COMMUNITY HEALTH WORKERS' KNOWLEDGE, ATTITUDES, PRACTICES, AND AWARENESS OF AMERICAN ACADEMY OF PEDIATRICS RECOMMENDATIONS OF SAFE SLEEP ENVIRONMENTS

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by

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LIST OF ABBREVIATION

AAP: American Academy of Pediatrics

APHA: American Public Health Association

ASSB: Accidental Suffocation and Strangulation in Bed

BTS: Back to Sleep

CDC: Centers for Disease Control and Prevention

CHWs: Community Health Workers

CEU: Continuing Education Units

DRICHP: Directors Recruited from Infant and Child Health Programs

DHHS: Department of Health, Human Services

IMR: Infant Mortality Rate

IRB: Institutional Review Board

KAPS: Knowledge, Attitudes, and Practice

LBW: Low Birth Weight

NANN: National Association of Neonatal Nurses

NICU: Neonatal Intensive Care Unit

NCSL: The National Conference of State Legislatures

NICHHD: National Institute of Child Health and Human Development

ODH: Ohio Department of Health

PH: Public Health

SAFE-T: sleep Awareness Family Education at Temple

SES: Socio-Economic Status

SIDS: Sudden Infant Death Syndrome

SPSS: Statistical Package for Social Sciences

SUID: Sudden Unexpected Infant Death

TUH: Temple University Hospital

UK: United Kingdom

US: United States

WHO: World Health Organization

DEDICATION

I dedicate this to my parents, my daughters, and my husband. Your love, encouragement, and prayers have been the fuel of my academic journey. This dissertation is a tribute to your endless belief in me and the love you've showered me in daily through the good and hard times. Thank you for being my pillars of strength. This accomplishment is as much yours as it is mine.

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Chapter 1

Introduction

Infant mortality, defined as the death of an infant under one year of age, accounts for about 4.2 million deaths globally, which is 75% of all deaths occurring before the age of five (Centers for Disease Control and Prevention [CDC], 2017 a; World Health Organization [WHO], 2020). Despite a decrease in infant mortality in the United States (U.S.) since 1990, infant mortality continues to receive increased attention as a public health concern because it poses a disproportionately higher risk among Black infants (Callaghan et al., 2013). Infant Mortality Rate (IMR) is the number of deaths under one year of age among the live births in a given geographical area during a given year per 1,000 live births occurring among the population of the given geographical area during the same year (CDC, 2017b). According to the WHO (2019), an estimated 5.2 million children die every year before reaching 5 years of age, of which 1.3 million are newborn babies (WHO, 2020).

IMR is widely used to measure the population health of mothers and children in the U.S. and globally and is commonly used to compare regions, populations, and periods. Such comparisons are frequently used in needs assessments for planning purposes and to evaluate the impact of public health programs. In 2018, 21,000 infants in the U.S. died before the age of one (CDC, 2020), with an infant mortality rate (IMR) of 5.7 infant deaths per 1,000 live births. The IMR in non-Hispanic Blacks was 11.4 per 100,000 live births, compared to 9.4 among Native Americans, 7.4 among Native Hawaiians, and 4.9 among non-Hispanic Whites, respectively (CDC, 2017c). Non-Hispanic Blacks experience the highest burden of infant mortality despite comprising 13.4% of the population compared to 76.5% of non-Hispanic Whites (Census, 2020).

Disparities in Infant Mortality

There are many infant mortality disparities across age, race, and ethnicity (CDC, 2017d). Geographically, most of the states in the top quartile for infant mortality are located in the southern U.S. and include Mississippi (9.8 per 1000 live births) and Alabama (8.52 per 1000 live births) (CDC 2013) (See Figure 1). Other states found in the Appalachian region, such as Georgia (7.44 per 1000 live births), Kentucky (6.74 per 1000 live births), Ohio (7.13 per 1000 live births), North Carolina (7.16 per 1000 live births), and Maryland (6.57 per 1000 live births), are also disproportionately affected due to poverty (Howard, 2018). The racial distribution of the U.S. population mirrors the variation in the geographical burden of infant mortality across the U.S. (Singh & Stella, 2017).

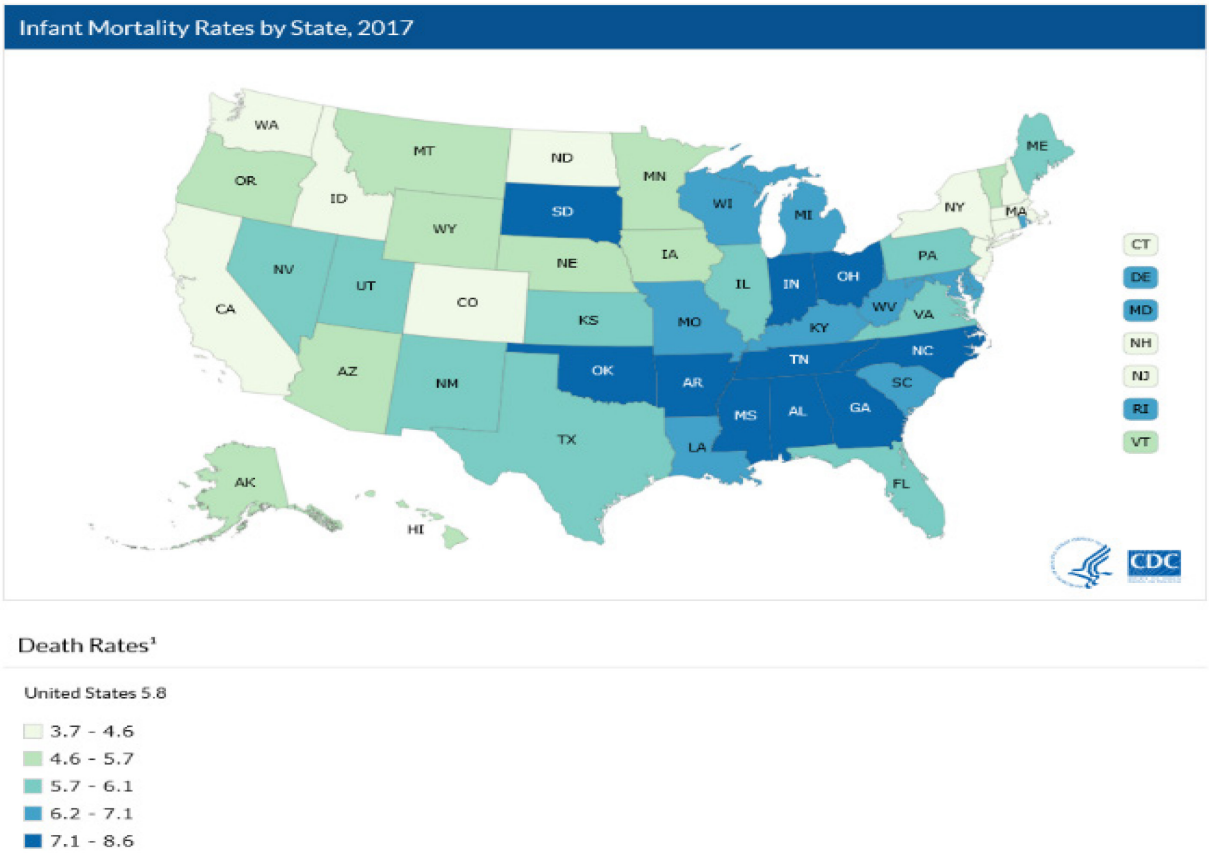
In addition to race, there are differences based on the mothers' age. IMRs are higher among infants born to adolescents (CDC 2011). For example, the IMR of children belonging to mothers aged 15-19 is 11.9, while for mothers aged 20-24 is 9.8, 25-29 is 7.3, and 30-34 is 5.0 (CDC, 2011). Adolescent populations are at risk for IMR due to young age, poor nutrition, and high stress levels (CDC 2010, 2011).

As mentioned earlier, the IMR in non-Hispanic Blacks is more than twice as compared to their non-Hispanic White counterparts (CDC, 2018). Also, regarding sudden unexpected infant death (SUID, discussed in detail below), Black infants are more likely to be affected than White (186.5 vs. 85.4 per 100,000 live births). Native Americans have about three times the increased risk of SUID than White infants (215.8 vs. 85.4 per 100,000 live births) (CDC, 2017d). Non-Hispanic Blacks also have a high prevalence of the major risk factors associated with high IMR, including preterm birth, defined as the birth of a baby before 37 completed weeks of gestation

(WHO, 2018), and low birth weight (LBW), defined ‘as a weight of fewer than 2500 grams (up to and including 2499 grams) irrespective of the gestational age (WHO, 2018).

Figure 1

Infant mortality rate by state in 2017



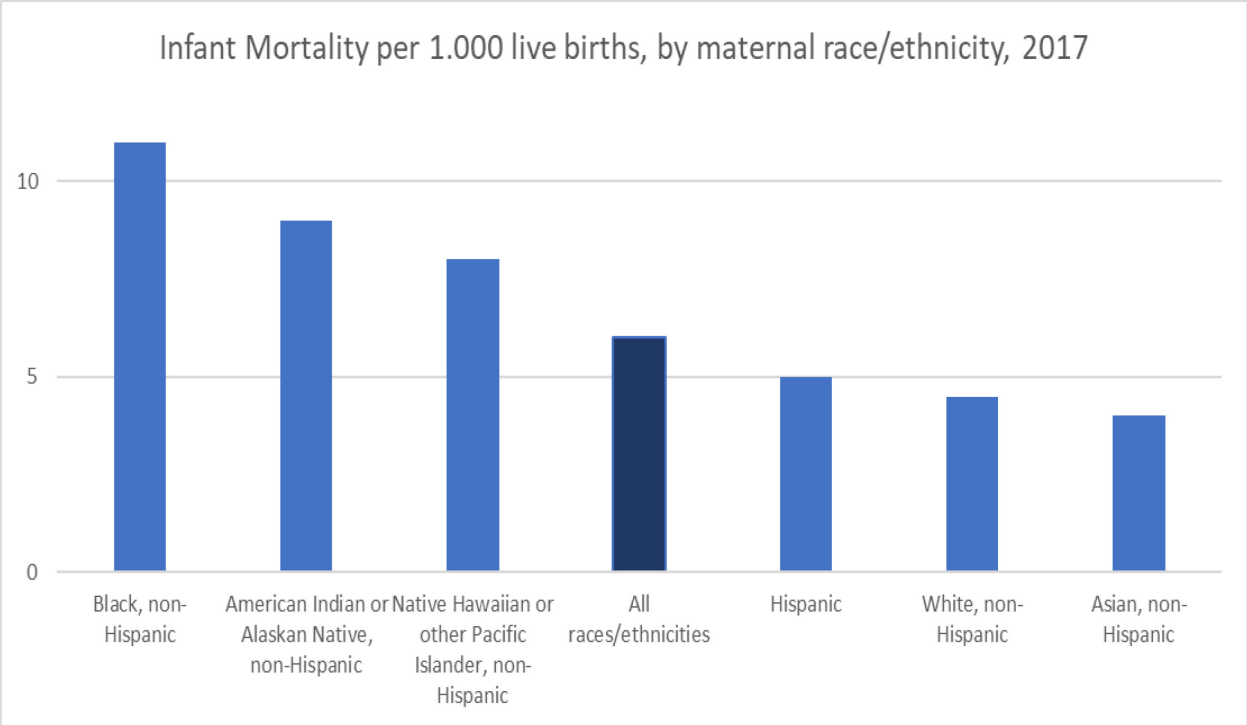
Adapted from CDC, 2017

According to the CDC (2017), in 2015, the IMR for short gestation and LBW for non-Hispanic Black infants was 256.9 per 100,000 live births, while the non-Hispanic White rate was 69.7 per 100,000 live births. The IMR due to SIDS for non-Hispanic Black infants was 87.1 per 1,000 live births, while the non-Hispanic White infant rate was 36.2 per 1,000 live births (CDC, 2017e). The IMR for maternal complications for non-Hispanic Black infants was 77.8 per 1,000 births, while the non-Hispanic White infant rate was 28.4 per 1,000 live births. Finally, the IMR

for all other causes of death for non-Hispanic Black infants was 593.0 per 100,000 births, while the non-Hispanic White infants rate was 236.7 (CDC, 2017f).

Figure 2

Infant Mortality Per 1,000 Live Births, By Maternal Race/Ethnicity, 2017. Adapted From CDC, 2017.



Sudden Unexpected Infant Death (SUID)

While some infant deaths can be explained based on previous illnesses or conditions, many are unexpected. Approximately 3,600 infants die every year in the U.S. from sudden, unexpected infant death (SUID) and other sleep-related infant deaths (CDC, 2018). SUID is the sudden and unexpected death of an infant less than one year of age (CDC, 2018). The commonly reported types of SUID are:

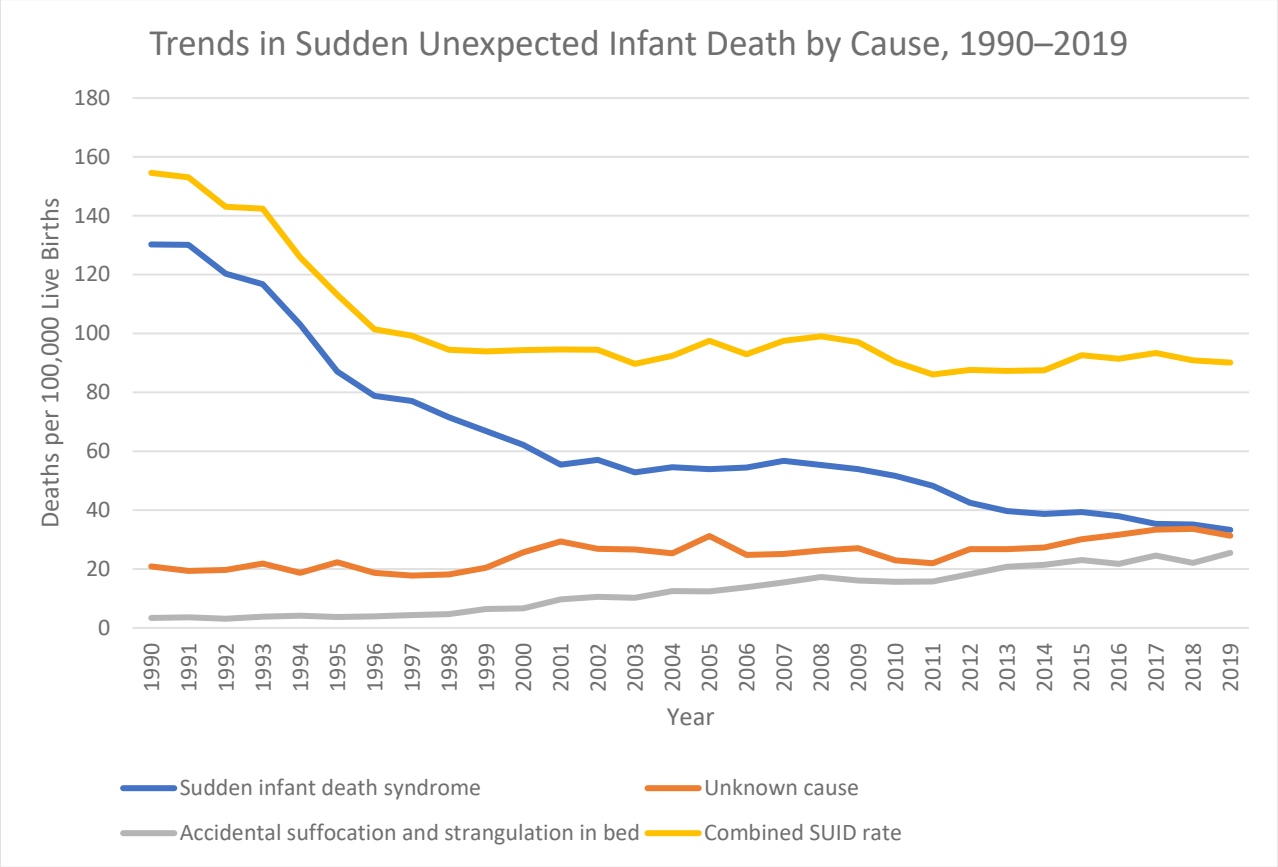
- Accidental suffocation and strangulation in bed (ASSB) as caused by infection, ingestion, metabolic disease, cardiac arrhythmias, or trauma.

- Sudden infant death syndrome (SIDS).
- Unknown causes (U.S. Department of Health and Human Services, 2018).

According to the CDC, in 2017, the U.S. lost 900 infants due to ASSB, 1,400 to SIDS, and 1,300 to unknown causes (CDC, 2017).

Figure 3

Causes of Death per 100,000 Live Births, U.S., 1990-2019



Adapted from CDC, 2017

There are differences between SIDS and unknown causes. SIDS is one subgroup of SUID, and it is unexplained even after investigation and autopsy. However, the unknown causes of death have been investigated, and there is no known reason for death. The significant risk

factors associated with sleep-related SUIDs include bed sharing, soft bedding, and infant non-supine sleep position (Bombard et al., 2015).

Sleep-Related Infant Mortality

Sleep-related infant deaths are a significant public health problem. Almost 3,600 infants die every year in the U.S. of sleep-related causes. Sleep-related infant death causes include Sudden Infant Deaths Syndrome (SIDS), Accidental Suffocation and Strangulation in Bed (ASSB), and Unknown Causes (CDC, 2020).

Figure 4

The Breakdown of Sudden Unexpected Infant Deaths (SUID) By Cause In 2019 (CDC, 2019)

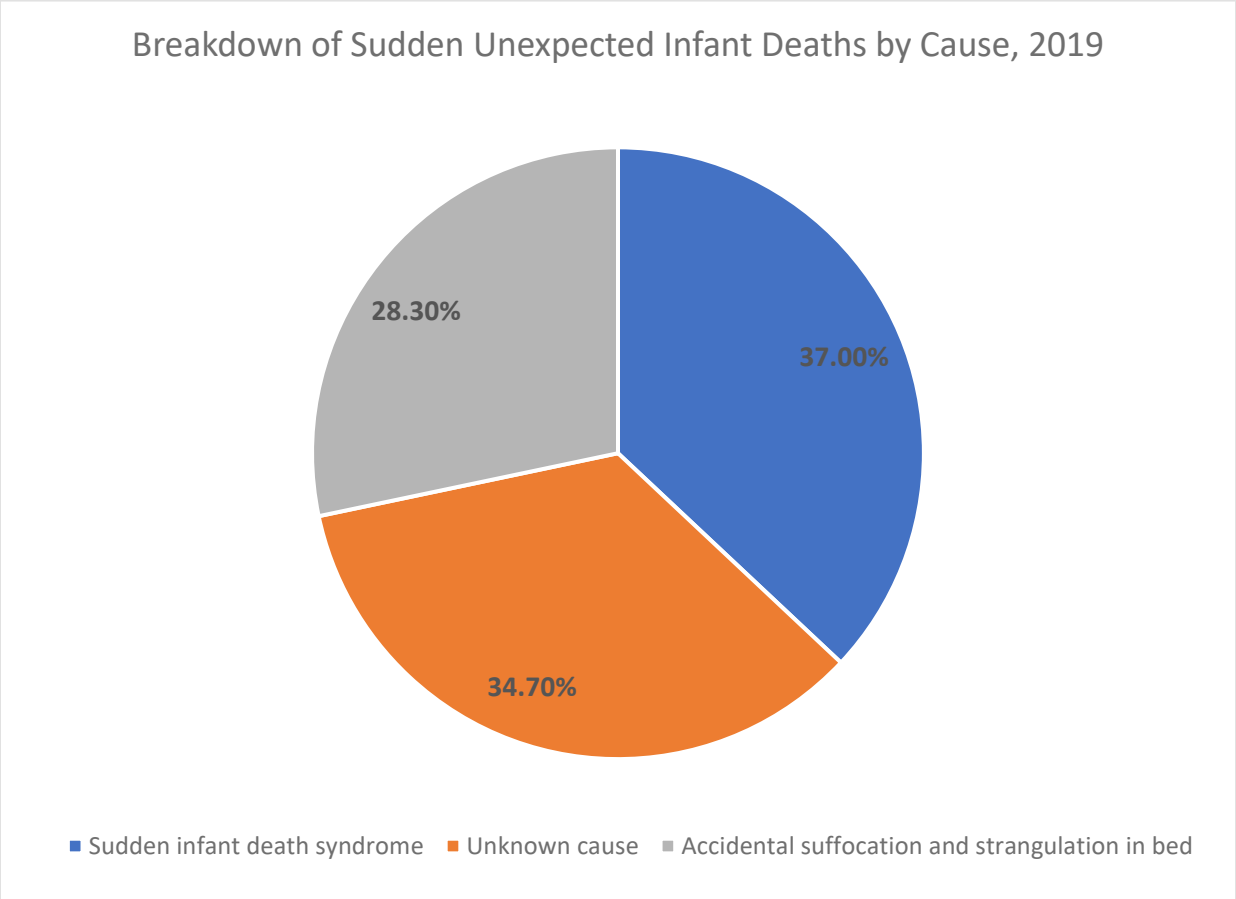


Figure 4 shows SUID breakdown by cause in 2019; SIDS was 37%, the Unknown Cases was 34.70%, and Accidental Suffocation and Strangulation in Bed (ASSB) was 28.30%.

SIDS

SIDS is one of many causes of SUID in infants, and it is the third leading cause of death in infants in the U.S. (CDC, 2017g). According to the CDC (2021), the infant mortality rate due to SIDS has declined in the US. The number of infant deaths showed a decrease of over 50% from 1990 to 2019. The number of infant deaths showed a decrease in SIDS rates from 35.4 in 2017 to 35.2 in 2018 (CDC, 2017h); although a decrease has occurred following short gestation periods, low birth weight, and congenital abnormalities, SIDS is still the third leading cause of infant mortality. SIDS currently accounts for about 1,250 deaths per year (CDC, 2019). SIDS occurs most commonly in infants two to four months of age and rarely after eight months of age, and more frequently in Blacks, Native Americans, and Alaska Natives than in Whites (Shapiro-Mendoza, 2006). It is also more common in boys than girls and occurs more often in winter than spring, primarily between 8:00 PM and 8:00 AM (Shapiro-Mendoza, 2006).

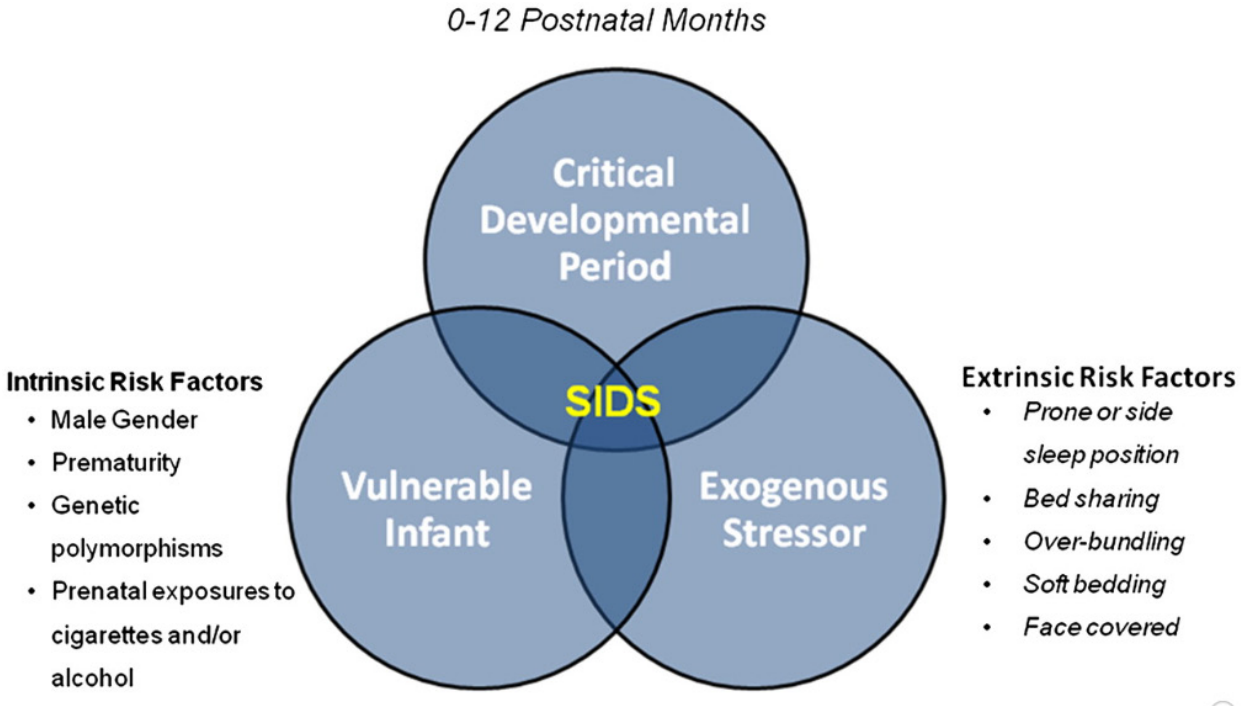
Since the early 1990s, SIDS rates have declined by more than 50%, in large part due to the national Back-to-Sleep Campaign's efforts to increase the number of infants placed on their backs to sleep (Shapiro-Mendoza, 2006). A safe sleep environment can play a significant role in reducing SIDS. Several risk factors can lead to increased SIDS associated with a safe sleep environment, including bed sharing with parents, placing the infant in a prone position, and putting the infant on a couch or other soft surfaces (Moon, 2016). The risk factors associated with SIDS are grouped into factors related to the critical developmental period in infants, their vulnerability, and the exogenous stressors that they encounter (Figure 5).

Public health campaigns were established to decrease SIDS, promote "Back to Sleep" interventions, and use the supine position to eliminate sleeping in a prone position. The researchers found an association between the prone position and SIDS by showing that infants

who died from SIDS were more likely to sleep in prone positions than infants who lived (Shapiro-Mendoza, 2006). Additionally, pacifier use was associated with a reduced risk for SIDS (Moon, 2016). The campaigns successfully helped reduce the prone or side position, increased the supine position, and diminished the SIDS rate in many countries (U.S. Department of Health and Human Services, 2018).

Figure 5

The Triple-Risk Model For SIDS



Note. Factors contributing to the vulnerability (bottom left circle) may include intrinsic risk factors. The exogenous stressors (bottom right circle) are the extrinsic risk factors for SIDS (Moon, 2016).

Despite the success in addressing SIDS, it remains a significant public health priority. A recent study shows that the cause of infant death reporting SUID may be unreliable (Shapiro-Mendoza et al., 2006; Malloy & MacDorman, 2005). This study reported that the decline in the

SIDS rate since 1999 was offset by an increase in mortality rates for ASSB. In other words, many cases of infant death previously reported as SIDS are now reported as deaths due to another reason, such as ASSB. This finding suggests that changes in reporting of cause of death might account for part of the recent decrease in rates of SIDS. In a 2013 study, 14% of the SUID cases were determined to have died from ASSB (CDC, 2015), and that number increased to 25% in 2014 (CDC, 2017). Approximately 14% of SUIDs categorized as accidental suffocation are probably due to information obtained during death scene investigations. In nearly 30% of SUIDs, the cause remains undetermined and is listed as such on the death certificate. An underdetermined cause may occur when the requirements for a SIDS classification are unmet (Schnitzer et al., 2012).

Accidental Suffocation and Strangulation in Bed (ASSB)

According to the National Institute of Child Health and Human Development (2019), "ASSB occurs when something limits a baby's breathing, like when soft bedding or blankets are against their face or when a baby gets trapped between two objects, such as a mattress and wall. Among babies, accidental suffocation is responsible for three-fourths of all unintentional injury deaths" (NICHD, 2019, p.1). Around 85% of all deaths from ASSB occur from birth to 6 months of age. Deaths from ASSB are less common in babies older than 6 months (NICHD, 2019). Shapiro-Mendoza and colleagues found that potentially risky bedding use was most common among infants sleeping in adult beds (71.5%) and when sharing a sleep surface such as a bed or couch (70.0%) (Shapiro-Mendoza, 2016). Overall, soft and loose bedding contributed to an increased risk of accidental suffocation.

Whether attributable to ASSB sleep-related deaths or not attributable to a known cause, they have similar risk factors (Moon, 2016). Mothers with male infants, preterm births, younger

in age, or from minority groups are more likely to experience ASSB than mothers without any of these characteristics (Carlberg, Shapiro-Mendoza & Goodman, 2012).

Unknown Causes

According to The National Conference of State Legislatures, 2020, the unknown cause of death is the death of an infant who has been investigated or when the cause of death is undetermined; therefore, the medical exam does not show how the infant died (NCSL, 2015). In 2019, unknown causes accounted for 34.7% of SUID, SIDS accounted for 37%, and ASSB accounted for 28.3%.

Risk factors for SUID

Currently, there is no known technique to stop SUID, including SIDS and sleep-related infant death, but there are methods to reduce associated risk factors. Many risk factors noticed before, during pregnancy, after birth, and during the first year of a baby's life can lead to death from SUID, SIDS, and sleep-related infant death. Some risk factors are non-modifiable and cannot be changed or controlled. Brain defects: some babies are born with brain defects or problems in their brains, and they are more likely to die from SIDS. If the baby's brain is not well developed to control breathing and waking up from sleep, the baby may have been born with brain defects. Low birth weight, premature birth, and multiple births are some reasons why a baby's brain may not be well developed. Respiratory infections have also been linked to SIDS deaths because the infections negatively affect the baby's breathing. Also, having a family history of SIDS places infants at a higher risk of dying from the condition (National Institutes of Health, 2006).

Other risk factors can be addressed before or during the mother's pregnancy. These include alcohol use, smoking, and drug use, all of which can be addressed before the infant's

arrival (Marshall et al., 2017). Additional risk factors include low birth weight, prematurity, smoking during and after pregnancy, substance abuse, mothers age less than 20 years, inadequate prenatal care (Hakeem, 2015), mothers' education being less than 12 years, and mother's consumption of alcohol during pregnancy (Iyasu et al., 2002, Athanasakis, 2011).

Safe Sleep Environment

According to ABCs safe sleep, 3600 infants' deaths were associated with an unsafe sleep environment in 2018 (ABCs, 2018). The sleep environment can play an essential role in reducing the chances of infant death by diminishing risks associated with SIDS and other related factors contributing to infant deaths. Several types of unsafe sleep environments can contribute to the total number of sleep-related deaths. For instance, the percentage of unsafe sleep environments is 30%, bedsharing is 27%, positional is 23%, and other SUIDs are 20% (CDC, 2018).

One of the most effective actions caregivers, parents, and healthcare providers perform to protect their babies is putting them to sleep on their backs (CDC 2017). A safe sleep environment is defined as a baby sleeping on its back, alone, on a flat sleep surface, and sleeping on a firm bed at all sleep times, including naps and nighttime (CDC, 2018). The baby should be dressed in appropriate clothing for sleep, for example, avoiding dresses covering the face and head. Parents should also dress the baby in light sleep clothing, such as a one-piece sleeper, and should not use a blanket and avoid covering their baby's head. The baby should sleep on a crib that does not have pillows, blankets, bumpers, loose bedding, toys, or other objects inside. Infants should sleep on a separate surface from their caregivers, siblings, and pets, not in the same bed but ideally in the same bedroom as caregivers in a crib or bassinet (AAP, 2016).

Moreover, sleeping in the parental bedroom reduces the risk of SIDS by 50%. It is thought that this is because infants who sleep in the parental bedroom are less likely to suffocate.

After all, the nearby parents are more likely to feed, comfort, and monitor more closely (CDC, 2019). Parents should never put their baby on a couch, armchair, or other soft surfaces (CDC, 2019). Parents should not smoke or let anyone smoke near the baby, and they should also ensure optimal temperature for the baby so they do not overheat (U.S. Department of Health and Human Services, 2019).

Babies should sleep at a temperature between 68°F and 77°F (20 to 25°C) because overheating can lead to death from SIDS (CDC 2019). Overheating is when the baby becomes too warm while he/or she is sleeping. Caregivers are recommended to uncover the baby's head and put them to sleep in clothing that will not need additional covers, such as a sleep sack, to reduce the risk of overheating (Mayo Clinic, 2018). Unsafe sleep environments refer to bed sharing, placing the baby on his side or stomach to sleep on soft bedding or with blankets, pillows, bumper pads, stuffed toys, or other objects. Research finds that SIDS is linked to the inability of a baby to correct the oxygen and carbon dioxide levels in their blood (Boston Children's Hospital, 2015). While the baby sleeps on his/ her stomach, they may re-breathe exhaled carbon dioxide and die from SIDS. Low carbon dioxide levels should trigger the brain nerves associated with breathing and wake the baby to turn around to access more oxygen. This trigger sometimes fails to happen, leading to babies dying from SIDS (Boston Children's Hospital, 2015). According to the CDC, about one in five caregivers place their baby on their side or stomach to sleep, and over half of the mothers and caregivers sleep with their babies in the same bed. About two in five mothers use soft bedding in the baby's sleep area.

However, variations exist between different racial groups. Racial differences in caregiving can lead to disparities in SIDS. A non-Hispanic Black mother of fewer than 25 years of age with 12 years or less education has a higher likelihood of placing a baby on their side or

stomach to sleep (CDC, 2019). According to Mathews (2013), more than 80% of Hispanic mothers placed their infant supine (on the back) for sleep, compared with about 60% of Black mothers. Although Black infants were significantly more likely to bed share with a parent, Hispanic infants were significantly more likely to share with one or more adults. Black infants were more likely to be exposed to smoke, and Black mothers were significantly more knowledgeable about SIDS than Hispanic mothers.

Recommendations To Reduce SUIDS and Sleep-Related Deaths

Mothers are advised to breastfeed their infant for at least the first six months or one year (U.S. Department of Health and Human Services, 2017). Breastfeeding of an infant can serve as a protective measure that can significantly decrease the risk of SIDS. The protective effect is the most substantial with exclusive breastfeeding for the first 6 months (CDC 2019). The use of monitors and various other devices is contraindicated by the American Academy of Pediatrics (AAP) as they have proven to be ineffective and confer safety risks. Mothers should offer pacifiers for their babies during naptime, but if the baby refuses them, mothers should refrain from forcing them as it could cause SIDS. If mothers intend to breastfeed their babies, they should wait until they are 3 to 4 weeks old to introduce the pacifier. Pacifiers appear to protect the infant from SIDS; however, the introduction of the pacifier is best after breastfeeding has started (CDC, 2019).

Some evidence shows that routine immunizations can also be a protective factor for SIDS, while no evidence shows they can increase the risk factors. No evidence indicates the risk of SIDS in association with routine immunizations. Instead, routine immunization has been linked to preventing SIDS among infants (CDC, 2018). Routine immunizations for the mother, such as human papillomavirus, have recently been found to have a protective effect against SIDS

(CDC, 2018). Several research studies show that receiving prenatal care is associated with a lower risk of SIDS (University of Rochester Medical Center, 2021).

AAP Recommendations

In the 1990s, sleep-related infant deaths experienced a decline. However, in more recent years, sleep-related infant death rates have not declined. The AAP recommends a safe sleep environment to reduce the risk of both sleep-related infant deaths and SIDS (AAP, 2016). In 1992, the AAP made recommendations to reduce SIDS by changing the infant's position during sleeping. Before the recommendations, infants routinely slept in both prone and side positions. However, in 1994, the AAP initiated the "Back to Sleep" campaign to promote the supine sleep position for healthy full-term infants. The supine sleep position for infants in the U.S. increased from 17% to 50% in 1992, while the prone position decreased from 43% to 12% from 1994 to 1998. In 2005, the AAP updated the recommendations to put infants on their side for sleep to be no longer an acceptable alternative to supine sleeping.

The AAP listed many guidelines in 2011 to provide infants with a safe sleep environment, including "Back to Sleep positions, room sharing but not bed sharing, avoiding the use of soft bedding and overheating, and the use of a firm sleep surface" (AAP, 2011, p. 5). Moreover, recommendations such as "breastfeeding; routine immunization; the use of a pacifier; and the avoidance of exposure to smoke, alcohol, and illicit drugs" were indicated for SIDS risk reduction (AAP, 2016). It was not until 2016 that the AAP added recommendations to favor skin-to-skin care for newborn infants (AAP, 2016). Additionally, the 2016 revision changed the recommendations to begin safe sleep education for parents at the start of pregnancy, rather than waiting until birth to begin safe sleep education for parents, and rephrased the recommendations from SIDS risk reduction to safe sleep practices. It also extended the recommended

breastfeeding duration from 6 months to 1 year or longer as mutually desired by the parent and infant.

General recommendations

The recommendations outlined here were developed to reduce the risk of sleep-related infant death (Moon et al., 2022). "As defined by epidemiologists, risk refers to the possibility that an outcome will occur given a particular factor or set of factors" (CDC, 2012). Although the AAP updated the AAP guidelines and all the 19 recommendations cited below are intended for parents and caregivers, health care providers and CHWs or others who care for infants also benefit from the recommendations. The last 4 recommendations are directed toward health policymakers and researchers. In addition, some recommendations are directed toward pregnant women or women who may become pregnant (Moon et al., 2022). According to Moon et al. (2022), there are three levels of recommendations or guidelines, A, B, and C.

Table 1

Updated 2022 AAP recommendations.

A level recommendation:
Back to sleep for every sleep.
Use a firm, flat, noninclined sleep surface to reduce the risk of suffocation or wedging/entrapment.
Feeding of human milk is recommended because it is associated with a reduced risk of SIDS.
It is recommended that infants sleep in the parents' room, close to the parents' bed, but on a separate surface designed for infants, ideally for at least the first 6 mo.
Keep soft objects, such as pillows, pillow-like toys, quilts, comforters, mattress toppers, fur-like materials, and loose bedding, such as blankets and nonfitted sheets, away from the infant's sleep area to reduce the risk of SIDS, suffocation, entrapment/wedging, and strangulation.
Offering a pacifier at naptime and bedtime is recommended to reduce the risk of SIDS.
Avoid smoke and nicotine exposure during pregnancy and after birth.
Avoid alcohol, marijuana, opioids, and illicit drug use during pregnancy and after birth.
Avoid overheating and head covering in infants.
It is recommended that pregnant people obtain regular prenatal care.
It is recommended that infants be immunized in accordance with guidelines from the AAP and CDC.
Do not use home cardiorespiratory monitors as a strategy to reduce the risk of SIDS.
Supervised, awake tummy time is recommended to facilitate development and to minimize the risk of positional plagiocephaly. Parents are encouraged to place the infant in tummy time while awake and supervised for short periods of time beginning soon after hospital discharge, increasing incrementally to at least 15 to 30 min total daily by age 7 wk.
It is essential that physicians, nonphysician clinicians, hospital staff, and childcare providers endorse and model safe infant sleep guidelines from the beginning of pregnancy.
It is advised that media and manufacturers follow safe sleep guidelines in their messaging and advertising to promote safe sleep practices as the social norm.
Continue the NICHD "Safe to Sleep" campaign, focusing on ways to reduce the risk of all sleep-related deaths. Pediatricians and other maternal and child health providers can serve as key promoters of the campaign messages.
B level recommendations:
Avoid the use of commercial devices that are inconsistent with safe sleep recommendations.
C level recommendations:
There is no evidence to recommend swaddling as a strategy to reduce the risk of SIDS.
Continue research and surveillance on the risk factors, causes, and pathophysiological mechanisms of sleep-related deaths, with the ultimate goal of eliminating these deaths entirely.

Level A recommendations were based on consistent scientific evidence. Level A recommendations are the content of the AAP guidelines, and Level B recommendations are based on limited or inconsistent scientific evidence. Level A includes infants should be immunized and supervising infants, parents, and caregivers, avoiding commercial devices marketed to reduce the risk of SIDS, and awake tummy time is recommended. Level C recommendations are based primarily on consensus and expert opinion, such as healthcare staff in newborn nurseries and NICUs. Childcare providers should endorse the SIDS risk-reduction recommendations from birth. Media and manufacturers should follow safe sleep guidelines in their messaging and advertising and continue research and investigation on the risk factors and causes of SIDS and other sleep-related infant deaths, with the ultimate goal of eliminating these deaths.

Interventions for Reducing Deaths Due to Unsafe Sleep Environment

"Back to Sleep" and SAFE-T Campaigns

Several interventions, such as "Back to Sleep" and SAFE-T, have been developed to prevent sleep-related infant deaths, such as "Back to Sleep" and SAFE-T (Moon, Hauck & Colson, 2016). In 1994, using studies conducted in Europe and Australia, the "Back to Sleep" campaign was initiated by the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) in the U.S. to educate millions of parents and caregivers on ways to reduce SIDS. The "Back to Sleep" campaign encouraged parents and caregivers to put babies on their backs to sleep. The NICHD expanded the campaign to emphasize safe sleep environments and "Back to Sleep" as ways to reduce SIDS and other sleep-related deaths in 2012 (Tanabe & Hauck, 2018). A few years after campaign initiation, the "Back to Sleep" campaign helped decrease SIDS rates by 50%. According to Tanabe & Hauck, SIDS rates have

dropped significantly due to the “Back to Sleep” campaign. SIDS rates remain high in the Black and American Indian/Alaska Native populations in the U.S.

In 2016, the AAP released updated recommendations for parents not following the guidelines for safe sleep environments. However, some recommendations, especially the advice against infant bed sharing, continue to be debated and are not followed by some groups (2018).

Cardboard Baby Boxes

In addition to addressing sleep positions, interventions for reducing safe sleep deaths also focus on bed sharing. Sleep Awareness Family Education at Temple, or SAFE-T, is a program that gives every family with a child younger than one year of age cardboard baby boxes to prevent higher risk behaviors contributing to SIDS (Temple University, 2017). Temple University Hospital (TUH) in North Philadelphia has the highest IMR in the U.S. of 8.4 per 1,000 live births due to poverty and mothers not having enough resources to provide for their infants. The SAFE-T program had a positive outcome in reducing SIDS by decreasing the rates of bed sharing. The program gave every mother who delivered at TUH a baby box for free (Temple University, 2017).

According to Heere and colleagues (2017), bed sharing with parents can increase the risk of SIDS. This risk is higher for mothers who smoke, drink alcohol, or take drugs. According to scientists at TUH, face-to-face information sessions and the distribution of baby boxes reduced bed-sharing rates by 25% during the first eight days of life. Baby boxes have been used for 75 years in Finland, where the government provides one for every parent-to-be. The cartons contain clothes, sheets, and toys. The empty boxes are used to put the babies to sleep, providing a safe sleep environment, while the clothes, sheets, and toys are given to the caregivers to use for the baby.

The initiative has been lauded as one reason for the Nordic countries' extremely low IMR. The Baby Box Company has launched similar programs at 13 hospitals in the UK and Ireland. New parents receive a free baby box after watching online videos about infant safety (Heere et al., 2017).

ABCs of Safe Sleep (Alone, Back, and Crib)

Many interventions have been introduced to reduce infant deaths due to Unsafe Sleep Environments, including the ABCs of safe sleep. The ABCs of Safe Sleep are based on A: a baby should always sleep alone in the crib. Parents can place the baby's crib in their room but never allow the baby to sleep with them in their bed. B: a baby should sleep on their back. When a baby sleeps on their back, the risk of SIDS is reduced. C: parents should always place their baby in a crib to sleep that meets current safety standards, and they should remove all choking hazards from the crib (Nationwide Children's, 2014). Leong et al. (2019) stated that a study was conducted to show the difference between the ABCs of safe sleep. ABCs of safe sleep have seen a significant improvement from pre-intervention to post-intervention, increasing by 31.2%, with the initial rate at 3.2% to the final rate at 34.4% (Leong et al., 2019).

Role of Public Health in the Reduction of Sleep Related Infant Mortality

Public health significantly reduces sleep-related infant deaths through education, environmental modification, and legislation enforcement. Public health implements programs and laws that educate, diminish unsafe sleep environments, and increase awareness of safe sleep environments and supine positions (International Affairs & Best Practice Guidelines, 2014). Education, Environment modification, and Enforcement of legislation:

- Education: educate parents to place their babies on their backs and follow the "Back to Sleep" campaigns. Training health care providers to model safe sleep maternity wards.

- Environment modification: providing safe sleeping advice and the equipment necessary to implement safe sleep protocols.
- Enforcement by legislation: to reduce parental cigarette smoking and provide safe sleep education and enactment resources.

Public health agencies are responsible for promoting safe sleep environments. They can reach their prioritized population through various methods, including communication campaigns, safe sleep policies in hospitals and care centers, and messages through home visits or WIC programs (International Affairs & Best Practice Guidelines, 2014).

Role of Care Providers and CHWs in Preventing Sleep-Related Death

Healthcare providers are responsible for educating mothers and their infants through all stages of pregnancy, including the prenatal period, pregnancy, and after delivery. Providers must include information on safe sleep environments and methods outlined by AAP guidelines, including supine position, firm sleep surfaces, room sharing without bed sharing, and preventing soft bedding use and overheating (CDC, 2018). Moreover, avoidance of exposure to smoke, alcohol, and illicit drugs, and the promotion of breastfeeding, routine immunization, the use of a pacifier, and skin-to-skin care for newborn infants to mitigate the risk factors of SIDS and other sleep-related causes of infant death (CDC, 2018). According to Haldar & Hinton (2023), CHWs address many health needs of targeted populations for high-risk women with chronic conditions. CHW interventions can be effective in reducing health issues related to unsafe sleep environments, especially for high-risk pregnant women, by practicing home visits. The CHWs have an essential role in reducing the rate of infant mortality by educating parents and communities about sleep-related infant death. Moreover, they should provide sources and information about safe sleep and educate their community about the risk factors of unsafe sleep

environments during their home visit. Although CHWs tend to educate families about breastfeeding and routine immunizations, less focus is on providing information about safe sleep environments.

Policies for Reducing Infant Deaths Due to Unsafe Sleep Environment

Ohio's Infant Safe Sleep Law took effect in May 2015 and was the most comprehensive program to combat SUID. The Ohio Department of Health was required to provide "educational materials on safe sleep, sample screening tools to identify expectant and new parents that were lacking a safe sleep environment for their infant and model policies for childcare centers, pediatric hospitals, and maternity units" (National Association of Neonatal Nurses 2016, p. 2).

Moreover, new parents lacked a safe sleep environment for their infant and model policies for childcare centers, pediatric hospitals, and maternity units" (National Association of Neonatal Nurses, 2016, p. 2). It mandated that many healthcare providers, public agencies, and other entities educate parents on safe sleep. The healthcare providers list includes childbirth educators, hospital personnel, and obstetrician and pediatrician office staff. Ohio laws and policies concerning safe sleep environments can be implemented in other states (Ohio Department of Health). In addition, Ohio law requires health departments to offer families of infants who have died of SIDS advising and other supportive services and urges parents who have a child less than two years of age who has died of SIDS to be reported immediately to the coroner for an autopsy to be performed (National Conference of State Legislatures 2015). Ohio Rev. Code Ann. § 313.121

According to the National Association of Neonatal Nurses, approximately forty-three states had laws associated with SUID or SIDS in 2016. Different laws address different aspects concerning SUID and SIDS. Many laws were enacted to establish advisory councils for parents

who experience an infant's death due to SUID or SIDS after the fact (NCSL, 2015). At the same time, others require states to require that all hospitals and birthing centers provide free materials to educate parents about SUID and SIDS prevention. Among the states that present additional information to educate parents, only a few require safe sleep practices and extra instruction at follow-up outpatient appointments to be followed by healthcare personnel. Ohio is one of the only states with a law to educate caregivers and parents about the safe sleep environment program. Other states require data collection and research on SIDS/SUID. There are "at least 12 states that require special training about SUID/SIDS for childcare personnel, firefighters, emergency medical technicians, or law enforcement officials" (NCSL, 2015).

Significance to Public Health

IMR is a widely reported indicator of population health. Despite its decrease in the last ten years, many infants continue to die due to unsafe sleep practices and other sleep-related issues, especially within minority groups, including Black and high-risk pregnant women. AAP recommendations have previously guided the decrease in IMR seen over the years. However, IMR remains a problem because parents and care providers such as nurses, doctors, and CHWs still do not follow AAP recommendations. CHWs often bridge healthcare providers and their communities, establishing many practices parents and caregivers follow in infant care. However, current research lacks CHWs' roles relative to safe sleep. This study aims to investigate the attitude, knowledge, and behavior of care providers (CHWs) toward a safe sleep environment and to understand CHWs' communication methods with parents and caregivers about safe sleep practices. Furthermore, this study also tries to determine whether additional training is required to ensure that CHWs' knowledge of AAP recommendations is sufficient. Overall, this study

strives to decrease IMR in the USA, allowing parents and caregivers to protect their infants from sleep-related deaths.

This study aims to understand better CHWs' awareness of AAP safe sleep guidelines and how they communicate the recommendations to parents and caregivers. Specifically, this study aims to determine the knowledge, attitude, and practice of CHWs toward safe sleep practices in the hospital environment, to understand the methods used by CHWs to communicate with parents and caregivers about safe sleep practices, and to determine the relationship between KAP and sociodemographic characteristics of CHWs.

The first four research questions were descriptive, and the fifth and sixth were inferential questions:

1. Determine the knowledge, attitude, and practice of CHWs toward safe sleep practices.

    RQ 1: What is the level of knowledge of CHWs relative to AAP safe sleep standards?

    RQ 2: What are CHW’s beliefs and attitudes toward AAP safe sleep standards?

    RQ 3: What are CHW’s professional practices relative to AAP safe sleep standards?

2. To understand CHWs' communication methods with parents and caregivers about safe sleep practices.

    RQ 4: How do CHWs communicate about safe sleep to parents/caregivers during home visits after the delivery of an infant?

3. To determine the relationship between KAP and sociodemographic characteristics of CHWs

    RQ 5: Do CHWs' KAP scores and Communication differ based on the demographic characteristics of CHWs?

    RQ 6: What factors influence the KAP scores for safe sleep among CHWs?

This study will be conducted to answer the six outlined research questions. The study will be primarily quantitative in design. This design is appropriate for collecting data and measurable statistics to understand CHWs' knowledge, attitudes, and professional practices (KAPs) surrounding safe sleep environments and their views on AAP recommendations.

Chapter 2

Literature Review

Introduction

This chapter overviews previous research on healthcare providers' knowledge, attitudes, and professional practices surrounding safe sleep environments. Additionally, the role of CHWs in providing information to help their community access health care for infants and mothers will be investigated. The first part of the chapter describes the critical role of healthcare providers and what knowledge, attitudes, and professional practices they possess related to infant safe sleep environments. The second part focuses on the best practices for information delivery to parents. The third part includes a brief overview of current information about healthcare providers and the importance of the patient-doctor relationship. Finally, the impertinence of CHWs to reduce infant mortality is covered. After these reviews, gaps in the literature will be identified and discussed.

Importance of Healthcare Providers in Promoting Infant Safe Sleep and Preventing Sleep-Related Death

According to the CDC (2018), healthcare providers have an essential role in decreasing sleep-related infant death. Outlined AAP recommendations are more likely to be followed by parents if providers communicate and distribute accurate advice about safe sleep environments for infants. The advice of health care providers can influence the decisions of parents to place babies on their backs to sleep and decrease the risk factors of SIDS by avoiding sharing beds with their babies. Health care provider counseling is also known to influence other kinds of health-risk and health-promoting behaviors. Only 55% of mothers surveyed reported receiving

correct advice about safe sleep during pregnancy and baby care visits, 25% reported receiving incorrect advice, and 20% reported not receiving advice at all (CDC, 2018).

According to Linneman (2016), there is a knowledge gap between nurses' awareness of safe sleep recommendations and applying the recommendations in the health care setting. Four themes are found in these gaps: knowledge deficits of infant sleep recommendations, conflicting attitudes towards infant sleep recommendations, inconsistent nursing practices, and the importance of policy in nursing practices. Unfortunately, no study was found to address nurses' knowledge, attitudes, or practices surrounding bed-sharing. Healthcare providers should encourage parents and other caregivers to reduce the risk of SIDS and other sleep-related infant deaths (Linneman, 2016).

According to the CDC, healthcare providers can increase parents' awareness of AAP recommendations by giving them the correct information outlined by the recommendations. Hodges et al. (2018) state that physicians and healthcare professionals are primary sources of pregnant women's information before birth. However, this population's infant sleep knowledge, attitude, and behaviors are unknown. Moon et al. (2002) explained the importance of the physician's knowledge about safe sleep environments, the modifiable risk factors of SIDS, and the importance of communicating this information to parents and caregivers. Furthermore, many physicians incorrectly recommend the side position as they are unaware of the AAP's most recent recommendations and other sleep environment hazards. Therefore, further educational efforts for physicians who provide care for pregnant women and children must be undertaken to diminish sleep-related infant deaths and the incidence of SIDS.

The healthcare providers' role is vital when educating parents and caregivers about safe sleeping. However, the lack of knowledge and practice of safe sleep environments and AAP

recommendations differ. First, many SIDS and sleep-related infant death causes are unclear. Furthermore, because the information is rapidly updated over the years as research expands, some recommendations seem to conflict with previous recommendations, advice, and common customs. Lastly, some advice might be complex for some families and their infants (MacCarthy, 2015).

Professional practices of health care providers toward a safe sleeping environment

Healthcare providers play an essential role in reducing the infant mortality rate associated with sleep-related infant death. A study by Bartlow, Cartwright, and Shefferly (2016) found that among the nurses who reported being aware of AAP guidelines, 95% correctly identified supine sleeping as the recommended position. However, the study showed that 34% of the babies were not correctly positioned, and 59% of crib environments did not meet the environmental guidelines. Blankets, towels, gloves, onesies, and diapers were found in cribs. One infant was even propped on his side with blankets (Bartlow, Cartwright, & Shefferly, 2016). Grazel, Gibbons, Phalen, and Polomano (2010) found that about 85% of the nurses could identify recommended strategies correctly, but 26.5% stated that supine or side sleeping was acceptable. Around 27% of nurses identified the use of home monitors as a SIDS risk reduction strategy. The nurses were afraid of aspiration regarding infant sleep and stated that the side position was more comfortable and safer for infants. About half of the nurses used positioning objects and placed blankets over the head of the crib, and about 73% offered verbal SIDS education (Grazel, Gibbons Phalen, & Polomano, 2010).

The knowledge, attitudes, and professional practices of health care providers toward a safe sleeping environment

Healthcare providers' knowledge, attitudes, and practices (KAPs) are significant to a safe sleeping environment. The knowledge and attitudes of care providers can affect their practice toward a safe sleep environment and "Back to Sleep," helping to decrease SIDS and sleep-related infant deaths. Little is known about the KAPs of care providers toward SIDS and sleep-related infant death. However, this population is an essential and trusted source of information for parents and caregivers. It often guides infant care to reduce SIDS and Sleep-related infant deaths (Hodges et al., 2018). According to Efi et al. (2012), nurses were aware of SIDS, but they did not know which sleeping positions could be used to prevent SIDS. Also, they accepted side positions for infants to sleep. Around 88% of nurses did not agree that parents should not share a bed with their babies (Efi et al., 2012).

According to Hodges et al. (2018), approximately 61% of nurses stated barriers to providing parental infants with safe sleep education and enabling and reinforcing factors associated with providing education about this subject. About 78% stated insufficient time to address the issue, while 71% lacked resources. About 65% of maternity care offices do not provide education. Around 25% lack of education among providers, 25% of patients are not interested in education on this topic, 9% stated that clinics are not the appropriate place for this education, and 60% of nurses did not agree with the AAP recommendations (Hodges et al., 2018). According to Welby (2004), nurses believed teaching and advising parents about supine positions created more anxiety. The nurses felt that the developmental and supportive care provided in the unit would prevent parents from adopting safe sleep practices at home. Although some pediatric nurses knew about SIDS, some nurses did not understand current guidelines.

Additionally, according to Bullock, Mickey, Green, and Heine (2004), the awareness rate did not correlate with the correct knowledge (Bullock et al., 2004). According to Aris et al.

(2006) and Bullock et al. (2004), years of nursing experience influenced attitude and practice. When nurses were asked about their interest in continuing education on safe sleep recommendations, 41% were uncertain or disinterested (Aris et al., 2006). Nurses with less than five years' experience were more interested in continued education than experienced nurses (Aris et al., 2006). Bullock et al. (2004) found that nurses with more experience were less likely to believe SIDS was associated with sleep position and were less likely to use the supine only position because they felt that infants did not sleep either. Conversely, their younger counterparts were more likely to encourage parents to use supine-only for sleeping (Bullock et al., 2004).

Acting as a primary source of information for most parents, healthcare providers know about safe sleep environments, and "Back to Sleep" can directly influence, teach, and advise parents on eliminating SIDS and sleep-related infant death. Healthcare providers play numerous roles in the overall well-being of babies and children. They provide preventive health measures, including immunizations and screening, support, education, guidance for parents and caregivers, care for illnesses and injuries, and referrals to specialists as needed (Sanford Health, 2020).

Healthcare providers are essential in teaching parents about safe sleep practices. Patients place trust in doctors when it comes to medical decisions. Recent data shows that 74% of Americans view medical doctors positively (Funk & Gramlich, 2020). They attributed their strong trust and positive outlook on their role to their education, training, and specialty in providing health and treatment. The study showed that higher levels of familiarity were associated with more positive and trusting views of the medical professional. Therefore, doctors they had the most contact with, like primary care physicians and pediatricians, were trusted. Parents are more likely to rely on or follow what they are told by these doctors (Funk &

Gramlich, 2020). Thus, it is crucial to study healthcare providers concerning safe sleep because they can play a vital role in modeling the AAP recommendations.

Through their interactions and practices, they can convince parents or caregivers to change their beliefs and attitudes regarding safe sleep through their interactions and practices. A review of the existing literature was performed with several articles related to safe sleep practices in the U.S.

In reviewing these studies, many issues and topics appeared. A study about safe infant sleep (Willinger et al., 1991) in the National Infant Sleep Position Study demonstrated that guidance by healthcare professionals has been highly influential in parental decisions regarding infant sleep position. In that study, the doctor's recommendation of the supine position was the most substantial influence on the sleeping position, resulting in more than a threefold likelihood that the infant would sleep supine and a fourfold decrease in prone sleeping. Existing data demonstrates that the advice of the infant's physician is most influential in determining the infant's sleep position. While the Back to Sleep campaign has been highly successful in decreasing the incidence of prone infant sleeping, the stated AAP goal of <10% prone sleep has not been reached. Forty percent of parents do not recall receiving sleep position recommendations from their infant's physician (Federico de Luca & Andrew Hinde, 2016).

A study done in 2002 demonstrated that parents who watched healthcare providers put their babies on their backs to sleep were more than likely to continue to put their babies in the same position. Unfortunately, more than half of healthcare providers did not follow the AAP recommended safe sleep practices in the hospital. Therefore, parents tended to be confused as what they were told and what they saw from healthcare staff differed (Moon et al., 2002).

Healthcare Provider Knowledge, Attitudes, and Professional Practices Related to Infant Safe Sleep

Moon et al. (2002) questioned a random sample of 3,717 physicians in North Carolina and metropolitan Washington, DC, to determine knowledge, beliefs, and practices regarding SIDS and SIDS risk reduction. Obstetrician-gynecologists were included in the Washington, DC cohort. Though the study had a low response rate (23%), the results indicated that most physicians were aware of prone sleeping and cigarette smoke exposure as risk factors for SIDS. Additionally, almost all physicians agreed that measures could be taken to reduce the risk of SIDS. They considered it essential to discuss SIDS and SIDS risk reduction strategies with parents of young infants. Despite this belief, only 56% of family/general practitioners, 18% of obstetrician-gynecologists, and 79% of pediatricians discussed SIDS routinely. Only 35% of pediatricians, 15% of family/general practitioners, and 16% of obstetrician-gynecologists provided written information. In addition, only 38% of physicians recommended supine, while 50% recommended side or back, 6% side, and 7% prone. Only two-thirds of pediatricians and one-third of family/general practitioners knew that the AAP recommended supine as the preferred sleep position for infants. Pediatricians were likelier to be aware of the AAP recommendations and discuss SIDS risk reduction strategies with parents, while obstetrician-gynecologists were least likely to promote the issue (Moon et al., 2002).

A study by Colson et al. (2006) demonstrated that only 59% of mothers placed their infant supine, 25% placed their infant on their side, 15% put their infant in a prone position for sleep, and 1% put their infant in the usual position. Only 34% reported never placing their infant in the prone position. Those who received advice reported receiving it 53% of the time from a doctor, 72% from a nurse, and 38% from a female friend or relative. The supine position was

recommended by a doctor only 36% of the time, a nurse only 42% of the time, and a female friend or relative only 15% of the time. Mothers who received advice followed the advice even when it contradicted current AAP recommendations. Advice given by female friends, relatives, doctors, and nurses was influential on mothers, even if the advice was incorrect. Mothers advised to place their infants in the prone position by female friends or relatives were likelier to do so than mothers who received no advice (Chesser et al., 2019). Similarly, mothers who were advised of placing their infants in non-supine positions by doctors or nurses were less likely to choose supine positions compared to mothers who received no advice at all.

The role of healthcare providers in reducing the infant mortality rate is associated with SIDS and other sleep-related infant deaths. Bartlow, Cartwright, and Shefferly (2016) stated that nurses reported being aware of AAP guidelines. 95% of the nurses correctly identified supine sleeping as the recommended position. However, upon observing the nurse's practices, about 34% of the babies were not correctly positioned, and 59% of crib environments did not meet the environmental guidelines.

Overall, 69% of the observations did not meet the guidelines for both positioning and environment. An assessment of their attitude indicated that about 26% of the nurses did not believe or were unsure that sleep position was associated with SIDS and other sleep-related infant deaths. About 25% of nurses stated that in their clinical experience, the infant would be at an increased aspiration risk when supine. Nurses also cited poor sleep and decreased infant comfort with supine sleep positioning. Blankets, towels, gloves, onesies, and diapers were found in cribs. One infant was propped on his side with blankets (Bartlow, Cartwright, & Shefferly 2016).

The 1980s ‘Back-to-Sleep’ (BTS) campaign increased awareness concerning the supine position’s protective effect on sleep-related infant deaths in many counties, following a systematic review by de Luca and Hinde (2016). Numerous media outlets discussed the Back to Sleep program, which led to an awareness of healthcare professionals' vital role in preventing deaths related to safe sleep. The study aimed to determine changes in healthcare professionals' knowledge and parent advice over the last 20 years concerning current recommendations (de Luca and Hinde, 2016). Though they found that healthcare providers are aware of the supine position as the best practice, there is still inadequate focus on the detrimental impact of the prone position.

According to Barsman, Dowling, Damato, and Czeck (2015), most nurses were aware of the AAP recommendations but believed that other positions, mostly side positions, were acceptable. They thought that side positions were safer for infants, especially after feedings (Gelfer, Cameron, Masters, & Kennedy, 2013). Nursing knowledge related to safe sleep recommendations did not predict practice in the hospital. A study by McMullen, Fioravanti, Brown, and Carey (2016) showed that nurses identified the supine position as the safest. However, they continued to place infants in other positions: “Developmental care practices, including non-supine positions, positioning aids, and extra blankets in the crib continued beyond 32 weeks, and clinical stability to promote infant comfort, influenced nurses’ noncompliance with safe sleep recommendations” (Barsman et al., 2015, pp. 29 32). A lack of training, time to review the research, and belief that their behavior would not change the situation or make any difference caused the healthcare providers not to follow the AAP guidelines (Stasny, 2004).

According to Barsman et al., 2015, half of the nurses surveyed strongly agreed that the recommendations of AAP can make a difference and reduce the number of infants who die of

SIDS. However, only 20% of nurses believed that the parents followed the AAP guidelines when they left the hospital and went home. Unfortunately, around 63% of nurses gave the parents verbal information, while 28% gave parents written information about SIDS; a tiny percentage of nurses believe giving advice or information to parents will reduce SIDS incidents.

A few issues become apparent when considering the review conducted by Federico de Luca and Andrew Hinde (2016). Healthcare providers and safe sleep have not been extensively explored; therefore, few studies exist. This lack of research implies that the discussed findings may be less accurate. Although trends were based on U.S. studies, the most recent data belongs to other countries, making comparability problematic. Additionally, most of the studies evaluated nurses, understandably so, since they spend a more significant proportion of time caring for newborns and parents. However, there is a need to understand the views of all healthcare providers and increase their awareness of safe-sleep practices, especially doctors who interact with pregnant women regularly, given that patients place considerable trust in their advice and practices.

Parent Education on Safe Sleep

Several methods advise parents and caregivers, such as video, paper/brochure written information, posters, infographics, group classes, and social media messages. A cross-sectional, descriptive study evaluated the Safe Sleep BABY video and its potential to influence infant sleep position and environment after hospital discharge (Raines, Faan, Robinson, 2018). The outcome was positive. Participants who used the internet to find learning materials were more likely to save the Safe Sleep BABY video to their phone, tablet, or laptop for easy access. They also found that videos were practical tools for parent education. The videos facilitated teachings that

healthcare providers should consistently deliver to new parents on the importance of safe sleep positions and environments for their newborns (Raines, Faan, Robinson, 2018).

People process information differently. The video offered auditory and visual messages essential when developing patient education materials. The video served as a reminder of infant safe sleep practices after parents left the hospital; parents could review the videos as many times as needed and share them with other caregivers to help and teach them about a safe sleep environment. When the parents watched the video, positive behaviors were noticed. The participants liked the video more than the paper handout. This study showed that videos are practical tools for parent education about safe sleep (Raines, Faan, Robinson, 2018).

Healthcare providers should use consistent education regarding safe sleep with the parents of babies (Naugler & DiCarlo, 2018). Around one-third of nurses in one study stated that they always give parents verbal information. Only 16% reported consistently providing parents with written information. About 20% of NICU nurses reported providing no SIDS education to parents at all (Barsman et al., 2015). The healthcare providers shared information on safe sleep with parents of premature infants through video. Fowler et al. (2013) found three areas of concern regarding parents of premature infants after leaving the hospital. These areas are "a) bed sharing with their premature infants, b) placing infants in areas other than the crib for sleep, and c) placing infants in non-supine positions for sleep "(Fowler et al., 2013, p. 1). In three studies, researchers educated parents about SIDS. All the groups used written material and videos to teach the family about safe sleep (Gelfer et al., 2013; Voos et al., 2014; Zachritz et al., 2016).

An increase (23% to 82%) in parental compliance with safe sleep practices after hospital discharge was attributed to consistent parental education (Gelfer et al., 2013). Zachritz et al. (2016) found that follow-up phone calls after parents left the hospital resulted in parents

following the safe sleep recommendations. Therefore, a consistent educational program for parents is needed to improve safe sleep practices after discharge. Giving parents educational videos and printed materials ensures that everyone gets the same information and that various learning styles are addressed (Naugler & DiCarlo, 2018). A study by Voos et al., 2014, had a safe sleep package with a video shared with all parents with a newborn to teach parents about a safe sleep environment. Around 21% of infants were in a safe sleep environment before the education, increasing to 88% after safe sleep education.

According to Newberry (2018), several studies show that nurses lack education regarding safe infant sleep. A descriptive questionnaire by Raines, Faan, and Robinson (2018) focused on new mothers and their preferred method of receiving information about safe sleep. Mothers who received traditional paper-based teaching materials (July-October 2015) and mothers who received video-based teaching materials (July-October 2016) constituted the two primary cohorts. There are about 100 participants in the two cohorts' questionnaires. Cohort 1 (paper-based patient education material) included 54%, and Cohort 2 (video-based patient education material) included 53% of women who were first-time mothers. The outcome was significantly higher for participants who received the video-based patient education materials. The results of this study reveal that new mothers preferred the video method because the video had live-action and helped the participant make the right decision. Using both a verbal message and a video image helps the healthcare organization to be consistent.

Further studies are recommended to recommend best practices for safe sleep. Consistency of information between healthcare providers and parents is essential. Nurses should have incentives to teach parents or caregivers about safe sleep practices (Raines, Faan, & Robinson, 2018).

Community Health Workers

According to Perry, Zulliger, and Rogers (2014), the U.S. Labor Department defines Community Health workers (CHWs) as workers who "assist individuals and communities to adopt healthy behaviors while helping to conduct outreach and advocate for individuals and community health needs." They may work for pay or volunteer to help people and the community. CHWs have many responsibilities, from working in communities to clinics and homes. They are trusted people in their community, people who can build trusting relationships with patients to learn about their patients' lives, the needs of their communities, and the barriers they face to being as healthy as possible (Connecticut Health Foundation, n.d., Massachusetts Department of Public Health, 2015). CHWs improve health outcomes and reduce costs to save money for the healthcare system by ensuring patients' needs and proper care (Perry, Zulliger, & Rogers, 2014). CHWs act as a bridge between the healthcare providers and their communities.

Approximately 85,000-200,000 CHWs working in several roles in the U.S. are helping people and communities access healthcare services (Perry, Zulliger, & Rogers, 2014). CHWs are known by many names and job titles and have many responsibilities. The names include "promoters, Tribal community health representatives, community health advocates, outreach counselors, and navigators" (National Heart, Lung, and Blood Institute, 2014). Qualifications for CHWs are not standardized; some programs require high school diplomas, while others require a college degree. In most instances, the CHW receives additional training, approximately 100 hours in the specific area of work (Connecticut Health Foundation, 2016). Essentially, CHWs serve as liaisons between healthcare providers or available health services and patients or parents, providing much-needed support to promote care. CHWs play a fundamental role in assisting communities in improving health and reducing costs and health disparities (Aboubaker

& Qazi, 2014). Hence, the provisions made for CHWs in the Patient Protection and Affordable Care Act (PPACA) provide an opportunity to sustain their contribution to improving health outcomes, filling the gap between healthcare providers and healthcare services (Martinez et al., 2011).

Most CHW programs are focused on low-income populations experiencing health disparities and challenges in accessing healthcare due to financial or structural barriers. Furthermore, CHWs have become impactful in working with high-risk populations such as pregnant women or women at risk of poor health outcomes. CHWs effectively improve child health outcomes and maternal health problems (Botsko et al., 2016). These programs mainly provide home visits to pregnant women, new mothers, or caregivers in the community to educate them about raising their children. Such efforts have been linked to prenatal care, breastfeeding, post-partum depression, preterm births, low birthweight access, healthcare services, child growth and development, immunization, proper nutrition, screening for developmental issues, and parental efficacy (Massachusetts Department of Public Health, 2015). The role of CHWs in promoting safe sleep practices is not well explored. In this context, CHWs can serve as extensions to nurses and other trusted healthcare providers to ensure AAP recommendations are emphasized and practiced after mothers leave the hospital with their children. So, the CHWs and nurses can play a dynamic role in reducing the rate of infant mortality.

CHWs and safe sleep

Although there exist several studies about infant mortality and maternal mortality and how to reduce the rate of infant mortality, only one study mentions safe sleep. The study states safe sleep but does not discuss it in depth (Furman & Dickinson, 2013).

Thus, no studies about safe sleep or information on CHWs on this topic are available. Studies indicate that CHWs offer information to parents regarding all risk factors. Although this information covers sleep position, breastfeeding, and postnatal exposures, essential elements of safe sleep environments, including bed sharing, bedding surface, pacifier, and room sharing, are much less likely to be covered.

The comparison between the CHWs and Nurses

According to the University of Nevada (2019), public health and community health workers have a significant role in providing access to a healthcare system. They work in the same field and serve many different purposes; they try to achieve the same goal. Health Care (HC) jobs are devoted to monitoring health trends, chronic diseases, promoting health, preventing diseases, prolonging life, and educating people about health. They are not focusing on individual patients, but they seek to improve the health of entire populations. CHWs focus on improving the health outcomes of different groups of individuals, especially those with low income.

The healthcare providers' job is to treat and advise patients. They spend most of their time working in their offices (University of Nevada, 2019). However, the CHWs job is focused on helping people and the community and providing access to health, making home visits to people with chronic diseases, pregnant women, breastfeeding mothers, and people at a high risk of health problems. Public health workers typically work in hospitals, medical centers, or urgent care clinics, while the CHWs work in different places, including communities in rural, urban, and metropolitan areas and at the borders. They are hired from healthcare or recruited from their communities. CHWs spend their time speaking with people, making home visits, and distributing information to their community.

Salary of Nurses and CHWs

The average annual salary of nurses across all specialties is around $73,300 as of 2019. The highest paying nurses' careers are over $180K annually. Specialized nurses typically earn more salary than those who practice general nursing. CHWs average starting salary is $35,000 to $42,000, and the senior CHWs may earn $42,000 to $52,000. Supervising CHWs can earn $52,000 to $60,000, and CHW managers can earn above $60,000.

Qualifications

The qualifications for CHWs are wide-ranging; some require only a high school diploma, while other employers require a college degree. On the other hand, nurses should earn a bachelor's, master's, or doctoral degree to be qualified.

Certification or license

Nurses should have a degree in nursing and a license to start practice and work. Specialized training is needed to earn high-level certifications and licenses, and licensed nurses can transfer their credentials between participating states. The majority of CHWs did not previously have certifications. However, around 17 states have established training and a certification process as of December 2015. The states include Alaska, Arizona, California, Florida, Illinois, Indiana, Kentucky, Massachusetts, Maryland, Minnesota, Missouri, Mississippi, New Mexico, New York, Ohio, Oregon, Rhode Island, South Carolina, and Texas. Texas was the first state to develop legislation to govern CHW activities in 1999. CHWs usually receive up to 100 hours of additional training on the job through classroom study, job mentoring, or a combination.

Community Health Worker Interventions about infant mortality (safe sleep)

According to the Ohio Department of Health (2018), approximately 850 CHWs, both certified and non-certified, work in Ohio (Whalen, Smith et al., 2018). Both certified and non-

certified CHWs practice in all 88 counties in Ohio. They range in age between 19-82 years old. About 94% of CHWs are female, 46% of CHWs are Black, and 44% are White. About 54% of the CHWs' level of education is college or an associate degree (Whalen, Smith, et al., 2018). The CHWs play a predominant role in increasing access to treatment and care for pregnant women and their newborns (Aboubaker, Qazi, et al., 2014).

Many initiatives and interventions are established to help families and communities bridge the gap between the clinic and the home (Regenstrief Institute, 2018). The WeCare project by Dr. Deb Litzelman shows results in reducing risks in newborn health by partnering pregnant women and new parents with CHWs. They also began an SMS best intervention to provide health information based on their needs, such as food access and smoking cessation. WeCare has improved high-risk maternal health outcomes for at least 1500 women. Moreover, infant health improves, with 7% more babies sleeping on the back and 6% more babies sleeping alone (Regenstrief Institute, 2018).

The Pathways Community HUB model is an excellent strategy to identify and address the risk factors of infant mortality risk factors in a whole-person approach. The Pathways Community HUB model is an example of a care coordination program that utilizes CHWs to reach out to people who are at risk. The HUB model uses a community-wide approach to address medical, social, and behavioral risk factors to improve population health (Zeigler, Carter, Redding, Leath, & Russell, 2014). Around twenty Pathways for pregnant women were used. These include "Adult Education, Health Insurance, Medication Assessment, Behavioral Health, Housing, Medication Management, Developmental Referral, Immunization Referral, Postpartum, Developmental Screening, Immunization Screening, Pregnancy, Education, Lead Screening, Smoking Cessation, Employment, Medical Home, Social Services Referral, Family Planning,

and Medical Referral'' (p. 11). The people at risk can use many Pathways programs, and the Pathways are complete only when all the risk factors are addressed. Under the Pathways Community HUB model, the HUB links different care coordination agencies operating in one community and tracks outcomes across the region but does not provide care coordination services (Zeigler, Carter, Redding, Leath, & Russell, 2014).

According to Goldman (2018), the Pathways HUB model differs from other social determinants models on two significant counts: first, the CHWs living in the same area as the patients. Second, the employee tries to incentivize people working as CHWs by successfully paying them money to address client risks, and the third is the reimbursement from health insurance, such as Medicaid (Goldman, 2018).

Challenge

Background and culture play a significant role in safe sleep. Mothers are always more likely to follow a female friend or relative's advice (grandmother, sister, aunt, mother-in-law) in a safe sleep environment (Chesser et al., 2019). Mothers who took advice from a doctor or a nurse about sleep positions were more likely to place their infants in the supine position. Mothers who believed that the supine position could cause their infant to choke were less likely to follow the advice. Approximately 36% of mothers placed their infants in the prone position because they believed it to be more comfortable, and 29% believed bed-sharing is preventative for SIDS. Only 43% believed SIDS was related to sleep positions (Colson et al., 2006). Lack of advice, wrong advice, lack of trust in healthcare providers, and knowledge and concerns about safety and comfort were the main barriers to placing infants in the supine position, primarily in low-income, black households (Colson et al., 2006). Besides, research shows that Black mothers were less likely to follow the AAP recommendations or the advice of healthcare providers (Stiffler et al.,

2020). There is a lack of incentives or penalties for healthcare providers that do not provide parents with information on safe sleep (Raines, Faan, & Robinson, 2018). Moreover, there is a lack of continued education on current AAP guidelines among practicing healthcare providers (Newberry2018).

In addition, there is a lack of a verification system on whether healthcare providers screen for or recommend safe sleep practices during each visit with parents of children less than one-year- old (Colson et al., 2006; Kreth et al., 2017). When designing interventions to get more infants to sleep on their backs (Colson et al., 2006). There are inconsistencies with the AAP recommendations (Linneman, 2016, & Newberry, 2018). Some recommendations seem to be against their previous recommendations or advice (MacCarthy, 2015). There is a lack of time for healthcare providers to give advice and educate caregivers (Stasny, 2004 & Hodges et al., 2018). Hence, the value of CHWs providing this much-needed service after the caregivers leave the hospital.

Gaps in Existing Literature

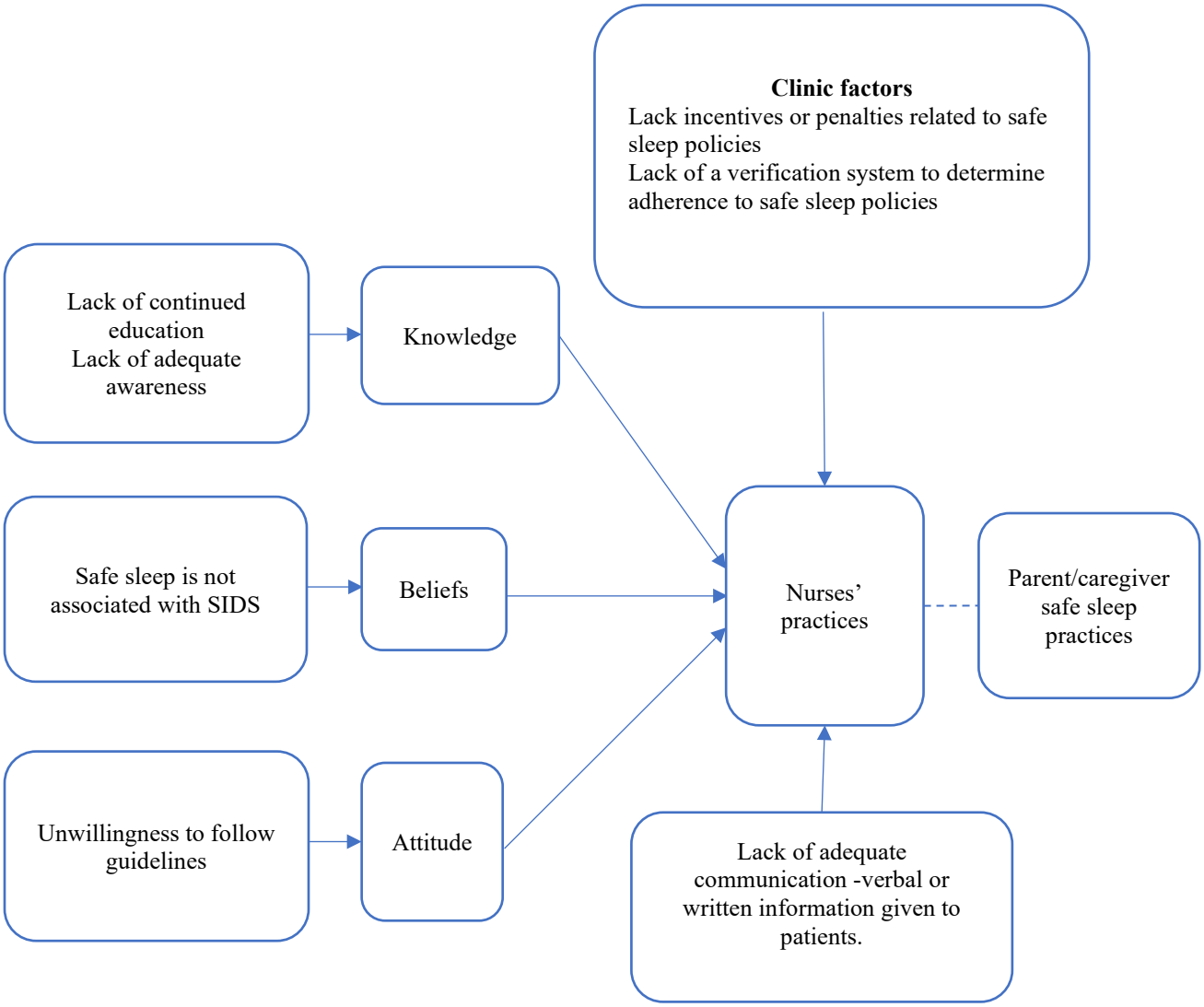
Several interventions encourage healthcare providers to educate caregivers about safe sleep (National Institute for Children's Health Quality, 2012, & Chesser et al., 2019). There is an opportunity for safe sleep information to be given to the caregivers. However, interventions focus on creating policies that favor promoting safe sleep, i.e., providers to discuss safe sleep with caregivers. The activities are not monitored or reported, including education packets in discharge paperwork and providing incentives to healthcare shared with providers. For example, only 28% of nurses report giving written information on safe sleep to caregivers (Barsman et al., 2015). A focus on interventions that change hospital or clinic processes is lacking. Evidence on

the effectiveness of such systems strategies is needed. Secondly, there is a lack of research on safe sleep-in association with CHWs.

The CHW services provided through various programs do cover some AAP recommendations. However, there is a lack of emphasis on a comprehensive, safe sleep environment. CHWs should be trained to provide resources and deliver information about safe sleep to educate their community about the risk factors of unsafe sleep environments during their home visits. This training will provide continuity of information caregivers receive from healthcare providers at the hospital about safe sleep. CHWs talk to families about breastfeeding, routine immunization, and sometimes bedsharing, but it is unclear if safe sleep is included in the curriculum.

Figure 6

Conceptual Framework



Chapter 3

Methodology

This chapter provides a cross-sectional study design approach. The 64 questions were distributed to CHWs in partnership with the American Public Health Association (APHA). As the most appropriate design, the quantitative design was used to collect data and measurable statistics to understand CHWs' knowledge, attitudes, and professional practices (KAPs) surrounding safe sleep environments and their views on AAP recommendations. The quantitative methods reflect the percentage of CHWs who self-report to comply with AAP and safe sleep environment standards. The study aimed to identify and evaluate why various standards and recommendations are not utilized or shared with parents/caregivers. This study was conducted to answer the six outlined research questions. SPSS was used to analyze the data.

Research Questions

This study will answer the following research questions:

- What is the level of knowledge of CHWs relative to AAP safe sleep standards?
- What are CHW's beliefs and attitudes toward AAP safe sleep standards?
- What are CHW's professional practices relative to AAP safe sleep standards,
- How do CHWs communicate about safe sleep to parents/caregivers during home visits after the delivery of an infant?
- Do CHWs KAP scores and Communication differ based on the demographic characteristics of CHWs?
- What factors influence the KAP scores for safe sleep among CHWs?

Study Sample

The study sample consists of CHWs from two major evidence-based infant mortality prevention programs, the Moms & Babies First program and the Help Me Grow program, across 77 Ohio Counties. The target was CHWs who provided care to pregnant women or newborns and their mothers after being discharged from the hospital. Ethical approval for the study was obtained from Kent State University Institutional Review Board (IRB 21-266).

Eligibility

To be eligible to participate in the study, participants had to be employed full or part-time in the community, be 18 years of age or older, have at least a high school degree, and have fulfilled all the required certifications, including training for 100 hours in their program, i.e., Moms & Babies First or the Help Me Grow program. Participants needed at least one year of experience working as a CHW. Any CHW's who worked in the community for less than one year were excluded from the study.

Recruitment Procedures

First, the CHWs Directors of Moms & Babies First Program and Help Me Grow in 77 Ohio Counties were contacted to support CHWs participation in the study by distributing the questionnaire (i.e., the first level of recruitment and program directors' recruitment). The invitation emails were sent twice over three weeks to request support from the directors. Following the initial email, a secondary email was sent to gauge the number of directors interested and inform them about the next steps. CHW participants were recruited electronically via an email sent by their program director. A 64-item online questionnaire was distributed to program directors to disseminate to CHWs in their programs. Reminders to complete the questionnaire were sent three times over two months, approximately two weeks apart.

Second, participants for the pilot study were recruited through the American Public Health Association (APHA) national CHW network/listserv. After obtaining approval from Kent State University's IRB, Ten CHWs were randomly selected from the list of APHA to participate in the pilot study to examine their responses to the questionnaire. The selected CHWs were given 3 weeks to decide their participation.

Participants for the main study were also recruited from the Directors and the APHA national CHW network/listserv.

The participants who completed the questionnaire were given an option to enter a drawing for one of 10 gift cards ($100). Corner et al. (2019) state that the ideal response rate for a survey of nurses should be at least 70%. However, that same study found that about 75% of studies offering an incentive fell below the ideal 70% response rate. Therefore, we aimed to achieve a response rate of 50% (Corner et al., 2019).

Data collection and instruments

The primary data collection instrument for this study was a 64-item online questionnaire. The questionnaire asked about CHW's knowledge, attitudes, and professional practices concerning safe sleep environments and whether they communicate with parents/caregivers about safe sleep practices. There was also a section about demographic/background factors. The questionnaire took approximately 15 minutes to complete. Qualtrics Questionnaire Software at Kent State University was used to administer the questionnaire electronically. The questionnaire consisted of 17 demographic questions, 43 multiple-choice questions, and 4 open-ended questions, for a total of 64 questions. The multiple-choice questions included (but were not limited to) Yes/No (16 questions) and a Likert scale (14 Disagree, somewhat disagree, neutral, somewhat agree, agree).

Questions were adapted from two studies to investigate SIDS prevention practices (Bartlow et al., 2016; Rudd, 2019). The first study looked at nurses in two Washington, D.C., urban hospitals. The study questioned whether nurses caring for newborns in the well-baby postpartum nursery knew and practiced the outlined AAP SIDS prevention guidelines (Bartlow et al., 2016). The questions were based on AAP guidelines. The second study by Rudd (2019) focused on Safe Sleep in the NICU. The study asked how likely physicians are to place orders for positioning, which conflicts with safe sleep practices. The Rudd (2019) study had questions on attitudes and practices (Rudd, 2019).

The current study's knowledge section asked questions on infant care and infant sleep environments, including sleep positions, bedsharing, room sharing, SIDS risk factors, soft bedding use, and night practices for infants born in the hospital -- all relative to AAP guidelines. The 'attitude' section asked what CHWs think about safe sleep, while the practice section included questions on a safe sleep environment and placing the baby on their backs.

Sources of questions

As mentioned, the Infant Sleep Position Questionnaire is adapted from Nurses' Knowledge and Adherence to Sudden Infant Death Syndrome Prevention Guidelines by Bartlow et al. (2016). The knowledge, attitude, and practices questions are adapted from Bartlow et al. (2016). The questions about communication were adapted from Safe Sleep in the NICU in Kentucky by Rudd (2019). The remainder of the questions were developed for this study based on AAP guidelines (Bartlow et al., 2016).

Operationalization of Variables

Demographic Variables

Demographic variables, including age, sex, race, education, county type, and years of experience, were collected. Age and length of time working in the infant mortality prevention program were assessed as continuous variables by asking the participants to tell us how old they were and their years of experience. The categorical variables were measured as follows: Sex (male, female, non-binary, transgender, not listed, and prefer not to respond), race (White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Pacific Islander, and other; with the option to select all that apply), highest education level attained (less than high school, high school graduate, high school diploma or equivalent including GED, some college but no degree, associate college degree, bachelor's degree in college, master's degree, doctoral degree, professional degree (JD, MD), licensure, and other). CHWs identified the county they worked for; this was recoded into Rural, Partially Rural, Urban, or Appalachian based on the Ohio Department of Health's classification system (Ohio Department of Health, 2020).

Professional Background

Knowledge

The knowledge construct was measured using 12 items developed based on previous research, literature review, and the AAP guidelines. The first item was a multiple-choice question, and the second item had 11 statements with Likert scale (Disagree, somewhat disagree, neutral, somewhat agree, agree). Knowledge was computed as an overall percentage of correct answers (that is, answered "somewhat agree" or "agree") and compared to AAP and safe sleep standards to assess how far current CHW's practice deviates from outlined standards and

recommendations. Also, the percent of CHWs that answered each question correctly (i.e., answered “agree” or “somewhat agree”) was calculated.

Attitudes Toward and Beliefs about Safe Sleep

The attitude score was computed as an average of nine Likert items using the following three questions to assess the attitude toward safe sleep. 1. “How much do you agree with the current AAP recommendation of supine positioning during sleep for all infants?” (Disagree, somewhat disagree, neutral, somewhat agree, agree). This first question assessed the workers' attitudes about the recommendations. The second question, “In your opinion, are infant sleep positions associated with sudden infant death syndrome (SIDS)?” (Disagree, somewhat disagree, neutral, somewhat agree, agree), was a measure of how important caregivers believe sleep positions are to child health. The third question asked, “How much do you agree with the following statements (Disagree, somewhat disagree, neutral, somewhat agree, agree)?” for each of these statements:

3.1 Policy is an important factor in determining how an infant should be put to sleep.

3.2 Personal preference is an important factor in determining how an infant should be put to sleep.

3.3 Supervisor is an important factor in determining how an infant should be put to sleep.

3.4 Parent’s choice is an important factor in determining how an infant should be put to sleep.

3.5 Clinical experience is an important factor in determining how an infant should be put to sleep.

3.6 Co-workers are an important factor in determining how an infant should be put to sleep.

3.7 Training guidelines are an important factor in determining how an infant should be put to sleep.

To calculate the attitude toward sleep score, all the responses were added to the questions and then divided by the number of the questions. The items were scored as -2 = disagree, -1 = somewhat disagree, 0 = neutral, 1= somewhat agree, 2 = agree. Cronbach's alpha was reported as the measure of scale reliability.

Practices Related to Safe Sleep

The practices score was computed as the average of 12 Likert items to measure the practices of CHWs toward infants' safe sleep. The maximum and minimum scores were based on the scores allocated to them, i.e., "(Disagree (-2), somewhat disagree (-1), neutral (0), somewhat agree (1), agree (2)". To calculate the practices related to safe sleep, all the responses to the questions were added and divided by the number of questions. Cronbach's alpha was reported as the measure of scale reliability.

Communication

The communication was primarily assessed using the response to the Likert item "Do you share (with patient or caregivers) information on safe sleep positions and AAP recommendations related to safe sleep risk reduction? (Disagree, somewhat disagree, neutral, somewhat agree, agree)". Other questions were about the modes CHWs use to communicate with patients and how they communicate when there are conflicting cultural practices related to safe sleep.

Data Analysis

The completed questionnaires were automatically exported to the Statistical Package for the Social Sciences (SPSS) program utilized to manage and analyze the data. First, descriptive statistics (e.g., mean, and standard deviations) were computed for all the study variables.

Second, the possible relationships between the dependent (safe sleep knowledge, attitudes, practices, and communication) and independent variables (age, race, education, county type, and years of experience) were assessed using multiple linear regression, correlation, and one-way ANOVA.

KAPs scores and communication responses were summarized using means, standard deviations, and Cronbach's alpha was used to report the internal consistency of the scales.

Protection of Human Subjects

Assuring Study Quality and Ethical Considerations

Before displaying the questionnaire, participants were informed about all information relevant to the study, including its purpose, right to refuse, withdrawal, skipping questions, benefits, and potential risks. This informed consent was delivered via an online consent form. The participant provided informed consent by clicking the "next" button on the consent page. The data was collected anonymously. There was no link between CHW's identity and her/his responses. The data was stored and protected by password, and only the researcher had access to the data.

The participants were eligible for a drawing to win one of 10 gift cards ($100) as an incentive to participate in the questionnaire. All identifiers, if any, were removed before analysis and kept separate from the data for drawing the winner of one of 10 gift cards ($100). Lastly, they had time to decide whether to participate since the questionnaire was available for two months.

This questionnaire has a Certificate of Confidentiality: "To help us protect your privacy, we have a Certificate of Confidentiality from the National Institutes of Health (NIH).

With this certificate, we cannot be forced by a court order or subpoena to disclose information that could identify you."

Chapter 4

Results

Introduction

This chapter deals with descriptive research questions, descriptive statistics, and inferential questions. The study aimed to understand better CHWs' awareness of AAP safe sleep guidelines and how they communicate the recommendations to parents and caregivers. Specifically, this study aims to determine the knowledge, attitude, and practice of CHWs toward safe sleep practices. SPSS Statistics was used to analyze the data.

Since there is no validated tool or questionnaire to assess awareness of safe sleep among healthcare providers, the questionnaire used in this study was based on similar questionnaires used in previous studies regarding nurses.

The first four research questions were answered using descriptive statistics, and questions five and six were answered using inferential statistics.

1. Determine the knowledge, attitude, and practice of CHWs toward safe sleep practices.

   RQ 1: What is the level of knowledge of CHWs relative to AAP safe sleep standards?

   RQ 2: What are CHW's beliefs and attitudes toward AAP safe sleep standards?

   RQ 3: What are CHW's professional practices relative to AAP safe sleep standards?

2. To understand CHWs' communication methods with parents and caregivers about safe sleep practices.

   RQ 4: How do CHWs communicate about safe sleep to parents/caregivers during home visits after the delivery of an infant?

   To determine the relationship between KAP and sociodemographic characteristics of CHWs

RQ 5: Do CHWs KAP scores and Communication differ based on the demographic characteristics of CHWs?

RQ 6: What factors influence the KAP scores for safe sleep among CHWs?

The study's results, including the pilot study's findings and analysis, will be discussed in this chapter.

Participants

For the pilot study, a listserv of CHWs across the US was obtained through a faculty at the Kent State University College of Public Health. The listserv is from the American Public Health Association (APHA) and includes 901 CHWs. Ten CHWs were randomly selected from the list of APHA to participate in the pilot study to examine their responses to the questionnaire. Two of the ten CHWs responded to the questionnaire. The questionnaire was sent to 30 more CHWs from the APHA listserv to obtain more participants. Therefore, the pilot questionnaire was distributed to 40 out of 901 CHWs. In all, ten CHWs participated in the pilot study.

Next, the questionnaire was revised based on participants' comments and feedback. As a result of the pilot study, the necessary adjustments were made to the questionnaire to be transparent to the rest of the participants/CHWs.

For the main study, CHW directors were contacted to ask If they would forward the questionnaire to their direct reports. Out of 88 Ohio counties, the contact information for only 77 CHW Directors was found. Of the 77 CHW Directors from Infant and Child Health programs across Ohio to whom the recruitment email was sent, 7 (6.1%) responded and agreed to distribute the questionnaire among their CHWs. Initially, four out of 77 agreed to participate; a reminder was sent after two weeks, and 3 more directors of the CHWs agreed to help and distribute the questionnaire.

In June 2022, the questionnaire was sent to the remaining 861 CHWs for their participation. After 3 weeks, the first reminder was sent to them. Another reminder was sent after 3 weeks to collect more data. The final response rate for the questionnaire was 12.1%, with 109/861 CHWs responding.

Demographic and Descriptive Statistics of the Sample

The respondents were asked about their age, gender, race, work experience, and education attained. The average age of the respondents was 46.5 (±11.9). The number of participants aged 50-59 was 26 (26%), while those aged 20-29 was 6 (6%). The majority of respondents were women (n= 91, 90%). Moreover, the demographic breakdown of the respondents included 55 Black or African American (57.9%), 38 White (40%), and only one Asian 1 (1.1%). The number of respondents with a bachelor's degree was 35 (34.7%), while the number of respondents with PhD or doctorate degrees was 2 (2%). Table 1 shows the descriptive characteristics of the sample.

Table 2

Descriptive Characteristics of Ohio Community Health Workers responding to questionnaire (n =109)

Sociodemographic and Environmental Factors	**N (%)**
Age, (years), Mean (SD)	(46.5, 11.9)
20-29	6 (6.0)
30-39	23 (23)
40-49	23 (23)
50-59	26 (26)
60 or older	14 (14)
Missing	9 (8.9)
Gender, f (%)	
Man	3 (3.0)
Woman	91 (90.0)
Non-binary	2 (2.0)
Missing	5 (5.0)
Race, f (%)	
White	38 (40.0)
Black or African American	55 (57.9)
Asian	1 (1.1%)
Other	7 (7.4%)
Education, f (%)	
Less than high school	0 (0.0)
High school or GED	3 (3.0)
Some college but no degree	26 (25.7)
Associate degree	15 (14.9)
Bachelor's degree	35 (34.7)
Master's degree	15 (14.9)
PhD or doctorate degree	2 (2.0)
Missing	5 (5.0)

Abbreviations: GED-General Educational Development Test, JD-Juris Doctor, MD- Medical Doctor. Race sub-groups for Native Americans or Alaska Native and Native Hawaiian or Pacific Islander were not included in the table since no respondent was from these races.

Table 2 shows that respondents who had a current license as CHWs were 90 (89.1%), 4 (4.0%) did not renew their license, and 7 (6.9%) did not respond. Around 61 (60.9%) participants were licensed in urban areas, 13 (12.9%) in partially rural areas, 3 (3.0%) in the Appalachian area, 6 (5.9%) refused to answer and information on 11 (10.9%) respondents was missing. The

years of experience as a CHW were categorized as less than 5 years and 5 years or more. This categorization was based on the ten-thousand-hour rule that was popularized by Malcolm Gladwell (2008). There were 47 (46%) respondents with less than 5 years of experience working as a CHW, 45 (44%) with 5 years or more of experience, and 10 (9%) with missing information. The number of respondents who renewed their license as CHWs were 12 in 2017 (11.9%), 6 in 2019 (5.9%), 15 in 2020 (14.9%), 49 in 2021 (48.9%), and 7 in 2022 (6.9%). Participants who never renewed (Initial certification active) their license were 5 (5%). Most participants worked in areas such as infant mortality 59 (63.4%), healthcare access 57 (61.3%), and mental health 51 (54.8%), while the health areas that respondents worked the least included HIV/AIDS 11 (11.8%) and screening for cancer 11 (11.8%). The number of CHWs who worked with patient populations of women (not pregnant) was 78 (84.8%), and for pregnant women, it was 77 (83.7%). The average number of years CHWs (n=77) worked with pregnant women was 5.3 (±5.7).

Table 3

Factors about CHWs

CHW factors	N (%)
Currently licensed as a CHW, f (%)	94 (89)
Yes	90 (89.1)
No	4 (4.0)
Missing	7 (6.9)
Residence where licensed, f (%)	
Appalachian	3 (3.0)
Partially Rural	13 (12.9)
Rural	7 (6.9)
Urban	61 (60.9)
Refused to answer	6 (5.9)
Missing	11 (10.9)
Years of experience as CHW, f (%)	
Less than 5 years	47 (46)
More than 5 years	45 (44)
Missing	10 (9)

Table 3 Continued

CHW factors	N (%)
CHW license renewal, f (%)	
2017	12(11.9)
2019	6 (5.9)
2020	15 (14.9)
2021	49 (48.9)
2022	7 (6.9)
Have never renewed (Initial certification active)	5 (5.0)
Not applicable	4 (4.0)
Pending	1 (1.0)
Refused to answer.	1 (1.0)
Health areas worked, f (%)	
Diabetes prevention	35 (37.6)
High blood pressure	39 (41.9)
Cardiovascular diseases	23 (24.7)
Obesity	23 (24.7)
HIV/AIDS	11 (11.8)
Infant mortality	59 (63.4)
Nutrition	34 (36.6)
Healthcare access	57 (61.3)
Mental health	51 (54.8)
Immunizations	35 (37.6)
Drug use	24 (25.8)
Screening for cancer	11 (11.8)
Other	31 (33.3)
Population(s) worked, f (%)	
Seniors/older population 65+	42 (45.7)
Adolescents	42 (45.7)
Pregnant women	77 (83.7)
Women (not pregnant)	78 (84.8)
Men	51 (55.4)
Immigrants	27 (29.3)
Rural residents	23 (25.0)
Other	7 (7.6)
Length of time working with pregnant women (in years)	5.3 (5.7)

Of the CHWs who reported having received safe sleep training, 75 (74.3%), while 15 (14.9%) did not receive training, 7 (6.9%) did not respond, and 4 (4.0%) were unsure. Respondents were asked who provided the training as an open-ended question; the organizations and agencies that provided the training were categorized based on similarities. The following

categories were chosen: Non-profit rural health network, Community-based organizations, City or county child & family services department, Hospital system, The U.S. Department of Health, Human Services (HHS), city or county department of public health, and college or university. The most common training provider was city or county departments of public health. Participants who reported receiving training were also asked for the duration of their training. Their responses ranged from minutes, hours, days, weeks, number of lectures, months, and no official training. There were 13 respondents who received their training from 2000-2016, while 63 received their training from 2017-2022. Only 3 respondents reported receiving annual training, and 2 were not sure. The response on awareness of American Academy of Pediatrics (AAP) guidelines for safe sleep included 75 (74.3%) reporting being aware, 10 (9.9%) were not aware, 9 (8.9%) were unsure, and 7 (6.9%) were missing. Additionally, respondents reported getting safe sleep information from the health department (n=52, 69.3%), continuing education units (CEDs) (n = 34, 45.3%), and nursing school (n = 2, 2.7%) as their sources.

Table 4

Safe sleep factors

Safe Sleep factors	N (%)
Received Safe Sleep Training, f (%)	
Yes	75 (74.3)
No	15 (14.9)
Unsure	4 (4)
Missing	7 (6.9)
Organization/Agency that provided the training, f (%)	
City or county child & family services department	2 (2)
City or county health department	41 (40.6)
College or university	4 (4)
Community-based organization	2 (2)
Didn't answer	27 (26.7)
Federally qualified health center	2 (2)
Hospital system	5 (5)
Nonprofit organization	16 (15.8)
The U.S. Department of Health and Human Services (HHS)	2 (2)
Duration of training program, f (%)	
1-12 weeks	6 (9.67)
1-2 hours	29 (46.7)
1-day	16 (25.8)
Other	
Years training received, f (%)	
2000- 2016	13 (16)
2017-2022	63 (77.7)
Annual	3 (3.7)
Not sure	2 (2.5)
Awareness of the AAP guidelines for safe sleep, f (%)	75 (74.3)
Yes	10 (9.9)
No	9 (8.9)
Unsure	7 (6.9)
Missing	

Table 4 Continued

Safe Sleep factors	N (%)
Source of safe sleep information, f (%)	
Hospital in-service	12 (16)
Health Department	52 (69.3)
Peer-reviewed journals	8 (10.7)
Nursing school	2 (2.7)
Physician	4 (5.3)
Continuing education units (CEUs)	34 (45.3)
Other, please specify	15 (20)

Abbreviation: AAP- American Academy of Pediatrics; Duration of training 'Other' category includes responses such as 1-day and ongoing, lecture, 3-hours, several different times, minutes, months, full day, ongoing for 3 years, unsure, and not official training.

Research question 1: What is the level of knowledge of CHWs relative to AAP safe sleep standards?

Table 5 shows the item level mean agreement among CHWs regarding safe sleep. Recall that knowledge items used a 5-point agree-disagree response scale, with -2 representing the strongest disagreement and 2 representing the strongest agreement. The mode for every item was 2. The mean of the responses to "Infants should be placed for sleep in a supine position (Back to sleep) until the child reaches 1 year of age" was 1.63 (SD .939). The mean of "side sleeping is not safe and is not advised by AAP guidelines" was 1.32 (SD 1.104). For "infants should be placed on a firm sleep surface," the mean was 1.78 (SD .667). The mean for the response "there should be no other bedding or soft objects (pillows and pillow-like toys, quilts, comforters, sheepskins, and loose bedding) in the crib" was 1.80 (SD .767). The responses show that the mean for "infants should not be left to sleep on sofas, armchairs, or in sitting devices" was 1.80 (SD .767).

Moreover, the average was 1.27 (SD .767) for "infants that should sleep in the parent's room, but on a separate surface." The mean "the infant's crib should be placed in the parents'

room for at least 6 months but on a different surface" was 1.06 (SD 1.076). Also, the mean was 1.165 (SD 1.195) for "breastfeeding is significant in helping to protect infants from death due to SIDS," .747 (SD 1.261) for "pacifiers decrease the risk of SIDS," and 1.670 (SD .844) for "smoking in the home increases the risk of SIDS." Finally, the mean of "bumper pads increase the risk of suffocation during sleep" was 1.77 (SD .579). The questions with the lowest average agreement were "no other bedding or soft objects (pillows and pillow-like toys, quilts, comforters, sheepskins, and loose bedding) in the crib" and "pacifiers decrease the risk of SIDS."

The number of items the respondent positively agreed with was summed to compute an overall knowledge score. This process created scores with the minimum value of 0 and the maximum value of 12. The overall knowledge scores had an average of 10.2 (SD 2.19). Cronbach's alpha was .777.

The column labeled "agree percent" represents the proportion of respondents who answered that item with an agree or strongly agree response. Questions number 6,7,8, and 9 had lower positive agreement rates of 77%, 66%, 74%, and 56%, respectively. These questions related to whether the infant should sleep in the parents' room or on a separate surface, whether the infant's crib should be placed in the parent's bedroom for at least 6 months but preferably a year, and whether breastfeeding significantly helps to protect infants from death due to SIDS, and pacifiers decrease the risk of SIDS. Otherwise, all the other knowledge items had 90% agreement or higher.

Research question 2: What are CHW's beliefs and attitudes toward AAP safe sleep standards?

Table 6 summarizes the responses to the attitude items, scored on a scale of -2 (strongest disagreement) to 2 (strongest agreement). The average agreement with AAP's recommended

infant sleeping position was 1.236, (on a scale from -2 to 2), meaning strong consensus about the supine position as the best position for putting a baby to sleep. The infant

Table 5

CHWs knowledge of AAP guidelines as measured by average agreement and proportion of the sample who agreed with the guideline.

Recommendation	Mean	SD	Mode	Agreed (%)
Infants should be placed for sleep in a supine position (Back to sleep) until the child reaches 1 year of age	1.63	.939	2	92.31
Side sleeping is not safe and is not advised by AAP guidelines	1.32	1.104	2	85.71
Infants should be placed on a firm sleep surface	1.78	.667	2	94.44
There should be no other bedding or soft objects (pillows and pillow-like toys, quilts, comforters, sheepskins, and loose bedding) in the crib	1.80	686	2	95.60
Infants should not be left to sleep on sofas, armchairs, or in sitting devices	1.80	767	2	95.56
Infants should sleep in the parent's room but on a separate surface	1.27	.767	2	76.92
The infant's crib should be placed in the parents' room for at least 6 months but on a different surface	1.06	1.075	2	65.93
Breastfeeding is significant in helping to protect infants from death due to SIDS	1.16	1.195	2	73.63
Pacifiers decrease the risk of SIDS	.747	1.261	2	56.04
Smoking in the home increases the risk of SIDS	1.67	.844	2	91.21
Bumper pads increase the risk of suffocation during sleep	1.77	.579	2	94.51

Likert scale ranged from -2 to 2, with a score of 1 or 2 indicating agree or strongly agree. Scores were collapsed into groups 1 and 2 or <0, indicating that the respondent disagreed with the statement.

sleep position associated with SIDS had a mean of 1.167, showing agreement between some CHWs. The average policy availability was 1.156, meaning agreement about policies to put infants to sleep. The average for the personal preference factor was -0.41, meaning that some CHWs disagreed with this statement. The average for whether the supervisor determines how an infant should be put to sleep was 0.956, showing consensus on supervision when putting a baby

to sleep. While the average for whether the parent's choice is a determinant was -0.167, meaning that CHWs disagreed with the parent's choice of sleep position as an influencing factor.

Table 6 shows the results of CHW practices related to infant safe sleep. The mean of the clinical experience factor to determine how an infant should be put to sleep is 1.344, showing agreement about how an infant should be put to sleep. The co-workers' factor determining how an infant should be put to sleep was -1.10, showing disagreement between CHWs and their coworkers' practices. The training guidelines determining how an infant should be put to sleep averages 1.61, showing a match between current AAP standards and training guidelines in place.

The average attitude on the nine Likert scale items included agreements and disagreements. CHWs agreed on the following criteria: the current AAP recommendation of supine positioning during sleep for all infants and policies, supervision, clinical experience, and training guidelines, which are important factors in determining how an infant should be put to sleep. On the other hand, there was a lack of consensus on personal preference, parents' choice, and co-workers' choice being important factors in determining how an infant should be put to sleep.

To calculate the attitude toward sleep score, all the responses to the questions were added and divided by the number of the questions. The items were scored as -2 = disagree, -1 = somewhat disagree, zero = neutral, 1= = somewhat agree, 2 = agree. Cronbach's alpha was .452. The overall average of the attitude scale was .642 (SD .492).

Table 6

Attitudes toward safe sleep practices

	Mean	Median	Mode	Std. Deviation
Do you agree with the current AAP recommendation of supine positioning during sleep for all infants	1.23	2	2	1.373
Infant sleep positions are associated with sudden infant death syndrome (SIDS)	1.16	1	1, 2[a]	0.838
Policy is an important factor in determining how an infant should be put to sleep	1.15	1	2	0.993
Personal preference is an important factor in determining how an infant should be put to sleep	-0.41	-1	-2	1.437
Supervisor is an important factor in determining how an infant should be put to sleep	0.95	1	2	1.217
Parent's choice is an important factor in determining how an infant should be put to sleep	-0.17	0	-1	1.384
Clinical experience is an important factor in determining how an infant should be put to sleep	1.34	2	2	0.926
Co-workers are an important factor in determining how an infant should be put to sleep	-1.10	-2	-2	1.180
Training guidelines are an important factor in determining how an infant should be put to sleep	1.61	2	2	0.681

a. **There were two modes for this question.**

Research question 3: What are CHW's professional practices relative to AAP safe sleep standards?

The mean agreement for most of the questions about practices with AAP guidelines was positive to strongly positive. The following questions will explain the average for each question in further detail. The average for the first question (Do you assess the home environment to determine if it meets the safe sleep guidelines) was 1.153. The average for question two (Do you observe how parents are practicing the safe sleep recommendations) was 1.04. The third question (Do you ask parents or caregivers if they are practicing safe sleep) had an average of 1.341. The average for question four (Do you instruct parents on safe sleep practices) was 1.360.

Table 7

CHWs' practices related to AAP safe sleep guidelines

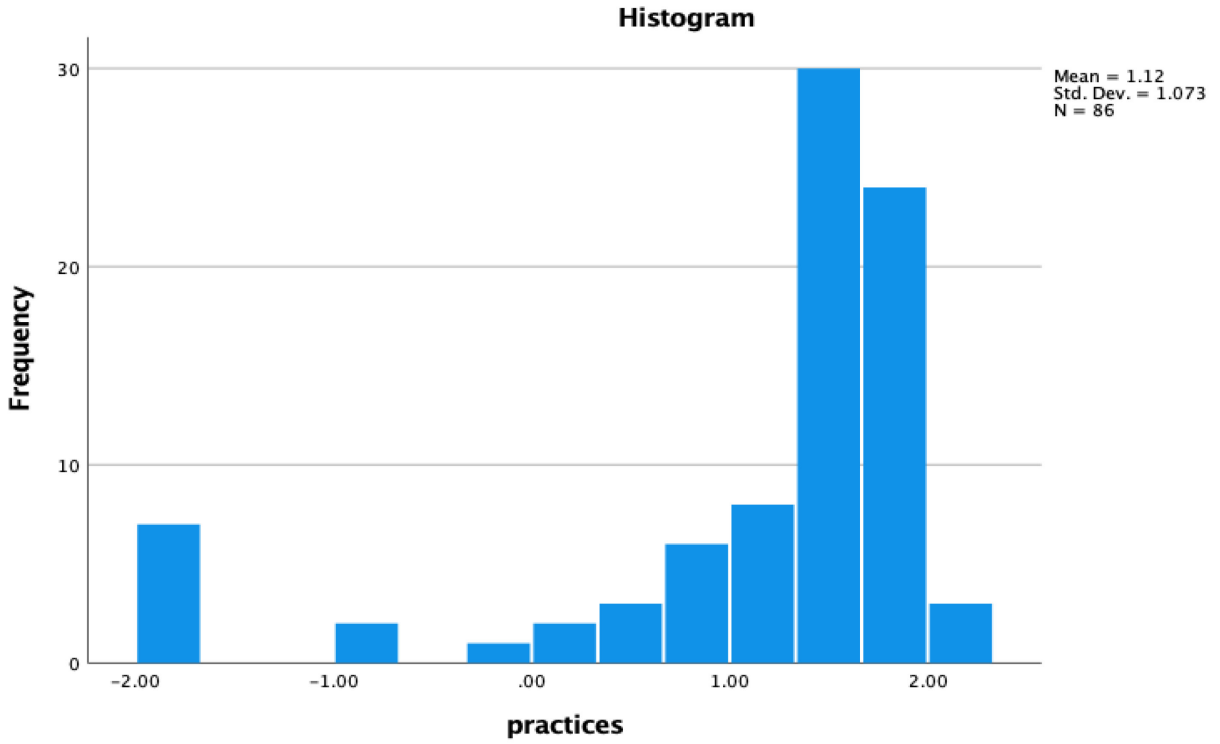
Item	N	Minimum	Maximum	Mean	Std. Deviation
Assess the home environment to determine if it meets the safe sleep guidelines	85	-2.00	2.00	1.15	1.384
Observe how parents are practicing the safe sleep recommendations	85	-2.00	2.00	1.03	1.401
Ask parents or caregivers if they are practicing safe sleep	85	-2.00	2.00	1.34	1.230
Instruct parents on safe sleep practices	86	-2.00	2.00	1.36	1.264
Ask or instruct parents or caregivers about safe sleep	85	-2.00	2.00	1.17	1.265
Demonstrate/show the parent or caregiver how to place the infant in a safe sleeping position	85	-2.00	2.00	.847	1.452
Recommend the supine position to parents as the only positioning during sleeping	86	-2.00	2.00	1.41	1.193
Recommend infants to sleep in the same room as the parents but on a different surface	86	-2.00	2.00	1.01	1.359
Recommend breastfeeding to parents and caregivers	86	-2.00	2.00	1.29	1.206
Teach parents to avoid overheating and head covering	85	-2.00	2.00	1.23	1.333
Follow a script or educational guidelines for safe sleep education	86	-2.00	2.00	1.26	1.305
Encounter families with cultural practices that contradict safe sleep practices	86	-2.00	2.00	1.33	1.111
Address unsafe sleeping practices with parents and caregivers	86	-2.00	2.00	-.244	1.188
	86	-2.00	2.00	1.38	1.248

The average for question five (How often do you ask or instruct parents or caregivers about safe sleep) was 1.177, while question six (Do you demonstrate/show the parent or caregiver how to place the infant in a safe sleeping position) had an average of .847. Also, the average for question seven (Do you recommend the supine position to parents as the only positioning during sleeping) was 1.419, and that for question eight (Do you recommend infants to sleep in the same room as the parents but on a separate surface) was 1.01. The average for question 9 (Do you recommend breastfeeding to parents and caregivers) was 1.29. The average score for question ten (Do you teach parents to avoid overheating?) was 1.24. The average agreement for question 11 (Do you teach the parents to avoid covering the infant's head while the infant sleeps), question 12 (How likely are you to follow a script or educational guidelines for safe sleep education), question 13 (How frequently do you encounter families with cultural practices that contradict safe sleep practice), and question 14 (Do you address unsafe sleeping practices with parents and caregivers), were 1.27, 1.33, -.244, and 1.38, respectively. The negative average for question 13 shows that CHWs rarely encountered families with cultural practices that contradict safe sleep practices.

Overall, the average agreement for practice on the 14 Likert item scale was 1.11 (SD 1.07). The results suggest that CHWs agreed with 13 current AAP guidelines and disagreed with one guideline. Figure 7 below shows the distribution of practice scores of CHWs (n = 86, mean = 1.12, SD =1.73). The distribution is skewed left. Cronbach's alpha for the practice scale was .968.

Figure 7

Histogram showing the distribution of practice scores.



Research question 4: How do CHWs communicate about safe sleep to parents/caregivers during home visits after the delivery of an infant?

Ninety-three percent (93%) of respondents shared safe sleep risk reduction information with parents or caregivers. CHWs were asked when they shared the written materials with the parents. Of the CHWs that responded to the question "When do you provide written materials to the parents with current AAP safe sleep recommendations?" (n= 75), the most common answer of when CHWs advise parents or caregivers about safe sleep was during a visit before birth (84 %) (**Table 8**). The most common answer was during the first visit three days after birth (10.7 %), and the least common was during a visit two months after birth (5.3 %).

Table 8

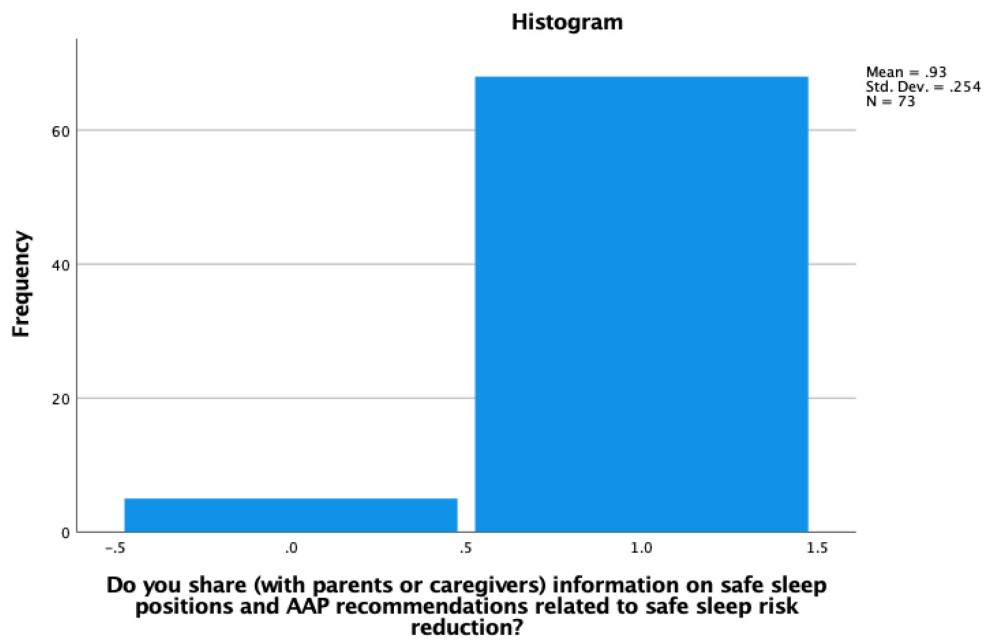
Frequency table for single-choice question "When do you provide written materials to the parents with current AAP safe sleep recommendations?"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Visit before birth	63	62.4	84.0	84.0
	First visit after three days of birth	8	7.9	10.7	94.7
	Two-month visit	4	4.0	5.3	100.0
	Total	75	74.3	100.0	
Missing	System	26	25.7		
Total		101	100.0		

Figure 8 shows the results for the question, "Do you share information on safe sleep practices with parents and caregivers?" CHWs, 73 (93%), agreed they shared information on safe sleep positions and AAP recommendations with parents or caregivers.

Figure 8

Histogram for question 1"Do you share information on safe sleep practices with parents and caregivers?"



Figures 9-15 show responses to the question, “What communication is available from your agency to educate parents and caregivers?” CHWs agreed (n= 75, .97%) that their agency’s brochures and handouts were available to educate parents and caregivers (Figure 9). Also, (n= 73, .71%) CHWs agreed that tutorial videos were available (Figure 10), while (n=73, 47%) of respondents reported that their agencies provided group classes (Figure 11). About (30%) reported that their agency sent email/mass email (Figure 12), while (42%) offered social media through Facebook or Instagram (Figure 13). Twelve percent of CHWs selected "other" as their preferred means of communicating safe sleep guidelines and practices with parents and caregivers (Figure 14). The proportion of CHWs whose agencies provided written materials in language appropriate for parents (translated into different languages) to educate parents and caregivers about safe sleeping was 99% (Figure 15).

Figure 9

Histogram for question 2: “What communication is available from your agency to educate parents and caregivers (brochures, handout)?”

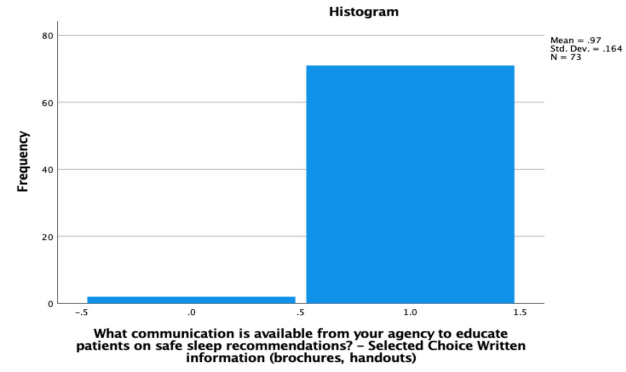


Figure 10

Histogram for question 3: "What communication is available from your agency to educate parents and caregivers (videos)?"

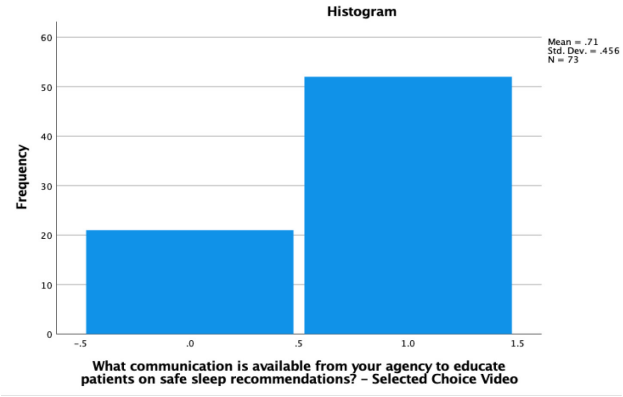


Figure 11

Histogram for question 4: "What communication is available from your agency (Group class)?"

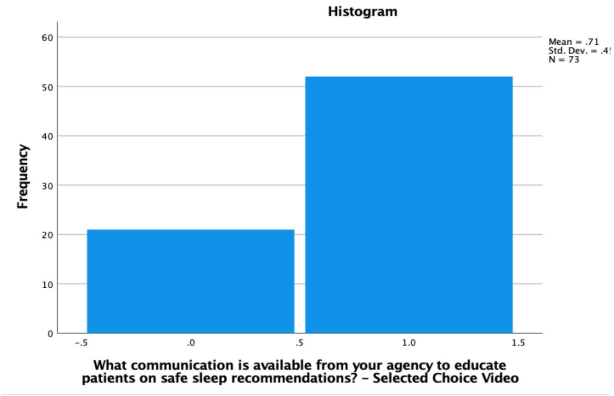


Figure 12

Histogram for question 5: "What communication is available from your agency to educate parents on safe sleep (Email/mass email)?"

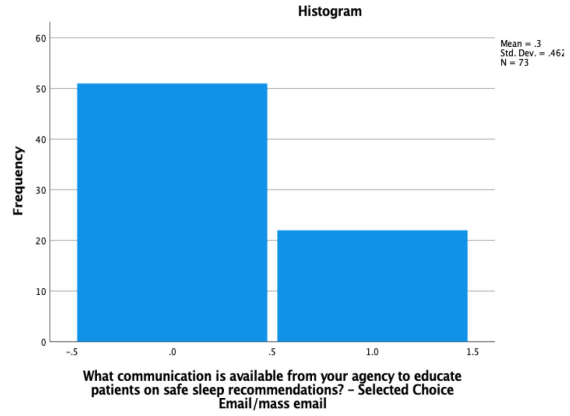


Figure 13

Histogram for question 6, "What communication is available from your agency to educate parents on safe sleep (Facebook, Instagram)?"

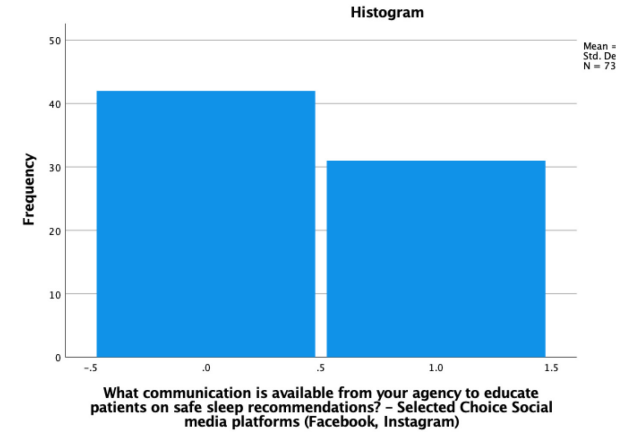


Figure 14

Histogram for question 7, "What communication is available from your agency to educate parents on safe sleep (Other)?"

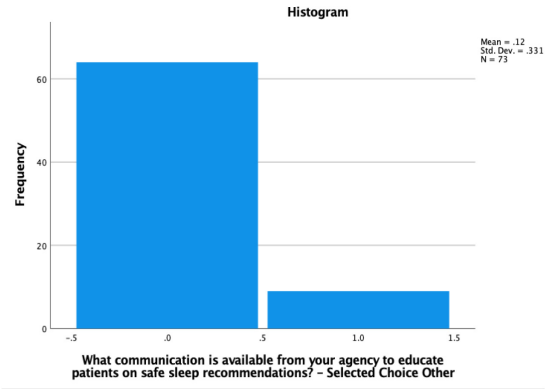


Figure 15

Histogram for question 8: "Are written materials provided and translated to different languages?"

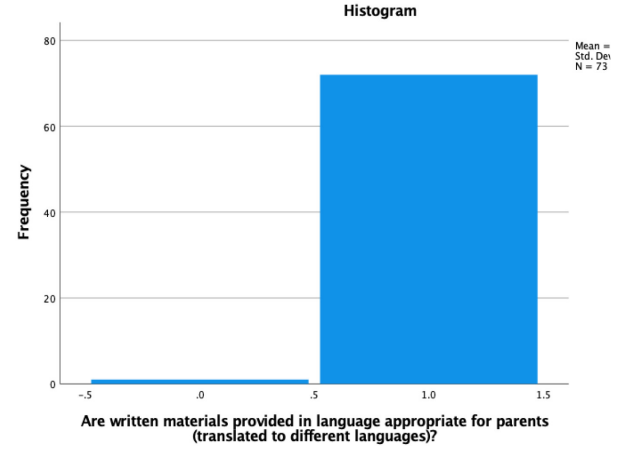


Table 8 shows the write-in responses for the 12% of respondents who selected "other" (Figure 15). Some methods used were billboards, talking or discussing in person, home visits, and community events.

Table 9

Frequency table of write-in responses to communication methods with parents and caregiver's questions.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	91	90.1	90.1	90.1
Billboards, T-shirts, Safe Sleep community events, Mommy Monday events	1	1.0	1.0	91.1
continuing education	1	1.0	1.0	92.1
Does not apply to current role	1	1.0	1.0	93.1
handouts	1	1.0	1.0	94.1
Home visits	1	1.0	1.0	95.0
In-person training	1	1.0	1.0	96.0
Individual classes	1	1.0	1.0	97.0
Ohio website	1	1.0	1.0	98.0
Talking / discussion	1	1.0	1.0	99.0
Traditional media, like billboards	1	1.0	1.0	100.0
Total	101	100.0	100.0	

Table 9 shows the responses to the question "the most preferred communication with parents and caregivers about safe sleep recommendations and practices." The most selected answers were one-on-one conversations (65%) and written information (brochures, handouts) (20%), while the least selected answer was video recommendations (15%).

Table 10

Frequency table of most preferred communication with parents and caregivers about safe sleep recommendations and practices.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Written information (brochures, handouts)	16	15.8	20.0	20.0

One-on-one conversations	52	51.5	65.0	85.0
Recommended videos	12	11.9	15.0	100.0
Total	80	79.2	100.0	
Missing System	21	20.8		
Total	101	100.0		

Table 10 shows the response of CHWs when asked how likely they were to provide additional education to parents with conflicting cultural practices. The most common answer was "very likely "(43%), followed by "always" (38%) and "somewhat likely" (13.9%). "Not likely" and "never" only accounted for 3.8% and 1.3%, respectively.

In conclusion, the most used form of communication were brochures and videos, and the least common were group classes, email, Facebook, Instagram, and other sources. In addition, in-person communication with parents before birth was the most preferred means of communication.

Table 11

Provide additional education to parents with conflicting cultural practices.

	Frequency	Percent	Valid Percent	Cumulative Percent
Never	1	1.0	1.3	1.3
Not likely	3	3.0	3.8	5.1
Somewhat likely	11	10.9	13.9	19.0
Very likely	34	33.7	43.0	62.0
Always	30	29.7	38.0	100.0
Total	79	78.2	100.0	
Missing System	22	21.8		
Total	101	100.0		

Research question 5: Do CHWs KAP scores and Communication differ based on the demographic characteristics of CHWs?

Age group

One-way ANOVA was used to determine statistically significant differences between the means for knowledge, attitude, and practices across the independent variables, age group, education, race, county type, and years of experience. The one-way ANOVA was performed because the variables have more than two categories. The average *knowledge* score by age group was 9.80, 10.22, 11.4, 9.84, and 9.23 for 20-29, 30-39, 40-49, 50-59, and Over 60, respectively (Table 12). The null hypothesis for one-way ANOVA is that there is no difference between the means. The null hypothesis was not rejected because the P-value was larger than .05. Therefore, there is no statistically significant difference in knowledge scores across the age groups. The average value of the *attitudes* by age group was (.688, .722, .592, .615, .620), so the means were roughly similar across the age group. The null hypothesis was also not rejected since the P-value was larger than .05. The average values for the *practices* by age group were different (-.057, .959, 1.612, .977, 1.30), and the null hypothesis was rejected because the P-value was less than .05.

Table 12

Knowledge, Attitude, and Practices of CHWs by age, education, Race, County type, and work experiences

	Knowledge Mean (SD)	Attitudes Mean (SD)	Practices Mean (SD)
Age group	F (4, 82) = 1.609, p=.180	F (4, 81) =.221, p=.926	F (4, 77) = 2.966, p=.025
20-29	9.80 (2.38)	.688 (.182)	-.057 (1.78)
30-39	10.22 (2.79)	.722 (.494)	.959 (1.30)
40-49	11.04 (1.24)	.592 (.593)	1.61 (.295)
50-59	9.84 (1.78)	.615 (.364)	.977 (.982)
Over 60	9.23 (2.86)	.620 (.688)	1.30 (1.079)
Education	F (5,85) = .828, p=.533	F (5,84) =.809, p .546	F (5,80) = 1.666, P=.152
High school or less	10.0 (2.0)	.703 (.559)	.904 (1.655)
Some college no degree	10.5 (1.87)	.608 (.5001)	.842 (1.519)
Associate degree in college (2 -year)	10.5 (1.92)	.802 (.518)	.261 (.8777)
Bachelor's degree in college (4 year)	10.09 (2.12)	.534 (.4717)	.8777(1.250)
Master's degree	9.23 (3.21)	.752 (.5115)	1.12 (1.190).7778
Doctoral degree	9.0 (1.41)	.777 (.314)	-.321 (2.373)
Employment experience	F (1, 87) =.088, p=.768	F (1,86) =.136, p= .713	F (1,82) =1.187, p=.279
Less than 5 years	10.23 (2.076)	.659 (.412)	.984 (1.167)
Greater than or equal to than 5 years	10.09 (2.34)	.580 (.640)	1.10 (1.084)
Race	F (3,86) = 0.534, p=.660	F (3,85) = 0.083, p=.969	F (3,81) = 4.135, p= .009
White	9.78 (2.44)	.642 (.423)	.623 (1.39)
African American	10.3 (2.17)	.630 (.537)	1.40 (.798)
Other	11.00 (1.00)	.754 (.333)	.523 (.352)
More than one race	10.40 (1.51)	.577 (.605)	1.54 (.321)
County Type	F (2, 79) =0.614, p=.544	F (2, 78) =0.233, P= .793	F (2, 75) =3.93 P= .024
Apalachin or rural	9.89 (2.71)	0.716 (.360)	.151 (1.50)
Partially rural	10. 77 (2.17)	0.615 (.571)	1.47 (.386)
Urban	10.03 (2.24)	0.592 (.512)	1.16 (1.098)

Education Level

The average value of *knowledge* scores by education level of CHWs with a bachelor's was the same as that of CHWs with an associate or master's degree. The null hypothesis was not rejected because the P-value is more than .05 (Table 12) For the average *attitude* scores by education level, there was no difference between the means. So, the null hypothesis was not rejected because the P-value is more than .05. The average *practice* scores were not significantly different concerning education. The null hypothesis was not rejected because the p-value was more than .05.

Employment experience

The *knowledge* by experience was not significantly different on average (p=.768) (Table 12). Also, the attitude and the practice scores followed a similar pattern and did not show a significant difference between the average work experience.

Race

The knowledge scores by race were not significantly different on average (p=.660) (Table 12). Moreover, the average attitude scores were not significantly different (p=.969). The ANOVA results for practice scores by race were significant (p=.009). Individuals who were Black or more than one race had slightly higher average practice scores (1.40 and 1.54) than individuals who were White or who answered the "Other race" category (.62 and .52).

County Type

The knowledge scores by county type were not significantly different on average (p= .544) (Table 12). Moreover, the average attitude scores were not significantly different (p=.793). The ANOVA results for county-level practice scores were significant (p=.024). The mean for the

Appalachian or rural group (M = .15, SD =1.502) was lower than the means of the partially rural (M = 1.47, SD =.386) and urban (M = 1.16, SD = 1.099) groups.

Research question 6: What factors influence the KAP scores for safe sleep among CHWs?

Dependent Variable: knowledge

The table of Coefficients (Table 13) shows that the B for education college degree (2-4 years) was -.009, (SE .286), and this means that this was not significant because the p-value is greater than .05. While the education graduate degree was -.681 (SE .431), and it also was not significant. The county type 2 Urban has a coefficient of 1.182 and was significant (P=.013). The CHWs from urban counties tend to have 1.182 units higher in *knowledge* scale than those from Rural counties. The partially rural was 1.481 (SE .540), which was significant (p=.008). Neither work experience nor age in years was significant. Overall, the model fit was poor (adjusted R-square = .053).

Dependent Variable: Attitude

Table 14 of the Coefficients shows that the B value for education college degree (2-4 years) was -.031 (SE .136), meaning that this is not significant because the P-value was greater than .05.

Table 13

Factors that influence knowledge of AAP safe sleep guidelines among CHWs

	Unstandardized Coefficients		
Model	B	Std. Error	Sig.
1(Constant)	-.270	.699	.700
education=College degree (2-year or 4-year)	-.009	.286	.976
education=Graduate degree	-.681	.431	.119
county_type2=Partially rural	1.481	.540	.008*
county_type2=Urban	1.182	.462	.013*
Work experience = 5 years or more	.219	.289	.451
What is your age in years?	.000	.011	.989

*p<.05

Meanwhile, the education graduate degree was .131 (SE .194), which was also insignificant. The county type 2 Urban had a -.062 coefficient (S E .248). The CHWs from urban counties tend to be .062 units lower on the *attitude* scale than people from rural counties, on average. Moreover, for work experience, .011 SD (.136) was non-significant, and for the age in years, it was -.005 SD (.006), which is insignificant. Overall, the model fit was poor (adjusted R-square = 0.007).

Dependent Variable: practices

The table of Coefficients (Table 15) shows that the B for education college degree (2-4 years) was -.205 (SE = .583), and this means that it is not significant because the P-value was greater than .05. While the education graduate degree was-1.208 (SE = .833), and it also was not significant. The county type 2 Urban had a coefficient of .220 (SE = .902). The CHWs from urban counties tend to score .220 units higher on average in *practice scale than those from rural counti*es. Moreover, for work experience B = .034, (SE = .573) was non-significant, and for the age, B = -.042 (SE = .023), was not significant. Overall, the model fit was poor (adjusted R-square = .078).

Table 14

Factors that influence attitude toward AAP safe sleep guidelines among CHWs

	Unstandardized Coefficients		
Model	β	Std. Error	Sig.
1(Constant)	.926	.322	.005*
Education=College degree (2-year or 4-year)	-.031	.136	.821
Education=Graduate degree	.131	.194	.502
County_type2=Partially rural	-.062	.248	.804
County_type2=Urban	-.122	.211	.564
Work experience	.011	.136	.938
What is your age in years?	-.005	.006	.368

*p<.05

Table 15

Factors that influence safe sleep practices among CHWs

Model	β	Std. Error	Sig.
1(Constant)	12.012	1.375	<.001*
education=College degree (2-year or 4-year)	-.205	.583	.727
education=Graduate degree	-1.208	.833	.152
county_type2=Partially rural	.865	1.060	.417
county_type2=Urban	.220	.902	.808
Work experience	.034	.573	.953
What is your age in years?	-.042	.023	.077

*p<.05

Correlation

Pearson correlation coefficients were computed to determine the relationship between knowledge, attitude, and practices. Firstly, the result indicates a non-significant positive relationship between knowledge and attitude [r (88) = .095, P = .375]. In addition, there was also a non-significant positive relationship between the attitude and practices, [r (84) = .038, P = .728]. In contrast, there was a significant positive relationship between knowledge and practices [r (84) = .512, p <.001]. To sum up, the correlation between knowledge and practices was the only one with a significant correlation.

Table 16

Pearson correlations matrix for knowledge, attitude, and practice

Variable		1	2
1.	Knowledge		
2.	Attitude	.095	
3.	Practices	.512**	.038

**. Correlation is significant at the 0.01 level (2-tailed).

Summary

The study aimed to understand better CHWs' awareness of AAP safe sleep guidelines and how they communicate the recommendations to parents and caregivers. Specifically, this study aims to determine the knowledge, attitude, and practice of CHWs toward safe sleep practices in a home environment. Ninety-four CHWs responded to the questionnaire, including 91 women (90%) and only 3 men (2.9%). The average age of the respondents was 46.5 (SD = 11.93) years. Most respondents, 26 (26%), were between ages 50 and 59, while those aged 20 to 29 were only 6 (6%). Moreover, the demographic breakdown of the respondents included 55 Black or African American (57.9%), 38 White (40%), and only one Asian 1 (1.1%). The number of respondents

with a bachelor's degree was 35 (34.7%), while the number of respondents with PhD or doctorate degrees was 2 (2%).

The training guidelines determining how an infant should be put to sleep averages 1.611, showing a match between current AAP standards and training guidelines in place.

Overall, there were fair to good levels of knowledge (10.14, SD = 2.19), attitudes (.642, SD = .491), and practices (1.11 SD = 1.07) in the sample.

There were two items of knowledge with less than 70% agreement, which is notable because most of the knowledge items had 90% agreement or higher. These were the items about whether the infant's crib should be placed in the parent's bedroom and whether pacifiers increase the risk of SIDS.

The one-way ANOVA result found no significant differences between knowledge or attitude, concerning age, education, race, and years of experience. The only significant difference was practices by age, race, and county type. The regression result found no significant relationships between the sociodemographic factors and knowledge or attitudes. Since education and employment showed no difference, but rather demographic characteristics. We need to provide more standardized training to all CHWs despite the county type. Also, offer cultural and diversity training to address race disparities. This training should be done regularly to keep their practices aligned with current standards.

In the regression for practices, the county type (urban and partially rural) was the only significant predictor. The study findings will be discussed in Chapter 5, including limitations, generalizability of the results, and recommendations for practice and further research.

Chapter 5

Discussion, Conclusions, and Recommendations

Introduction

This chapter discusses the outcome of the CHWs' awareness of AAP safe sleep guidelines, how they communicate with parents and caregivers, and the knowledge, attitude, and practice of CHWs toward safe sleep practices in a home environment. This chapter starts by briefly summarizing the study's results concerning the six major research questions, then discusses the strengths and limitations of the study, the implications of the study, and concludes with the practice recommendations.

RQs This dissertation examined the following research questions:

RQ1- What is the level of knowledge of CHWs relative to AAP safe sleep standards?

RQ2- What are CHW's beliefs and attitudes toward AAP safe sleep standards?

RQ3- What are CHW's professional practices relative to AAP safe sleep standards?

RQ4- How do CHWs communicate about safe sleep to parents/caregivers during home visits after the delivery of an infant?

RQ5- Do CHWs KAP scores and Communication differ based on the demographic characteristics of CHWs?

RQ6- What factors influence the KAP scores for safe sleep among CHWs?

Summary of Results

The analysis found that there were fair to good levels of knowledge (M= 10.14, SD= 2.19), attitudes (M= .642, SD .491), and practices (M= 1.11 SD= 1.07) in the sample (RQ1, RQ2, RQ3). When comparing differences in means between these variables and the independent variables age group, education, county type, and years of experience, the one-way ANOVA

result found that the only significant difference was practices by age, race, and county type (RQ5). Otherwise, there were no significant differences between knowledge or attitude, concerning age, education, race, county type, and years of experience (RQ5). The regression results found no significant relationships between the sociodemographic factors and knowledge or attitudes (RQ6). However, the county type (urban and partially rural) was the only significant predictor for practices, but overall, the model fit was poor (adjusted R-square .078) (RQ6). In-person communication with parents before birth was the most common communication method used by CHWs (RQ4). Brochures and videos were also commonly used, while group classes, Email, Facebook, and Instagram were the least used communication methods. (RQ4).

The attitudes about the training guidelines, which determine how an infant should be put to sleep, averaged 1.611 (on a scale from -2 to 2), showing relatively good agreement between the CHWs who responded and the current AAP standards. Seventy-five (74.3%) were aware of AAP safe sleep guidelines, while 10 (9.9%) were unaware. In a study that assessed awareness of AAP guidelines among Neonatal Intensive Care Unit (NICU) nurses, 50% reported being aware of the guidelines and agreed that the guidelines can help reduce the number of infants who die (Barsman et al., 2015). However, only 20% of the nurses believed that the parents followed the AAP guidelines when they left the hospital and went home. Moreover, around 30% of the nurses stated they always provided parents with verbal information, only 16% reported consistently providing parents with written information, and approximately 20% reported not providing SIDS education to parents (Barsman et al., 2015).

In the present study, of the CHWs who were aware of the AAP guidelines, the most common sources of information were the health departments (n=52, 69.3%), continuing education units (CEDs) (n=34, 45.3%), and nursing school (n=2, 2.7%). The most common

organizations providing safe sleep training were the Department of Health (n=41, 40.6%), non-profit organizations (n=16, 15.8%), and hospital systems (=5, 5%). These findings are important since, to my knowledge, no studies have assessed the source of safe sleep training among nurses or CHWs. Since many infants have died from unsafe sleep environments, CHWs, parents, and caregivers should know how to protect them. A study like this can show people who need training where to go.

Knowledge

For RQ 1, "What is the level of knowledge of CHWs relative to AAP safe sleep standards?"

Overall agreement with AAP recommendations on knowledge questions was mostly favorable to extremely positive. The responses to two questions were "There should be no other bedding or soft objects (pillows and pillow-like toys, quilts, comforters, sheepskins, and loose bedding) in the crib" and "infants should not be left to sleep on sofas, armchairs or sitting devices" had the strongest average agreement (1.80, SD .77). The question on whether infants should be placed in a supine position until age one also had relatively strong agreement of (1.63, SD 0.94) and 92% of the CHWs agreed with the statement. Compared to Grazel et al. (2010), in a NICU study, 56% of nurses could not correctly identify the supine-only position for sleep as a recommendation, while 26.5% of participants identified supine or side positions for sleep as a risk-reduction strategy for SIDS. In the same study, 90% and 88% of nurses reported the firm sleep surface and avoiding exposure to smoke as interventions to reduce the risk of SIDS. According to Newberry (2018), most nurses lack education regarding safe infant sleep. The study shows that 26.5% of the nurses stated that supine or side sleeping was acceptable, and 27% of nurses identified using home monitors as a SIDS risk reduction strategy. The nurses were afraid of aspiration regarding

infant sleep and stated that the side position was more comfortable and safer for infants. Meanwhile, the responses of CHWs in this study for the firm sleep surface, as a recommendation, was 94%, and the response for smoking exposure was 91%.

Furthermore, while 96% of CHWs said there should not be any bedding or soft objects in the crib, 10% of nurses from the NICU study admitted to occasionally putting soft toys in the cribs. So, the CHWs seem to be more aware of AAP recommendations than the NICU nurses from Grazel et al., conducted in 2010. The lowest average agreement in this study was for "The baby's crib should be in the parents' room for at least 6 months, but on a different surface" (mean = 1.06, SD = 1.08) and "Pacifiers decrease the risk of SIDS" (mean =.75, SD 1.26).

When looking at the proportion of respondents that selected "somewhat agree" or "strongly agree" to the study items, five had less than 90% of CHWs in agreement. These questions were related to whether side sleeping was not safe and not advised by AAP guidelines (85.7%), the infant should sleep in the parents' room or on a separate surface (76.9%), the infant's crib should be placed in the parent's bedroom for at least 6 months but preferably a year (65.9%), breastfeeding significantly helps to protect infants from death due to SIDS (73.6%), and pacifiers decrease the risk of SIDS (56%). The average knowledge score was 10.15 (SD 2.198) out of 12, corresponding to a grade of 84.5%. According to Linneman (2016), there is a knowledge gap between nurses' awareness of safe sleep recommendations and applying the recommendations in the health care setting.

Attitude

The results for research question 2, "What are CHW's beliefs and attitudes toward AAP safe sleep standards?" showed the highest average agreement with training guidelines compared to knowledge and practices, suggesting that attitude (mean = 1.61, SD 0.68) is an important

factor to consider when making decisions about infant safe sleep. However, there was a weaker positive agreement about the importance of CHW supervisors' opinions (mean = 0.96, SD 1.21). On the other hand, there was a lack of consensus or even strong disagreement about the importance of personal preference (mean = -0.41, SD 1.44), parent's choice (mean = -0.167, SD 1.38), and the influence of co-workers (mean = -1.1, SD 1.18).

According to similar studies, the factors that influence decisions related to infant safe sleep include parents' and caregivers' background, culture, and advice, which can play a significant role in their safe sleep practice and decision-making processes (Chesser et al., 2019; Pease et al., 2021). A study by Chesser et al. (2019) concluded that parents and caregivers were likelier to adhere to advice from a female friend or relative. Similarly, Pease et al. (2021) drew and supported the same conclusion. Parents and caregivers tend to trust and follow safe sleep guidelines more cautiously when the advice is received from a trusted relative or a friend. However, there was an added factor when the advice received from healthcare providers or CHWs conflicted with the parents' and caregivers' preexisting beliefs or the advice of their trusted family member. Regardless of the source of information, to ensure adherence to safe sleep practice, CHWs should provide regular follow-up visits to implement further strategies discussed in previous visitations. Follow-up visitations were a critical factor in influencing behavioral and attitude change toward safe sleep practice, reducing the risk of SIDS (Sidebotham et al., 2018). The CHWs should follow up with parents to ensure they understand the guidelines and can effectively interpret and practice the strategies. Knowledge about reducing the risks in the infant sleep environment may not always be enough to influence behavior and change attitudes toward safe sleep practices. However, reinforced advice from multiple healthcare

personnel (doctors and nurses), including CHW follow-up after the parents leave the hospital, can potentially be an important factor in improving safe sleep practice.

Practices

Research question 3, "What are CHW's professional practices relative to AAP safe sleep standards?" The mean agreement for most of the questions about practices with AAP recommendations was positive to strongly positive. CHWs indicated they were likely to recommend a supine position for sleep but were not as likely to demonstrate how to put the infant in a safe sleep position: the responses to the question "Do you recommend the supine position to parents as the only positioning during sleeping?" had the most agreement response (mean = 1.419, SD 1.193), while the least agreement was connected to the questions "Do you demonstrate/show the parent or caregiver how to place the infant in a safe sleeping position?", (mean = .847, SD 1.452), and "Do you address unsafe sleeping practices with parents and caregivers?" (mean = -.24, SD 1.188). Overall, the average agreement for practice from the 14 Likert items scale was 1.116 (SD 1.07). Most of the responses were in agreement about the current AAP recommendations, with one disagreement about CHWs encountering families with cultural practices that contradict safe sleep practices. The CHWs are willing to advise parents and caregivers about safe sleep but may feel reticent to confront parents/caregivers when they observe potentially unsafe sleep practices. Grazel, Gibbons Phalen, & Polomano (2010) found that about 73% of surveyed nurses offered verbal SIDS education to parents (Grazel, Gibbons Phalen, & Polomano, 2010). In the current study, 65% of CHWs offered verbal communication to educate parents about safe sleep. Bartlow, Cartwright, and Shefferly (2016) asked nurses about their knowledge of AAP guidelines and observed their practices in a hospital setting.

Nurses acknowledged knowing AAP guidelines and 95% of the nurses accurately identified supine sleeping and suggested the preferred position.

However, when the nurse's behaviors were observed in the hospital setting, around 34% of the infants were not safely positioned, and 59% of crib surroundings failed to fulfill the environmental criteria. With supine sleep positioning, nurses reported poor sleep and decreased infant safety. The Bartlow et al. (2016) study exclusively observed the practices of nurses in a hospital setting. It did not include observations of nurse/parent education or home visits. In the current study, no direct observation of CHW practices took place. In the current study, 74% of the CHWs knew of the AAP's safe sleep recommendations.

Communication

Research question 4, "How do CHWs communicate about safe sleep to parents/caregivers during home visits after the delivery of an infant?" Ninety-three percent (93%) of CHW respondents indicated sharing information about safe sleep risk reduction with parents or caregivers. When nurses in another study were asked this question, 72% of nurses reported communicating with mothers about safe sleep (Colson et al., 2006). The brochures and videos were more commonly used, and the least common communication methods were Group classes, Email, Facebook, Instagram, and other sources. In addition, in-person communication with parents before birth was the most common. Prior studies have found pre-visits to be an effective way to increase positive outcomes for mothers and infants. A study by Rotheram-Borus et al. (2014) found that more home visits by CHWs were positively associated with infant physical health birth metrics. According to Kawaya 2023, home visit programs were effective in preventing preterm birth for high-risk pregnant women. Local health departments and CHWs should follow up and focus on home visits after birth at least more than two times to teach

parents and caregivers about safe sleep practices. Currently, CHWs typically conduct three visits to a mother: one visit before giving birth, two visits after birth, three days after, and two visits at two months (Tripathi et al., 2016). The number and timing of the visits are a concern since the last visit occurs before the high-risk window for SIDS. According to Shapiro-Mendoza, 2006, SIDS occurs most commonly in infants two to four months of age and rarely after eight months of age. Hence, it is critical to have more visits two months after birth to reinforce the safe sleep messaging during this period.

Additionally, the first visit to mothers before birth may not be effective in delivering the messages since mothers might be experiencing burden and fatigue from pregnancy and may not focus on preparing a safe sleep environment. After giving birth, the mother may also forget what the CHWs taught her about safe sleep. Moreover, CHWs should conduct additional follow-up visits after birth, especially two months after, to remind the mother about safe sleep practices. A study by (Kawaya, 2023) described a healthcare project in Egypt, which recommended four home visits: within 24 hours of delivery, on day four after birth, on day seven after birth, and another visit on day forty to make sure the mother and infant are well. In this study, of the CHWs who reported working with the pregnant women population (n =75), 63% stated they visited the mothers before birth, 8% after three days, and 4% after two months.

KAP by the demographic characteristics of CHWs

For research question 5, ‘‘Do CHWs KAP scores and Communication scores differ based on their demographic characteristics?” The one-way ANOVA was used to determine whether there are any statistically significant differences between the means of three dependent variables, knowledge, attitude, and practice, and independent variables, age group, education, race, county type, and years of experience. Overall, there were fair to good levels of knowledge (M= .14, SD=

2.19), attitudes (M= .642, SD= .491), and practices (M= 1.11 SD= 1.07) in the sample. For the age group, the one-way ANOVA result found a significant difference for practices, but not for knowledge or attitude. Additionally, there were no significant differences in knowledge, attitude, or practices concerning education and years of experience. The knowledge and attitude were not significantly different on average by race, but practices were statistically significantly different by race. Individuals who were Black or more than one race had slightly higher average practice scores than White or who answered the "other race" category. Racial differences in caregiving can lead to disparities in SIDS. The current study shows Black CHWs and those who are of more than one race, had better practice than the White and Other counterparts. This is an interesting finding because it contradicts the previous research. Although Black CHWs and those from more than one race had higher average practice scores than white CHWs, it doesn't always mean that they only work with black caregivers or parents. They can work with other minority groups. They have the practice, but the finding of the current study showed that they were slightly less likely to demonstrate safe sleep placement or observe parents safe sleep practices. This means they personally do it or recommend it but don't show how to do it. Finally, Infant mortality is high in minority groups especially African Americans because of several other social determinants of health that need to be addressed. This study only focuses on one, which is providing education about infant safe sleep practices. A non-Hispanic Black mother of fewer than 25 years of age with 12 years or less education has a higher likelihood of placing a baby on their side or stomach to sleep (CDC, 2019). According to Mathews (2013), more than 80% of Hispanic mothers placed their infant supine (on the back) for sleep, compared with about 60% of Black mothers. Although Black infants were significantly more likely to bed share with a parent, Hispanic infants were significantly more likely to share with one or more adults (Mathews,

2013). Black infants were more likely to be exposed to smoke, and Black mothers were significantly more knowledgeable about SIDS than Hispanic mothers (Mathews, 2013).

Factors that influence KAP toward safe sleep

For research question 6, ‘‘What are the factors that influence the KAP scores for safe sleep among CHWs?’’ The regression results found no significant relationships between the sociodemographic factors and knowledge or attitude scores. In the regression results for practice scores, the county type (urban and partially rural) was the only significant predictor, but overall, the model fit was poor (adjusted R-square .078). According to Bryan et al. 2022, other factors associated with safe sleep practices include parental age under 25, parental race and ethnicity, parent education, first-time parents, homes with smoke exposure, and infants born <37 weeks. Religion, employment, marital status, income levels, and migration background also play a part (Bryan et al., 2022). Sociodemographic characteristics of CHWs appear to have less relationship to safe sleep practices than parents' sociodemographic.

Interpretation of the Findings

According to the results of this study, three items had lower than average agreement: "The infant's crib should be placed in the parent's room for at least 6 months but on a different surface" (66%), "pacifiers decrease and prevent the risk of SIDS" (56%), "breastfeeding significantly helps to protect infants from death due to SIDS" (74%). Therefore, this information is less well-known among CHWs. Moon et al. (2022) stated that the AAP guidelines were revised in 2022. All three items with low agreement observed in this study were already in the AAP guidelines in 2016. The three items with low agreement were not newly introduced during this study. Thus, the training for CHWs involved with supporting parents and infants should focus more on these three items to teach parents and caregivers that the infant's crib should be

placed in the parent's room for at least the first 6 months (room sharing, not bed sharing) and a pacifier should be used to protects infants from SIDS. Note that the AAP guidelines about when to start pacifier use were updated in 2022 after this study's data collection began: "For breastfed infants, delay pacifier introduction until breastfeeding is firmly established" (Moon et al., 2022).

Moreover, CHWs should know more about how breastfeeding is linked to a reduction in the rate of SIDS and infant mortality. In 2022, the AAP updated the breastfeeding for infant guidelines to extend the duration from six months to one year or more if mutually agreeable to the parent and infant (Moon et al., 2022). Additionally, the AAP guidelines regarding crib placement were updated to be more culturally inclusive, stating, "It is recommended that infants sleep in the parents' room, close to the parent's bed, but on a separate surface designed for infants, ideally for at least the first 6 months" (Moon et al., 2022).

The CHWs responded that 75 (74.3%) reported being aware of AAP guidelines for safe sleep. CHWs who support parents and infants need to be more aware of AAP guidelines and more training about safe sleep practices to teach parents and caregivers. On the other hand, nurses reported being aware of AAP guidelines. About 95% of the nurses correctly identified the supine sleeping position as recommended, but some still used the side and prone position to place the infant. Additionally, upon observing the nurse's practices, about 34% of the babies were not correctly positioned according to guidelines (Bartlow, Cartwright, and Shefferly, 2016). The health organizations and entities responsible for training nurses and CHWs on infant and safe sleep knowledge and practices vary in content, which may not always provide comprehensive information. The results show that the sources of information were the health department, 52 (69.3%), continuing education units (CEUs), 34 (45.3%), and nursing school, 2 (2.7%). Therefore, the Department of Health should provide more content about safe sleep

practices to ensure that safe sleep messaging is emphasized in their training so more CHWs can be informed.

Approximately 93% of respondents indicated sharing information about safe sleep risk reduction with parents or caregivers. The most common responses of what time the CHWs shared information were before birth (62.4%), the first visit after three days of birth (7.9%), and the least common answer was after a two-month visit (4%). Programs employing CHWs should consider adding visits after three days of birth and after two months because an unsafe sleep environment after birth can lead to SIDS and sleep-related infant death. The CHWs preferred to communicate with parents about safe sleep guidelines and practices using one-on-one conversations, with a mean of 52 (51.5%), while the written information was less preferred with a frequency of 16 (15.8%), and recommended videos were 12 (11.9%).

There are several opportunities for growth in patient – CHW communication. The methods of group classes, email, Facebook, Instagram, and other sources were infrequently used to communicate with parents and caregivers. In addition, CHWs were most likely to share information with parents and caregivers before birth, but post-birth follow-ups are also opportunities to share (or re-share) information about safe sleep.

The types of organizations that provided safe sleep training to CHWs were city or county health departments (n= 41,40.6%), federally qualified health centers (n= 27, 26.7%), nonprofit organizations (n= 5, 5%), community-based organizations (n= 4,4%), the city or county child and family services departments (n= 2, 2%), and college or university hospital systems (n= 2, 2%). These organizations that deliver safe sleep training must always provide the most up-to-date education for CHWs with AAP guidelines. Their role in preventing SIDS and reducing the infant mortality rate can focus on educating the people who distribute the information to the

parents and caregivers. When planning outreach to CHWs, this information can help guide strategies to share and distribute messages quickly.

Limitations of the Study

The first limitation of this study is the sample size since the response rate was low. The questionnaire was sent to 901 CHWs, but only 109 (12.1%) of CHWs agreed to complete it. Similar questionnaires sent to nurses have had response rates of 39% (Bryan et al., 2022). To increase response, several reminders were sent to the CHWs directly and through their directors (n= 7), who agreed to help disseminate the questionnaire. Sending reminders for electronic surveys has increased participation levels with online surveys (Aerny- Perretten, Dominguez-Berjon, Esteban-Vasallo, & Garcia-Riolobos, 2015).

Additionally, an incentive was offered; this is a known way of increasing participation (Magro, Prybutok, and Ryan, 2014). Despite the modest sample, a higher proportion of respondents were women (90%) and of African American origin (57%), which is representative of the CHWs in Ohio, of whom 94% are female and about 46% are Black Americans (Whalen Smith et al., 2018). According to Jia Wu et al. 2022, sending an online survey to more participants did not generate a higher response rate. On the other hand, sending surveys to chosen specific participants positively impacts the online survey response rate. Moreover, the use of incentives had no meaningful effect on the response rate of online surveys. Other factors influencing the rates included a project's financial status and the participants' age and employment (Jia Wu et al 2022). Krieger et al., 2023 stated that after the COVID-19 epidemic, national and state survey response rates in the United States changed. American Community Survey household response rates decreased from 86% in 2019 to 71.2% in 2020, and the US

National Health Interview Survey response rates fell from 60% to 42.7%. Lower education and lower income had the greatest decreases in response rates (Krieger et al., 2023).

The second limitation was the self-selection bias, which can emerge when survey respondents' participation in a research study is voluntary (Nikolopoulou, 2023). Self-selection bias can impact the validity and reliability of study outcomes and lead to a misunderstanding of data (Smith, Noble, 2014). It can also affect the generalizability of the results of the study. In this study, not only did CHWs have to opt into the questionnaire, healthcare managers who agreed to forward the questionnaire to CHWs in their organizations, also contributed to self-selection bias. Therefore, the findings might not be generalizable to all Ohio CHWs and not necessarily to CHWs outside Ohio. Additionally, licensed CHWs were slightly over-represented (89.1%), which is higher than licensed CHWs in the State of Ohio (70%) (Ohio Department of Health, 2018). Since the licensure is self-reported, verification of CHW status is a challenge.

The third limitation was Cronbach's alpha of some scales. Cronbach's alpha assesses the reliability, or internal consistency, of a set of scale or test items. According to Taber (2018), the acceptable *reliability* for each scale should be (alpha = 0.70 or above) (Keith Taber, 2018). The Cronbach's alpha for the scale of attitudes was .45, which is lower than 0.70. This means that the attitude scale had unacceptably low internal consistency. A low internal consistency value can result from items that lack correlation to each other or can be a sign that more than one dimension or construct is present (Tavakol et al., 2011).

Despite the limitations, this is the first study to investigate the knowledge, attitude, and practices of safe sleep guidelines among CHWs and their role in this issue. Also, this study fills this gap by providing baseline KAP among CHWs. No literature has previously addressed this topic. This study can inform training practices as it outlines the gaps of knowledge and attitude

gaps and further helps enact new policies to inform CHWs who work and support parents or caregivers about safe sleep practices. This study also provided evidence for longer follow-up by CHWs when working with new mothers. According to Patricia et al. (2021), nurses may not follow guidelines because they lack trust in the AAP. Repeated revisions to the AAP guidelines, lack of resources and support, and lack of hospital policies and procedures cause confusion. The most recent policy was in 2016, “NYS passed a new law requiring that hospitals and birth centers provide maternity patients with a video or brochure that contains the AAP recommendations "relating to safe sleep, including sleep space, sleep position, and discussion on how to reduce the risk of infant deaths through safe sleep practices” (Patricia et al., 2021).

Conclusion

In conclusion, CHWs need additional training to help teach parents and caregivers about safe sleep. This training is required to ensure that CHWs are aware of AAP guidelines to protect the infant from sleep-related infant death. The results indicate that the CHWs still need more education. They provide information to increase knowledge, but this is not enough to change their attitude, as attitude is an important factor in CHWs practice or application of safe sleep strategies. As mentioned before, the healthcare providers and CHWs are still using the other sleeping positions (prone, side positions), so CHWs must be educated about AAP recommendations and safe sleep practices to teach the parents and caregivers about safe sleep environments before and after their infant is born. Healthcare providers and CHWs should follow up and have open conversations with parents and caregivers to encourage them to have open and nonjudgmental conversations about safe sleep practices for their infants. According to Linneman (2016) and Newberry (2018), there are inconsistencies and conflicts with the AAP

recommendations (Linneman, 2016 & Newberry, 2018). Some recommendations seem to be against their previous recommendations or advice (MacCarthy, 2015).

There is a lack of time for healthcare providers to give advice and educate caregivers (Stasny, 2004 & Hodges et al., 2018). Therefore, the CHWs have an important role and enough time to give advice and help parents and caregivers create a safe sleep environment for their infants after the caregivers leave the hospital. There is an opportunity for parents and caregivers to learn about safe sleep environments from CHWs. The healthcare providers did not have enough time to teach the parents and caregivers about safe sleep practices; hence, the CHWs had an opportunity to teach them about safe sleep practices. The interventions should focus on creating policies that promote safe sleep, i.e., including education packets, paperwork, and videos to discuss safe sleep with caregivers after discharge. The activities of healthcare providers are not monitored, reported, or shared. For example, only 28% of nurses report giving written information on safe sleep to caregivers (Barsman et al., 2015). In addition, there is a lack of research on safe sleep-in association with CHWs. The CHWs' services are provided through different programs and cover some AAP guidelines. However, there is a lack of emphasis on a comprehensive, safe sleep environment. CHWs should be trained to provide resources and deliver information about safe sleep to educate their community about the risk factors of unsafe sleep environments during their home visits. This training will provide a continuity of information about safe sleep that caregivers receive from healthcare providers at the hospital. CHWs always talk to families about breastfeeding, routine immunization, and sometimes bed-sharing. However, they sometimes neglect to focus on a safe sleep environment.

Parents need to observe and learn from CHWs and healthcare providers to use the supine position after the mother and baby are discharged from the hospital, at the time of discharge

before going home, and the CHWs should follow up through home visits. CHWs should communicate with the parents of infants on their opinion of safe sleep positions, and they should educate parents about reducing the risk factors of unsafe sleep environments. CHWs have an opportunity to influence parents' decisions regarding infant sleep position since they are in the unique position of being with parents after they deliver the baby and at their home. CHWs should continue the role and repeat the advice the healthcare providers gave when the parents were at the hospital. Teaching new mothers and caregivers of infants about safe sleep needs to extend outside the hospital. CHWs have an important role in teaching parents and caregivers about safe sleep practices and AAP recommendations to help reduce the infant mortality rate.

The death of infants under one year of age is a critical issue and affects many people emotionally, not only the parents but the family as well. They can get angry, sad, and depressed, and they may start blaming themselves because they feel guilty. They may also be unable to go to work, which can affect them financially. In the area of medical care for women before and after giving birth, the infants require increased attention. Healthcare providers and CHWs must do this to serve populations and provide them with the essential health services they need. CHWs typically serve people of low socioeconomic status (SES) who are a high-risk group for infant mortality (U.S. Department of Health and Human Services, 2021). Therefore, efforts to ensure that CHWs KAP align with AAP safe sleep guidelines are imperative due to their interaction with mothers and caregivers of low SES.

CHWs can play a vital role in identifying pregnant women and infants in need of medical attention and providing the care needed. CHWs link the community and population to healthcare and encourage follow-up meetings with the parents and caregivers of infants, according to Aboubaker, Qazi, and Bahi (2014). Effective implementation of CHW strategies requires policy

support, training, supervision, performance maintenance, and regular supplies. In addition, CHWs are increasingly responsible for many health and development tasks, and the expansion of their duties needs to be carefully considered in this light (p. 6).

Policy Implications

CHWs are at the frontline of public health because they are trusted members of their community. CHWs play an essential role because they steer individuals towards gaining access to healthcare. They also serve the entire population, especially high-risk pregnant women, individuals who live under the poverty line, and populations with a high infant mortality rate (U.S. Department of Health and Human Services, 2021). Such efforts can help reduce inequities in infant mortality because minority populations are more likely to be at risk for SIDS and other sleep related death. Including AAP safe sleep recommendations in the training for CHWs, can be made into policy to ensure uniformity in the quality of training and coordination of agencies that hire CHWs. Recently, the Biden administration has supported expanding the training in workforce development of CHWs, hence, CHWs can help meet the needs of underserved communities at potentially lower costs (Haldar & Hintton, 2023). These recommended changes to see CHWs training can inform policymakers in Ohio to enact new policy to develop training that emphasizes safe sleep practices to parents and caregivers. For example, Ohio's Infant Safe Sleep Law took effect in May 2015 and was the most comprehensive program to combat SUID (National Association of Neonatal Nurses 2016, p. 2). A survey conducted by Haldar & Hintton in 2023 assessed current state-level practices about Medicaid payments for CHW services. As of July 1, 2022, 29 of 48 states that responded to the survey allowed Medicaid payments or services provided by CHWs (Haldar & Hintton, 2023).

Based on the findings of this study, CHWs should have more follow-up visits with parents to teach them about safe sleep guidelines. Digital communication channels are also an under-utilized way for CHWs to interact with and teach new parents and caregivers. Gaps in training for CHWs include the benefits of breastfeeding, pacifier use, and the placement of infant cribs in reducing SIDS or other sleep-related incidents.

Recommendations for Future Research

No data in the literature explicitly addresses knowledge, attitudes, and practices of AAP recommendations of safe sleep environments for infants among CHWs. This study showed no significant differences in knowledge or attitude concerning the age, race, education, county type, and years of experience of CHWs. The significant differences were for practices by age, race, and county type. Since sample size was a concern in this study, a more extensive study could be more informative to corroborate our findings. Additionally, future studies should focus more on evaluating training programs aimed at helping CHWs understand more about breastfeeding, pacifier use, and the placement of infant cribs in reducing SIDS or other sleep related incidents. Further investigation into the types of communication used by CHWs is needed. For example, I will assess differences in knowledge or awareness of safe sleep across messaging delivered through social media, specifically via group classes, email, Facebook, and Instagram.

To develop relevant programs that ensure all CHWs, and families are aware of the evidence that supports the AAP safe-sleep recommendations, more research must be done to test and identify the most effective strategies. The goal of the AAP recommendations is ultimately to reduce infant death. CHWs can and should have an important role in preventing infant death and SIDS. To address infant mortality related to safe sleep, a comprehensive approach is needed to include healthcare providers, policymakers, and now, CHWs who present an opportunity to

increase knowledge, improve attitude, and practices about infant safe sleep among parents and caregivers.

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Appendix A

Infant Sleep Position Questionnaire

Instructions: Please take a few minutes to complete this questionnaire regarding your activities working with newborns in your institution.

Demographic

1. What is your age in years? _____

2. To which gender do you most identify:
    a. Man
    b. Woman
    c. Non-binary
    d. Transgender
    e. Not listed: _____
    f. Prefer not to respond

3. Choose one or more races that you consider yourself to be:
    a. White
    b. Black or African American
    c. American Indian or Alaska Native
    d. Asian
    e. Native Hawaiian or Pacific Islander
    f. Other

4. What is the highest level of school you have completed or the highest degree you have received?
    a. Less than high school
    b. High school or GED
    c. Some college but no degree
    d. Associate degree in college (2-years)
    e. Bachelor's degree in college (4-years)
    f. Master's degree
    g. Doctoral degree
    h. Professional degree (JD, MD)
5. Are you currently licensed as a Community Health Workers (CHWs)? Yes/NO

    5.1 If yes, In what state? _____

    5.2 In what county? _____

6. How many years have you worked as CHW? _____ years

7. When did you last renew your CHW license? _____ years ago

8. What areas have you worked? (Check all)
    a. Diabetes prevention
    b. High blood pressure
    c. Cardiovascular diseases
    d. Obesity
    e. HIV/AIDS
    f. Infant mortality

g. Nutrition

h. Healthcare access

i. Mental health

j. Immunizations

k. Drug use

l. Screening for cancer

m. Other _____

9. With which population(s) have you worked? (Choose all that apply)

a. Seniors/older population 65+

b. Adolescents

c. Pregnant women

d. Women (not pregnant)

e. Men

f. Immigrants

g. Rural residents

h. Other_____

10. If yes, for pregnant women, how long (in years) have you worked with them?

Other factors

11. Have you ever received Safe Sleep Training? (Access to health information) (Yes, No, Unsure)

11.1 If 'yes,' who provided the training (organization/agency)? _____

11.2 How long was your training program? _____

11.3 In what year did you receive this training? _____

12. Are you currently aware of the American Academy of Pediatrics (AAP) recommendations regarding sleep positions for healthy infants? (Awareness) (Yes, No, Unsure)

13. In reference to the previous question, if yes, what was the source of this information? (Check ALL that apply) (Source of health information)

    a. Hospital in-service
    b. Health Department
    c. Peer-reviewed journals
    d. Nursing school
    e. Physician
    f. Continuing education units (CEUs)
    g. Other, please specify. _____

Knowledge

14. What is the preferred sleep position in general for a normal, healthy newborn, according to AAP recommendations? (Check ALL that apply)

    a. Supine (back) (1)
    b. Prone (tummy) (-1)
    c. Lateral (side) (-1)

15. Do you agree with the following statements: (Disagree (-2), somewhat disagree (-1), neutral (0), somewhat agree (1), agree (2))

a. Infants should be placed for sleep in a supine position (wholly on the back) until the child reaches one year of age.
b. Side sleeping is not safe and is not advised by AAP guidelines.
c. Infants should be placed on a firm sleep surface.
d. The crib should have no other bedding or soft objects (pillows and pillow-like toys, quilts, comforters, sheepskins, and loose bedding).
e. Infants should not be left to sleep on sofas, armchairs, or in sitting devices.
f. Infants should sleep in the parents' room but on a different surface.
g. The infant's crib should be placed in the parent's bedroom for at least 6 months but preferably a year.
h. Breastfeeding is significant in helping to protect infants from death due to SIDS.
i. Pacifiers decrease the risk of SIDS
j. Smoking in the home increases the risk of SIDS
k. Bumper pads increase the risk of suffocation during sleep

Attitude

16. How much do you agree with the current AAP recommendation of supine positioning during sleep for all infants? (Disagree (-2), somewhat disagree (-1), neutral (0), somewhat agree (1), agree (2))

17. In your opinion, are infant sleep positions associated with sudden infant death syndrome (SIDS)? (Disagree, somewhat disagree, neutral, somewhat agree, agree)

18. How much you agree with the following statements (Disagree, somewhat disagree, neutral, somewhat agree, agree)

18.1 Policy is an important factor to determine how an infant should be put to sleep

18.2 Personal preference is an important factor to determine how an infant should be put to sleep

18.3 Supervisor is an important factor to determine how an infant should be put to sleep

18.4 Parent's choice is an important factor to determine how an infant should be put to sleep

18.5 Clinical experience is an important factor to determine how an infant should be put to sleep

18.6 Co-workers are an important factor to determine how an infant should be put to sleep

18.7 Training guidelines are an important factor to determine how an infant should be put to sleep

Practices

When you visit the new mothers and their caregivers, how do you communicate about safe sleep practices (Never, rarely, sometimes, almost always, always)

19. Do you **assess** the home environment to determine if it meets the safe sleep guidelines?
20. Do you **observe** how parents are practicing the safe sleep recommendations?
21. Do you **ask** parents or caregivers if they are practicing safe sleep?
22. Do you **instruct** parents on safe sleep practices?
23. How often do you **ask or instruct** parents or caregivers about safe sleep?
24. Do you **demonstrate/show** the parent or caregiver how to place the infant in a safe sleeping position?
25. Do you **recommend** the supine position to parents as the only positioning during sleeping?
26. Do you **recommend** infants to sleep in the same room as the parents but on a different surface?
27. Do you **recommend** breastfeeding to parents and caregivers?

28. Do you **teach** parents to avoid overheating and head covering?

29. How likely are you to **follow** a script or educational guidelines for safe sleep education?

30. How frequently do you **encounter** families with cultural practices that contradict safe sleep practices?

31. Do you **address** unsafe sleeping practices with parents and caregivers?

If (sometimes, almost always, or always)?

31.1 how did you initiate the conversation? (open-ended question)

31.2 how did the parent or caregiver receive your advice/recommendation? (open-ended question)

31.3 did you follow up on the next visit? Yes/No

31.4 did the interaction/advice change their unsafe sleeping practices? Yes/No

31.5 Please describe one such scenario. (open-ended question)

Communications of AAP guidelines with parents/family

32 Do you share (with patient or caregivers) information on safe sleep positions and AAP recommendations related to safe sleep risk reduction? (Yes, No)

33 When do you provide written materials to the parents with current AAP safe sleep recommendations? (Visit before birth, first visit after three days of birth, and two months old)?

34 What communication is available from your agency to educate patients on safe sleep recommendations?

a. Written information (brochures, handouts)
b. Video
c. Group classes
d. Email/mass email
e. Social media platforms (Facebook, Instagram)
f. Other_____

35 Are written materials provided in language appropriate for parents (translated to different languages)?

36 How would you prefer to communicate to parents about safe sleep recommendations and practices?

a. Written information (brochures, handouts)
b. One-on-one conversations
c. Recommended videos

37 How likely are you to provide additional education to parents or families with conflicting cultural practices? (Never, not likely, sometimes, very likely, always)?

38 What else do you think can be done to promote safe sleep (open-ended)?