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PRECONCEPTION AND INTERCONCEPTION CARE: THE ROLE OF THE HOME VISITOR

A CRITICAL LOOK AT THE CURRENT LITERATURE AND RECOMMENDATIONS FOR PROGRAMS

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Introduction

Preconception and Interconception are intersecting areas that span almost the entire lifespan of women. Preconception (PC) health generally refers to women's pre-pregnancy health status.[1] The goal of PC care is to identify and address physical and mental health issues, and social risk factors to women's health and pregnancy outcomes by providing prevention and management interventions.[2, 3] Similarly, Interconception (IC) health is women's health status between pregnancies. It is important to note that the distinction between early postpartum and early interconception is not always clear, however IC generally includes the postpartum stage. [1, 4] The goal of IC care is similar to that of PC care with the addition of pregnancy spacing.[2, 5]

PC and IC health care has been at the forefront of the nation's efforts towards improving pregnancy outcomes. Since 2000, national goals have included: [6]

1) Improving the knowledge and attitudes and behaviors of men and women related to preconception health;
2) Assuring that all women of childbearing age in the United States receive preconception care services (i.e., evidence-based risk screening, health promotion, and interventions) that will enable them to enter pregnancy in optimal health;
3) Reducing risks indicated by a previous adverse pregnancy outcome through interventions during the Interconception period, which can prevent or minimize health problems for a mother and her future children; and
4) Reducing the disparities in adverse pregnancy outcomes.

Healthy People 2020 includes several objectives targeting preconception and interconception health (MCH-14, 16, 16.1-16.6):[7]

- ☑ To increase the proportion of women of childbearing potential with intake of at least 400 µg of folic acid from fortified foods or dietary supplements
- ☑ To increase the proportion of women delivering a live birth who received preconception care services and practiced key recommended preconception health behaviors
    - Discuss preconception health with a health care worker
    - Take multivitamins/folic acid
    - Do not smoke
    - Do not drink alcohol
    - Maintain a healthy weight
    - Used contraception

Along with these national goals, the Centers for Disease Control and Prevention (CDC) and the American College of Obstetricians and Gynecologists (ACOG) have highlighted the importance of improving the delivery and quality of PC and IC care.[8] Currently, the majority of PC and IC care is provided at primary care visits, however, alternative avenues of delivery can expand and enhance care, especially for underserved populations.[9, 10]

Home Visitors (HV) and other community health workers are ideal for beginning conversations and providing information on IC and PC care to individuals from primarily disadvantaged groups. Serving as

patient advocates, HVs have been found to be effective members of the health care system.[11, 12] Their roles are usually restricted to the scopes of specific programs or projects. However, with effective training and integration, HVs can help address current gaps in the PC and IC care system resulting from: [11, 12]

- Short duration of primary care visits, making it difficult for health care providers to spend the time to discuss PC and IC health care;
- Limitations of clinician training in addressing behavioral and social risk factors;
- Language and cultural differences, especially for the sensitive topic of contraception for many cultures and religions;
- Limited ability to affect behavior change that requires much time for discussion and follow-up;
- Lack of reproductive life plans already developed at the time of PC and IC health care visits; and
- Limited access to vulnerable populations who often do not have access to PC and IC health care due to lack of health insurance or other socio-economic barriers.

HV's work with women within communities can be an important way for ensuring that women obtain the additional information, support and guidance for PC and IC care. This report aims to highlight the importance of IC and PC care for communities with high needs, provides an overview of recommendations for the potential role of HV in PC and IC care, and presents evidence of the integration of HVs (from studies, reviews, recommendations, and guidelines) into the delivery of PC and IC care.

The Importance of Preconception & Interconception Care

In the context of the reproductive life course, PC and IC fall before and between pregnancies. Both stages are crucial as they serve as the foundation for optimum pregnancy outcomes. Women's unhealthy behaviors before they become pregnant have been associated with many poor pregnancy and infant outcomes. Research findings show that women who are healthy before pregnancy have a higher chance of having healthier infants.[11] On the other hand, women with pre-pregnancy health conditions such as hypertension, obesity, diabetes, and others, have had higher risk of low birth weight, miscarriages, and small for gestational age, among others. Other risk factors include social (age, income, education, stress, domestic violence, etc.) and behavioral issues (smoking, drug/alcohol use, inactivity, etc.). Overall, study results have shown that women who have received PC care are also more likely to be more overall healthy compared to women without PC care, regardless of the planned status of the pregnancy. PC and IC care interventions have also been found to improve health knowledge, attitudes, and behaviors.

PC and IC care are especially important for communities facing multiple social and economic stressors and related health conditions. Based on research and analysis of national databases, pregnancy outcomes are worse for women of lower socio-economic backgrounds and for African Americans.[13] A health equity

Key elements of preconception & interconception care:

- ☑ Reproductive Life Plans
- ☑ Risk Factors:
  - Maternal Age
  - Medical Conditions
    - Periodontal Health
    - Mental Health
    - Pregnancy History
- ☑ Healthy Behaviors
  - Folic Acid
  - Healthy Weight Management
- ☑ Risky Behaviors:
  - Smoking
  - Use of Illicit Drugs & Alcohol
  - Marijuana
- ☑ Social and Economic Stressors
  - Lack of Resources
  - Racism and Discrimination
  - Intimate Partner Violence
- ☑ Environmental Exposures
- ☑ The Role of Men's Preconception & Interconception Health
- ☑ Barriers to Access to Care
- ☑ Issues Specific to Interconception Care:
  - Birth Spacing
  - Previous High Risk Pregnancies

approach can be used for the PC and IC care of women with disparate outcomes, providing the opportunity to identify individual women's conditions and provide care and assistance based on their needs.

PC and IC care represent the set of interventions that attempt to identify and treat health issues, change behaviors and address social challenges of women before they get pregnant. PC and IC care can help reduce the prevalence of these risk factors and negative health outcomes including ensuring that each pregnancy is planned and intended. HVs are instrumental to this process and have the opportunity to work with women to plan individual or group based interventions for improving PC and IC health. Table 1 (Appendix B) provides examples of PC and IC health research studies exploring the association between HVs or other community health workers on maternal and infant outcomes.

Recommendations for Preconception and Interconception Care

The CDC, ACOG, and other health organizations have highlighted the importance of providing care early in women's reproductive lives and continuing throughout. Key components of this care include developing a reproductive life plan, providing knowledge of various risk factors, screening and treating physical and mental health conditions, addressing behavioral issues, ensuring access to care, and identifying and addressing social needs. Table 2 (Appendix B) highlights studies summarizing the literature and providing guidance and recommendations. Though the primary focus of PC and IC care information has been for the clinical setting, the HV can begin the conversation and increase awareness of important elements of PC and IC health, and refer for resources to address barriers to access to care.

Reproductive Life Plan

A reproductive life plan (RPL) is a personalized set of goals regarding whether or not to have children and the desired number.[14] The process of developing a RLP can assist both women and men to reflect upon and discuss their reproductive plans, timeline, the desired number of children, and contraception methods appropriate for the timeline.[15] The plans can also be developed early in a young woman's life and updated as needed. By developing a plan early, women can better plan their reproductive lives within the context of other life goals including careers or social situations.

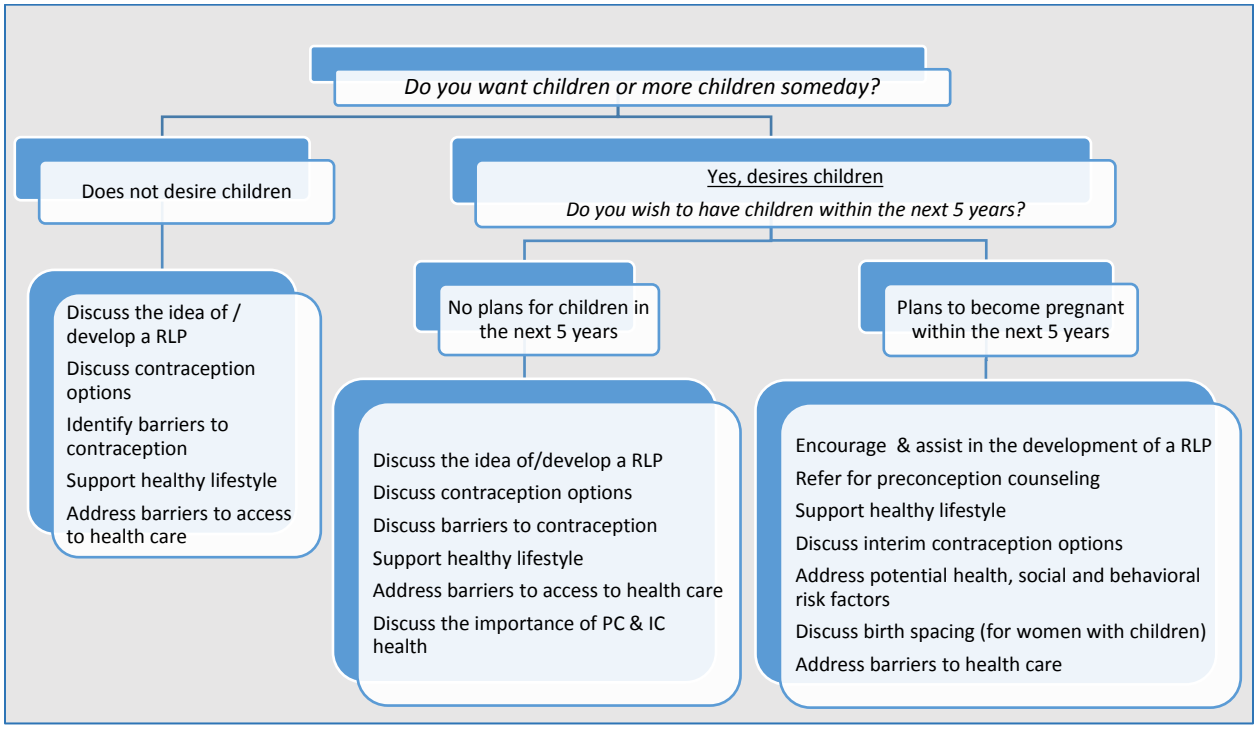
Developing a Reproductive Life Plan: Potential Questions for Engaging Clients in the Process

- *Do you hope to have any (more) children?*
- *How many children do you hope to have?*
- *How long do you plan to wait until you become pregnant?*
- *How much time do you plan to have between your pregnancies?*
- *What do you plan to do until are ready to become pregnant?*
- *What can I do to help you achieve your plan?*

Figure 1 provides an example of a framework for addressing for the development of RPL with women served. This can be introduced by clinicians, other care providers, or HVs in a respectful manner by beginning with the question of whether the woman plans to have a child within the next 5 years.[16] Within the setting of a primary care appointment or a gynecological exam, this question will less likely to be considered pushy. However, HVs can be trained to effectively approach the topic in a nonthreatening manner[17], as their established relationship with the women is beneficial to the process. Once the topic has been introduced, the care provider or HV should allow the individual's responses to steer the conversation. The framework in Figure 1, developed based on existing literature and CDC recommendations, sets out to identify the preconception stage of each woman to further refine the discussion. If the woman has no plans for children, then the discussion can focus more on contraception

and plans future discussions. For women who do plan to have children, the approximate timing of their plans to get pregnant will direct the conversation. For those who have no plans in the near future it is reasonable for the HVs to introduce the concept of contraception, encouraging health behaviors, and eventually developing an in-depth RLP. In contrast, for women who have plans to conceive within the following 5 years, then the HV would expand the conversation to discuss health risks, timing, and offer referrals for preconception counseling.[17] For women who are in between pregnancies (IC), the HV can provide information about optimal spacing of 18 months between pregnancies or 24 months between births. In the case of miscarriages, there is no need to wait prior to becoming pregnant again, as long as the woman is deemed healthy enough by a health provider. In all cases, the process and discussion of a RLP should be individually tailored and handled with cultural sensitivity, nonjudgmental responses, and respect.

Figure 1. Example of procedures for developing a Reproductive Life Plan (RLP)



Knowledge of Preconception and Interconception Factors Impacting Maternal and Infant Outcomes

Maternal Age

Adolescent and older women are at higher risk for poor birth outcomes. Infants born to adolescent mothers are at higher risk for preterm birth, low birth weight, neo-natal mortality and lower Apgar score.[18, 19] Among mothers 50 years old or above, the risks for very low birth weight, very preterm birth, and small for gestational age is higher than among women between the ages of 20 and 39, indicating that having a child at 50 or above is associated with multiple risks for the baby.[20, 21] Because many teen pregnancies are unplanned, it is important that HVs work with adolescent clients and provide them with knowledge about contraception and empower them to discuss contraception choices with their health

provider in order to select the best method(s) for them. Long Acting Reversible Contraception (LARC) is becoming more common and accepted among teenagers. Information on LARC and where to obtain it can be provided by the HV. It is important for the HV to discuss with the clients that LARC does not protect from sexually transmitted diseases and then provide the client with additional information on protective measures. Older women wishing to prevent pregnancy may also benefit from similar advice on LARC. For women above 50 who wish to get pregnant, HVs can discuss the potential dangers and risks to the infant. Women over 35 may also be at risk, but would have less risk than very young or older women. Similarly sharing information on potential risks might be a task for the HV, however, clients should be encouraged to discuss their desire for children with their physician or health care provider.

Medical Conditions

The HV can be a support for women dealing with health conditions. Though not trained to screen or diagnose, HVs can work with their clients to identify any previously diagnosed conditions, engage in conversations about treatment status, follow-up appointment for checkups, and provide overall information about screenings and treatment of conditions prior to becoming pregnant. Common health conditions to treat during the PC and IC stages include diabetes, asthma, sexually transmitted infections, thyroid disease, phenylketonuria, seizure disorders, high blood pressure, arthritis, and eating disorders. Screening for potential new conditions and treating them prior to becoming pregnant can greatly improve pregnancy outcomes.

Periodontal Health is an important but often ignored element to optimal PC and IC health. Infections of the teeth or mouth can lead to more severe conditions if left untreated and can impact women's health. Gum disease can increase the risk of clogged arteries, heart disease, and stroke.[22] It may also worsen existing conditions such as diabetes, respiratory diseases, and osteoporosis. It has also been identified as a potential preventable cause of premature births and lower birth weight.[13] The HV can therefore share information about the importance of dental care and the need to address current dental health issues.

Identifying and treating any **Mental Health** conditions is also essential for ideal PC and IC health. Constant anxiety or stress that interferes with daily life should be treated. HVs can make their clients aware of treatment options and connect them to care, and/or provide information on positive coping mechanisms for reducing stress.

The assessment of **pregnancy history** is critical to avoid adverse pregnancy outcomes in future pregnancies. Women who previously had a pregnancy with adverse outcomes such as a miscarriage, a stillbirth, or premature delivery, have an increased risk for similar outcomes in future pregnancies. For example, research findings suggest that some women with early onset preeclampsia in her first pregnancy may be more likely to experience more severe preeclampsia in her second pregnancy.[23] HVs are well placed to discuss the history with clients and encourage them to share it with their care provider, especially when trying to conceive.

Healthy Behaviors

Folic Acid is a vitamin that has been noted to help prevent major birth defects on the infant brain and spine.[24] For it to be effective, it must be taken starting at least one month before pregnancy and continued during pregnancy. Folic Acid may be taken by all women of reproductive age as it helps the body produce healthy new cells. HVs can not only inform clients of its importance, but also where and how to obtain their daily dose (400 micrograms) of Folic Acid. For example, it is included in certain foods such as some

breakfast cereals, or multivitamins. HVs can encourage women to check labels for 400 μg or 100% of the daily dose of Folic Acid.

Attaining and maintaining **Healthy Weight** is a behavioral aspect that can be challenging but important to address. Women who are overweight or obese have a higher risk for many conditions: complications during pregnancy, heart disease, type 2 diabetes, and certain cancers.[25] Women who are underweight have increased risk of preterm birth, low birth weight, fetal growth restriction, and birth defects.[26] HVs can be instrumental in providing information on the importance of physical activity and healthy eating in general, and can refer women to their primary care provider or, if income eligible, Cooperative Extension nutrition programs such as EFNEP, SNAP-ED. They can also refer women to community physical activity program providers, such as mall walking in more urban settings, or churches with physical activity programs in rural settings.

Maintaining healthy behaviors requires a change in lifestyle to include healthy eating and physical activity. HVs can be helpful by encouraging their clients to discuss ways of reaching and maintaining healthy weight before getting pregnant.

Risky Behaviors

Smoking and the use of illicit drugs and alcohol can have both social and physical consequences. **Smoking** can cause preterm birth, some birth defect and stillbirth.[27] Quitting smoking can be difficult but it is one of the best ways a woman can protect herself and her baby. As for use of **alcohol** during pregnancy, there is no known safe level of alcohol. Any amount of alcohol during pregnancy can lead to preterm labor, decreased production of breastmilk[28], and increased risk of miscarriage in the first trimester by as much as 4 fold.[29] Infants exposed to higher amounts of alcohol during pregnancy can be born with Fetal Alcohol Syndrome, a condition that can affect the development of the central nervous system, and potentially many other parts of the infant's body (heart, eyes, legs, arms, for example).[30]

With the widespread use of **marijuana** in the U.S. as a result of legalization of the drug, many women use or are exposed to marijuana. Exposure to marijuana has been associated with significant congenital malformations, including spina bifida and encephalopathy [31, 32], and impacts the development of the infant's central nervous system and long term behavior.[33, 31] In addition to the many risks associated with use during pregnancy, being intoxicated (drugs or alcohol) can dull judgment and increase the chances of unplanned pregnancies. As for women planning to get pregnant, it is essential that they refrain from smoking (tobacco or marijuana) , drinking any amount of alcohol and using any form of illicit drugs; women may not know they are pregnant for up to 4 to 6 weeks and may unintentionally expose the baby to these harmful substances. HVs can help to emphasize these facts and provide information, recommendations and referrals for help with smoking cessation or quitting drug or alcohol use.

Social and Economic Stressors

The communities most HVs serve are often plagued with many **social and economic risks**. The women who live in these high risk communities must deal with many daily challenges such as lack of **adequate housing, resources**, and **stress** associated with unsafe neighborhoods, domestic violence and concerns about meeting basic needs. Psychological stress and anxiety resulting from these circumstances impact pregnancy through chronic stress hormones or unhealthy coping mechanisms such as use of drugs, alcohol, and so forth. Maternal stress has been associated with a wide range of adverse birth outcomes,

including preterm birth, and low birth weight.[34, 35] HVs are well placed to work with women to identify risk factors and make the appropriate referrals for services when needed.

Racism and discrimination has been found to be an important factor in poorer birth outcomes among African Americans. Considered both a stressor and a structural barrier (such as neighborhood resources and safety), racial discrimination has been associated with higher risks for preterm birth and low birth weight among African Americans, compared with Caucasian and Hispanic women of the same socio-economic status.[36, 37] For HVs, awareness of the impact of racism can help with building trust and understanding with African American women. HVs can not only validate the existence of racism the women face, but may address some of the impact of structural racism by referring clients to local resources and stress-related support and care.

Another potential social issue and additional source of stress a HV may need to help a client deal with is domestic violence. Any form of violence (physical, emotional or sexual) against women can impact their PC & IC health, and their pregnancy outcomes. **Intimate partner violence** has been associated with emotional and physical consequences for women, but also with stillbirth, preterm birth, small for gestational age, and low birth weight.[38, 39] Here as well, HV can help to identify and address intimate partner violence or any domestic violence through information, support and referrals.

Environment Exposures

The risk of exposures **to environmental toxins and chemicals** are present in many communities living in poverty and must be recognized and addressed. For example, some environmental exposures have been linked to preterm birth, stillbirth, birth defects, low birth weight, central nervous system disorders, and developmental disorders in infants. [40-42] Because of the extensive number of potential chemicals, organic and inorganic toxins, the primary roles of HVs are to (1) raise awareness of the potential health risks of PC and IC environmental exposures on pregnancy outcomes; (2) encourage women to speak to their provider about environmental exposures; and (3) follow-up with clients regarding provider recommendations and work with them to consider eliminating the exposures that are within their control.

Examples of Environmental Toxins to Consider during the Preconception & Interconception Life Stages

- Second hand cigarette and marijuana smoke
- Some household cleaners
- Dry cleaning chemicals
- Nail Salon/Cosmetology Chemicals
- Some cosmetics
- Gardening/Farming Pesticides
- Childhood Lead Poisoning
- Printing Chemicals (e.g., Ink)
- Lead in home (paint of pre-1978 homes), cosmetics, at work
- Mercury (in shark and swordfish)
- Some medications and dietary supplements (discuss with healthcare provider)
- BPA (Bisphenol A) in plastic containers, especially those used in microwave of hot items, for example.

Men's Preconception and Interconception Health

PC and IC health status are also important for men, as fathers contribute half of the genetic material of a child. It is important for women and potential fathers to be aware of how men's health and behaviors impacts the genetic material they pass on, so as to establish an incentive for making an effort toward healthier outcomes. It is also important for HVs to keep this in mind, and make an effort to include fathers when helping to establish healthy habits and/or when developing a RLP. This can be achieved through work similar to that with women, by establishing a personal RLP or participating in a joint development of a RLP, as well as encouraging them to take into consideration pre-existing physical and mental conditions, as well as family health history. By providing information and strategies to improve and manage such

conditions through behavioral health changes and altering environmental exposures, HVs can help fathers to be more proactive in the health of their child. Men may also provide support to women when they are receiving PC and IC care; therefore, the more men know about the necessary steps to improving PC and IC health, the more supportive they may be as their partner makes an effort to improve her health.[43]

Barriers to access to PCC and ICC

Barriers to accessing care, whether financial (can't afford insurance, can't pay for transportation, etc.), social (lack of support, lack of child care, etc.) or informational (don't know how to complete paperwork, where to access care, etc.), need to be identified and steps taken to ensure women have health insurance and access to the care they need, whether for healthy woman visits of for obstetric care. A role of HVs is to ensure their clients have health insurance and access to health care providers. They also may need to address any additional barriers to accessing care, such as transportation or child care. Individual barriers may include women's motivation to seek health care, a fear of the medical system, or a lack of awareness of the importance of preconception care [1]. Structural barriers can include long wait times, location and hours of health care facilities, language and attitudes of staff and provider, cost of services, lack of child-friendly facilities.[1] HVs can connect clients to local resources to address structural barriers, and education and information to address personal barriers. HVs can serve as facilitators by creating open pathways to access to care for all women.[1]

Specific to Interconception Care

How women space their pregnancies can have an impact on both mother and infant. According to research findings, becoming pregnant within the first 6 months after delivery is associated with an increased risk of premature birth, placental abruption, low birth weight, congenital disorders, and schizophrenia.[44-46] Some studies have also found a high risk of Autism in second-born children of pregnancy less than 12 months apart.[47, 48] To reduce the risk of complications, research suggests waiting 18 to 24 months after a live birth before the next pregnancy. This does not apply to women who have had miscarriages since there might not be a need to wait if the woman is healthy.

Also specific to IC health care is the importance of knowing and addressing risk factors associated with previous difficult pregnancies and poor birth outcomes. In cases of previous risky pregnancies such as late miscarriages, stillbirths, preterm births and other maternal conditions, it is important for Home Visitors to encourage preconception counseling and to refer women to Regional Perinatal Health Centers (RPHC) where available, or other health centers or providers specializing in risky pregnancies. The 17 Regional Perinatal Centers in the state of New York's system provide the highest level of care for high risk pregnant women and newborns and operate neonatal intensive care units (NICU).[49] Associated local Perinatal Centers can also provide IC care for women at risk but each provide one of 3 levels of perinatal care: normal to low-risk, moderate risk with a NICU, high risk with NICU. Home Visitors' supervisors or directors of maternal and infant programs are responsible for developing formal relationships with the RPC or the Levels 2 and 3 Perinatal Centers serving their region. It is crucial that HV training include familiarizing them with local resources and centers to refer women who are planning to become pregnant but have had previous risky pregnancies.

The effectiveness of Home Visitors in improving PC and IC Care

As described above, the HV plays an important role in the care of women at the PC and IC stages. Traditionally the task of physicians and trained health providers or health workers, their time constraints,

the formal and authoritative nature of the medical setting can impede the ideal PC and IC care for women from high need communities. HVs can contribute to PC and IC care based on their understanding of the community and local culture and language, and the informal setting of their meetings with clients. To fully function as advocates of PC and IC health care, maternal and infant programs will fare well to ensure that HVs receive topic-specific training on basic knowledge of essential IC and PC factors such as those described above, and become familiar with local and state resources available to their clients and associated referral processes and protocols.

Examples:

Addressing Health Weight with clients:

Promote an active lifestyle by asking "*How satisfied are you with the kind and amount of activity you are currently doing?*" If not, "*Tell me what you would like to do to move more. What is one thing you could do to get started?*"[50]

Addressing pregnancy spacing with clients:

Ask, "*Do you plan to have more children in the future?*" If yes, "*When?*" Share with her, "*It's healthier for you if you wait until your youngest child is at least 18 months old before getting pregnant again.*" Ask "Right now, w*hat is your plan for preventing another pregnancy until you're ready?*" Discuss options with her and ensure that she has access to contraceptives.[50]

In sum, preparation for optimal maternal and infant outcomes begins long before conception. A woman's health prior to pregnancy has been shown to have an important impact on her pregnancy and the health or her baby. A woman who is healthy prior to becoming pregnant reduces her risks of pregnancy complications related to preexisting conditions such as hypertension or diabetes, and the impact of her health and behaviors on the baby's development and overall outcomes at birth and beyond. Given the potentially sensitive nature of discussing reproductive health with women from disadvantaged communities, Home Visitors are well placed to:

- Initiate the conversation and provide information regarding the importance of early PC and IC,
- Work with women and their partners to develop a reproductive life plan,
- Identify and address informational, social, economic, and physical barriers to access to contraception care,
- Ensure access to health care by identifying and addressing potential barriers, and
- Prepare women to discuss PC and IC issues with their health providers.

Training of Home Visitors should include the skill of guiding women (and their partners) to develop a reproductive life plan, basic knowledge of issues related to PC and IC health, and familiarity with local social and health care resources available. This will equip HV as they work to ensure women from disadvantaged communities have access to the care they need to optimize their health and prepare them for their next pregnancy.

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Appendix A

Additional Sources for Home Visitors and Clients	
Resources for HVs	**Resources for Clients**
• The National Preconception / Interconception Care Clinical Toolkit. For access, click here. • CDC information center for preconception health. For access, click here. • A one-page informational flyer to provide women about preconception health. For access, click here. • *Good Health before Pregnancy: Preconception Care* provides answers to frequently asked questions. For access, click here. • *Tips for a Healthy Baby* is a handout that can be provided to clients considering having a baby. For access, click here. • Recommendations for the Routine Care of All Women of Reproductive Age. For access, click here.	• *My Life Plan Self-Assessment* is a reproductive life plan for teen girls that includes a checklist of ways to stay healthy and facts about teen pregnancy. For access, click here. • *Power Me A2Z* is a preconception health magazine that includes a reproductive life plan tool and frequently asked questions. This is available in English and Spanish. For access, click here. • *Set Your Mind Set Your Goals* is a booklet to assist women with creating a life plan. For access, click here. • *Show Your Love! Steps for a Healthier Me!* is a checklist for women who do not want to become pregnant, to help them set goals and make a health plan. It can also be used to discuss a woman's goals with a healthcare provide. This is available in English and Spanish. For access, click here. • *Show Your Love! Steps for a Healthier Me and Baby-to-Be!* is a checklist for women who wish to become pregnant, to help them set goals and make a health plan. It can also be used to discuss women's goals with a healthcare provider. The checklists come in two printable formats. This is available in English and Spanish. For access, click here. • *"Pregnancy" in the Healthy Woman: A Complete Guide for All Ages* is book chapter about pregnancy that also includes information about preconception health. For access, click here. • *Not Right Now. Put Pregnancy on Pause* is an interactive campaign website for teens and parents of teens that includes information, advice, teen blogs, and informational videos. For access, click here. • *My Health Journal* is designed to help women keep track of their health. For access, click here. • *Taking Care of Me* is a booklet of health information and health quizzes. For access, click here. • *Becoming a Parent* is a preconception checklist. For access, click here. • *Becoming a Parent* is a booklet with preconception health information. For access, click here.

Appendix B

Table 1. Preconception and Interconception Care Studies Included (U.S. Studies, 01/2010 – 03/2017)

Author, year (Type)	Population	Objectives	Key Findings Related to Preconception and Interconception
Ayoola et al., 2016 (Descriptive)	Women 18-51 years old. (N=123)	Examine women's perceived health status and behaviors such as drinking, smoking, exercise, and use of multivitamin and folic acid.	- Preconception should be used for everyone just in case someone gets pregnant without planning it. - Preconception should be talked about in all clinical areas.
Beckmann et al., 2015 (Case-Control)	Women during reproductive age (N=407)	Evaluate whether women receiving preconception care are more likely to be healthy around the time of conception compared with women with a planned pregnancy but have no preconception care.	- Results indicate that women who attend a preconception consultation are more likely to be healthy across several domains than women who plan their pregnancy but do not attend a preconception consultation.
Bixenstine et al. 2015 (Cross-sectional)	Postpartum women (N=4,426)	Examine the relationship between folic acid preconception counselling and folic acid use. Looked the reasons for non-use among women with a recent live birth.	- Reasons for non-use were "didn't think needed to take" and "not planning pregnancy". - Folic acid PPC was associated with three times the odds of folic acid use.
Bombard et al. 2013 (Cross-sectional)	Women, 18-44 years old, self-reported history of hypertension or current anti-hypertension medication use (N=2,036)	Provide estimates for prevalence of provider advice offered to reproductive-aged women and to assess the association with behavior change.	- Health care providers should routinely advise hypertensive reproductive-aged women about lifestyle changes to reduce blood pressure and improve pregnancy outcomes.
Boutain et al. 2017 (Cross-sectional)	White & Black women (N=92)	Describe the interconception challenges of women who had prior preterm births.	- 91% of study participants expressed facing challenges - Types of challenges included mothering, self-care desires, finances, employment, partner relationship, mental health, balance, physical health, housing and family.
Brown et al., 2016 (Cross-sectional)	Women, ages 12-44 years old (N=97,788)	Understand the relationship between health insurance coverage and tobacco and alcohol use among reproductive age women.	- Access to health care, via health insurance coverage is a promising method to help reduce alcohol use during pregnancy. - Despite health insurance coverage, tobacco use persists during pregnancy, suggesting missed opportunities for prevention during prenatal visits.
Cha et al. 2015 (Cross-sectional)	Women with live births (N=193,310)	Examine the association between intimate partner violence (IPV) and contraceptive use. Assess whether the association varies by receipt of prenatal birth control counselling and race/ethnicity.	- IPV victimization adversely affects the use of contraceptive methods following delivery in women with live births. Birth control counseling by health providers may mitigate these effects; however, the quality of counseling needs further investigation.
Chor et al., 2011 (Cross-sectional)	White, Black & Hispanic women (N= 4,005)	Assess the association between chronic medical disease status and pregnancy intendedness or contraceptive use.	- Age and chronic medical disease were associated with different risks of pregnancy intention in the index pregnancy. Women with and without chronic disease in both age groups reported similar postpartum contraception use
Coonrod et al. 2014 (Retrospective Descriptive)	Women with a prior preterm birth or still birth enrolled (N=102)	Describe of preconception care services aimed at underserved women who have experienced an adverse birth outcome.	- Women in the program had improved preconception knowledge, attitudes and behaviors.
Denny et al., 2012 (Cross-sectional)	Non-pregnant women ages 18-44 years old (N=54,612)	Estimate the prevalence of drinking, cigarette smoking, obesity, diabetes, and frequent mental distress among non-pregnant women aged 18-44 years by demographic and psychosocial characteristics.	- The high proportion of women of childbearing age with preconception risk factors highlights the need for preconception care. - The common occurrence of multiple risk factors suggests the importance of developing screening tools and interventions that address risk factors that can lead to poor pregnancy outcomes. - Increased attention should be given to high-risk subgroups.

Author, year (Type)	Population	Objectives	Key Findings Related to Preconception and Interconception
Dunlop et al., 2010 (Cross-sectional)	African-American and Hispanic females and males (N=144)	Explore the acceptability and utility of integrating an assessment of reproductive plans into primary care encounters.	- Questions assessing patients' reproductive plans were viewed as important by the majority of female.
Goossens et al., 2016 (Cross-sectional)	Women, reproductive-aged, with a desire to have (more) children (N=242)	Assess women's interest in preconception care, their organizational preferences, and their preconception-related information and support needs.	- Reproductive aged women are interested in preconception care, and would prefer to receive this care directly from a professional caregiver. - Most women had high preconception-related information needs and lower support needs.
Handler et al., 2013 (Longitudinal, multi-method approach)	Low-income, African-American, women (N=220)	Evaluate the implementation of a pilot interconceptional care program and the experiences of the participants in their first postpartum year.	- Interconception care is a complex process of matching interventions and services to meet women's unique needs, including their socioeconomic needs
Harelick et al., 2011 (Convinence sample survey)	Black and Hispanic women ages 18-44 (N=340)	Examines women's knowledge and behaviors related to preconception risk factors in two community health centers that serve low income, racially diverse communities.	- Knowledge alone or a doctor's recommendation are not enough to change behaviors. - Innovative programs and support systems are required to encourage women to adopt healthy behaviors throughout the childbearing years.
Mittal et al., 2014 (Survey)	English and Spanish speaking women, 18-40 years old, active diabetes, hypertension, obesity (N=27)	Test the reproductive life plan to improve knowledge of preconception and contraception health in women with chronic diseases.	- A reproductive life plan is a brief, cost-effective preconception and contraception counseling tool in the primary care setting for women with chronic diseases. - This tool increases knowledge about reproductive health and enables women with chronic diseases to make informed decisions about their reproductive future.
Heavey, 2010 (Retrospective chart review)	Pregnant women under the age of 19 (N=108)	To examine pregnant adolescents' desire for pregnancy and determine if there were opportunities for preconception care.	- Nurses who provide care to adolescents have an opportunity to discuss future pregnancies and to use healthcare visits to teach about preconception health. - Teaching adolescents who both express a desire for pregnancy and those who do not express such a desire is an important part of comprehensive nursing care. - Teens require thorough teaching about healthcare risks such as smoking cessation, body weight control, interpersonal violence, and the need for folic acid. - Adolescents should be prime recipients of preconception education at every healthcare visit.
Bronstein et al. 2012 (Cross-sectional)	Family planning providers accepting Medicaid-covered clients and women in Arkansas and Alabama (N= 459 &1,991)	Examines provider and client perceptions of the extent to which general health concerns are addressed in the context of publicly supported family planning care.	- Increased provider engagement in identifying patient health concerns and improved integration with publicly supported family planning resources could potentially expand the delivery of preconception or general health care.
Chuang et al. 2010 (Focus groups)	Non-pregnant women with chronic condition (diabetes, hypertension, obesity) (N=72)	Examine how women with diabetes, hypertension, and obesity perceive their pregnancy-associated risks or make reproductive health decisions.	- There was limited knowledge about pregnancy risks related to chronic medical conditions and about preconception health - Diabetes and hypertension affected pregnancy intentions - Lack of control to avoid unintended pregnancy, including limited knowledge about how medical conditions might affect contraceptive choices
Mazza et al., 2013 (Qualitative)	General practitioners (N=22)	Examine the barriers and facilitators to the delivery and uptake of preconception care guidelines from general practitioners' perspective	- Some of the perceived barriers identified by practitioners: o Time constraints o Women not presenting at the preconception stage o Competing priorities within the general practice setting o The cost of and access to preconception care o Lack of resources for assisting in the delivery of preconception care guidelines - Perceived enablers identified by practitioners: o Availability of preconception care checklists and patient brochures, handouts, and waiting room posters outlining the benefits - Availability of preconception care consultations

Author, year (Type)	Population	Objectives	Key Findings Related to Preconception and Interconception
Tripathi et al., 2010 (Survey)	Women with pregestational diabetes who delivered a singleton pregnancy (N=588)	To investigate the association of preconception counseling with markers of care and maternal characteristics in women with pre-gestational diabetes	- Preconception counseling was associated with better glycemic control 3 months preconception and in the first trimester, higher preconception folic acid intake, and reduced risk of adverse pregnancy outcome. - Maternal sociodemographic characteristics impact the uptake of preconception counseling.
Weisman et al., 2011 (Population-based cohort)	Women who had a live singleton birth (N=116)	To examine maternal preconception predictors of birthweight and fetal growth for singleton live births	- Elevated preconception BMI and vegetable consumption (at least one serving per day) had statistically significant and positive effects on birthweight and fetal growth. - The study supports that preconception maternal health status and health-related behaviors can impact birthweight and fetal growth independent of prenatal and socioeconomic variables.
D'Angelo, et al., 2007 (Surveillance)	Women who delivered a live born infant	To monitor selected maternal behaviors and experiences that occur before, during, and after pregnancy among women in selected states and cities in the United States	- The prevalence estimates and the majority of indicators suggest that a substantial number of women would benefit from preconception interventions - These results illustrate the disparities among age and racial/ethnic subpopulations, especially with respect to pre-pregnancy medical conditions and access to care before conception and postpartum.
Hogan et al. 2013 (Prospective cohort)	African-American women (N=19)	To understand how social and structural contexts shape individual risk, vulnerability, and interconception health-related behaviors of African-American women	- Experiences grounded in the interactions of racism, class, gender, and history may influence participation in and the effectiveness of preconception and interconception health care. - African-American women's health and behaviors are influenced by an experience of racism structurally embedded and made more virulent by its intersection with class, gender, and history. - To improve women's interconception health and to reduce disparities, health promotion efforts should focus on the individual as the locus of intervention must concomitantly unravel and address the intertwining structural forces that shape individual circumstance

Table 2. Published Reviews and Guidelines on Preconception and Interconception Care for Health Practitioners (01/2005-04/2017)

Author, year (type)	Key Findings on Preconception and Interconception Care
Berg et al., 2013 (Policy strategies and recommendations)	- Provision of sexual and reproductive health care within a broad framework of population-based (men, women, lifespan) public health, prevention and primary care - Evaluation of alternative models of service delivery, including better integration of SRH care into primary care - Study of existing community-based models of services related to unintended pregnancy prevention to identify those with particular promise for vulnerable populations of women
Chandranipapongse et al., 2012 (Guidelines)	- Engaging in healthy lifestyle, discusses exercise, smoking, alcohol, psychosocial stress - Optimally managing chronic diseases; including morning sickness - Maintaining a healthy weigh - Multi-vitamins including folic acid - Up-to-date vaccinations
Dean et al., 2014 (Review)	- All women, but especially those who become pregnant in adolescence or have closely-spaced pregnancies (with interval less than six months), could benefit from nutritional assessment during the preconception period. - The effectiveness of nutritional interventions should be simultaneously monitored, and inform the development of improved delivery strategies and new interventions
Dean et al., 2014 (Review)	- Fundamentals of preconception care include: o Improving health and preventing pregnancy during adolescence o Promotion of birth spacing by increasing correct and consistent use of effective contraception - Additionally, the promotion of reproductive planning on a wider scale is closely interlinked with the reliable provision of effective contraception - Innovative strategies, such as community based health workers and peer educators, are needed to encourage girls and women to plan their families
Files et al., 2011 (Review)	- Key elements of reproductive life plans: o Desire for children o Age of the women and her partner o Maternal health o Number and spacing of children o Risk tolerance o Life context - Constructing a RPL: o Assessing readiness for contraception o Defining personal risk tolerance - Guiding the conversation with the right questions
Hoyt et al., 2017 (Review)	- PCC, including contraceptive care, is an important component of primary health care services for all women living with HIV with the potential for childbearing. - The goal of PCC is to ensure that every pregnancy is planned, well timed, occurs in the context of optimal maternal health and prevention measures to decrease the risk of HIV transmission to an uninfected partner and the infant is reduced. - Health care providers can be proactive in addressing the reproductive intentions and contraceptive practices and needs of every HIV-infected woman. - PCC is ongoing and starts when providers initiate nonjudgmental conversations with women at every visit about pregnancy intentions, contraception, and sexual health.
Lanik, 2012 (Review)	- Preconception care should focus on: o Medical history (reproductive, medication use, and vaccinations) o Chronic conditions (obesity, hypertension, diabetes) o Mental health concerns (depression) - Social and family history and current situation
Lassi, 2014 (Review)	- Details multiple intervention opportunities including: o Birth spacing o Preventing teenage pregnancy o Promotion of contraceptive use o Optimization of weight and micronutrient status o Prevention and management of infectious diseases

Author, year (type)	Key Findings on Preconception and Interconception Care
	○ Screening for and managing chronic conditions - Highlights packages of preconception interventions that can be combined and co-delivered to women through various delivery channels and provides a logical framework for development of such packages in varying contexts
Lassi, 2014 (Systematic Review)	- Maternal pre-pregnancy diabetic care is a significant intervention that reduces the occurrence of congenital malformations and perinatal mortality. - Preconception management of epilepsy and phenylketonuria are essential and can optimize maternal, fetal and neonatal outcomes if given before conception. - While prevention and management of the chronic diseases like diabetes and hypertension, through counseling, and other dietary and pharmacological intervention, is important, delivering solutions to prevent and respond to women's psychological health problems are urgently needed to combat this leading cause of morbidity.
Mahmud et al., 2010 (Review of guidelines)	- Guidelines were consistent in counselling about the risk of congenital malformation related to uncontrolled blood sugar, ensuring adequate contraception until glycaemic control, and monitoring metabolic control and medications - International guidelines for the care of women with diabetes who are contemplating pregnancy are generally consistent. - There is now a need to focus on guideline implementation via an examination of the barriers and enablers to successful implementation, and the applicability of the recommendations in the local setting.
Berghella et al., 2010 (Clinician Guidelines)	- PCC is defined as a set of interventions that aim to identify and modify risks to a woman's health or pregnancy outcome through prevention and management. - PCC should occur any time any provider sees a reproductive age woman. - Personal and family history, physical exam, laboratory screening, reproductive plan, nutrition, supplements, weight, exercise, vaccinations, and injury prevention should be reviewed in all women. - Women should receive the flu vaccine if planning pregnancy during flu season; the rubella and varicella vaccines if there's no evidence of immunity to these viruses; and tetanus/diphtheria/pertussis if lacking adult vaccination. - Specific interventions to reduce morbidity and mortality for both the woman and infant should be offered to those identified with chronic diseases, or exposed to teratogens or illicit substances.
Lu, 2007 (Recommendations)	- Every woman of reproductive age capable of becoming pregnant is a candidate for PC care, regardless of reproductive plans - PC care aims at identifying and modifying biomedical, behavioral, and social risks through preventive and management interventions. - Key components include: ○ Risk assessment ○ Health promotion ○ Medical and psychosocial interventions - Patients should develop a reproductive life plan that outlines personal goals about pregnancy based on the patient's values and resources. - This care can be provided in a primary care setting and through activities linked to schools, workplaces, and the community.
Delissaint et al., 2011 (Systematic review)	- Six categories were identified: ○ Frequency of alcohol intake prior and during pregnancy ○ Glycemic control/diabetes management ○ Physical activity before and during pregnancy ○ Pregnancy planning behavior ○ Cystic fibrosis carrier screening ○ Other risk factors - Knowledge, awareness, and beliefs of PC care don't lead to preconception health practice. - Younger preconception women and those with children were less likely to engage in PC health behaviors, but women with postgraduate education were more likely to practice PC care. - There is a need to educate young women regarding the importance and benefits of PC care
Toivonen et al., 2017 (Review)	- There is a major focus in the literature on the use of preconception folic acid use. - Overall, folic acid, alcohol, and cigarettes have consistently been topics of interest, while exposure to harmful environmental substances, stress, and sleep have been largely neglected. - Despite strong evidence for the importance of men's health during the preconception period, few studies included male participants. - Future research should focus on: ○ Including men ○ Assessing a wider variety of behaviors

Author, year (type)	Key Findings on Preconception and Interconception Care
	○ Consideration of behavioral intentions - Consideration of the relationships between preconception health knowledge intentions, and behavior
Wahabi et al., 2010 (Systematic/Meta-analysis)	- Preconception care is effective in reducing diabetes related congenital malformations, preterm delivery, perinatal mortality, and maternal hyperglycemia in the first trimester of pregnancy. - Preconception care lowers HbA1c in the first trimester of pregnancy.
Johnson et al., 2006 (Recommendations)	- Recommendations aim at achieving four goals ○ Improve the knowledge and attitudes and behaviors of men and women related to preconception health ○ Assure that all women of childbearing age in the United States receive preconception care services ○ Reduce risks indicated by a previous adverse pregnancy outcome through interventions during the interconception period, which can prevent or minimize health problems for a mother and her future children ○ Reduce the disparities in adverse pregnancy outcomes - The recommendations focus on changes in: ○ Access to care ○ Continuity of care ○ Risk screening ○ Appropriate delivery of interventions ○ Health behaviors of men and women of childbearing age - A series of specific action steps are provided for implementing each recommendation.

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