTA ridership in city</p>	<p>-Advocate further use of public transportation and carpooling -Improve MTA image and operation -Move up planning and construction of mass-rail system -Vehicle emission standards need to tightening, perhaps also car tax -Subsidy for indoor air filters in dilapidated housing</p>
<p><u>SIDS/ASSB</u></p> <p><i>*Baltimore has 2x the SIDS rate and &gt;9x the ASSB rate of US</i></p> <p><i>*Baltimore has not seen rates drop, US has</i></p> <p><i>*Baltimore AA SIDS rate no drop, unlike W</i></p>	<p>SIDS: Prone sleeping position, soft, loose or thick bedding, overheating, anemia, smoking, AA race, low magnesium ASSB: soft loose bedding/mattress, bed frame/mattress entrapment, adult overlay suffocation, lower SES  *Dangerous sleeping arrangements* *Faulty, unsafe cribs*</p>	<p>-most SIDS/ASSB among Baltimore AA -high prevalence of dangerous sleeping in Baltimore, says HD -AA more likely → prone sleeping, low magnesium intake, less reached in SIDS advocacy -AA also low SES, thus less optimal sleeping environ, and less able to afford safe cribs for infants</p>	<p>-Further targeting of AA for mass advocacy against prone sleeping -Education against infant-adult bed sharing to reduce overlay suffoc. -Emphasize proper nutritational intake and vitamin supplementation -Enacting citywide free crib subsidy (see proposal matrix for more) -Petition SIDS Alliance to focus more on its Baltimore homefront -Lobby HHS to fund NIH for more SIDS etiology and disparity research, fund SIDS education, and fund national crib subsidy program</p>

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*\*[article not dated, but latest year described in content suggests article written in 2001 or after]*