IMPORTANCE OF A TEAM RECOMMENDATION APPROACH ON HPV VACCINE UPTAKE

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\textbf{Purpose:} Little is known about how often parents speak with multiple healthcare team members about vaccination, or if all team members communicate similar messages about HPV vaccination. Therefore, using data from a national sample of parents of adolescents, we sought to examine HPV vaccine communication in the context of the healthcare team. The study aims were to assess: 1) the prevalence of discussing HPV vaccination with multiple providers on an adolescent’s healthcare team, 2) the prevalence of receiving a congruent recommendation for HPV vaccine during the healthcare visit, and 3) associations between these factors and HPV vaccine initiation.

\textbf{Methods:} In 2016, we conducted a national, cross-sectional, online survey of parents of adolescents (aged 11 to 17 years) who had discussed HPV vaccination with at least one member of their adolescent’s healthcare team. Multivariable logistic regression assessed associations between HPV vaccine initiation (≥1 dose) and having: 1) discussed HPV vaccination with multiple team members; and 2) received congruent recommendations about HPV vaccination.

\textbf{Results:} Of 795 parents, a little more than half (52%) reported discussing HPV vaccination with multiple members of the healthcare team. Most reported receiving congruent recommendations for (76%) or against (12%) HPV vaccination and a few (12%) received mixed recommendations. Parents who discussed HPV vaccination with multiple members of the healthcare team had the greatest odds of series initiation (OR=2.34, 95% CI: 1.61-3.40). Parents who received mixed versus congruent recommendations for HPV vaccination had lower odds of vaccination (OR=0.56, 95% CI: 0.33-0.95), and these odds were nearly the same as those who only received recommendations against HPV vaccine (OR=0.44, 95% CI: 0.27-0.72).

\textbf{Conclusions:} Findings suggest that a coordinated team approach to recommendations may be a facilitator of HPV vaccine uptake. Future research is needed to examine vaccine communication behaviors of all members of the healthcare team in order to 1) ensure all members give a congruent recommendation for HPV vaccination and 2) build effective vaccine communication interventions taking into account parent and patient exposure to multiple providers. Healthcare institutions should examine system and provider level approaches to providing multiple positive HPV vaccine recommendations at the same visit and overtime, plus consider clinical in-services to ensure that all members of the team understand the importance of a comprehensive communication strategy that promotes multiple opportunities to provide congruent and clear HPV vaccine recommendations to patients and families.

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DO HEALTH PROMOTION MESSAGES INTEGRATE PREGNANCY AND STI PREVENTION? A CONTENT ANALYSIS OF ONLINE INFORMATION FOR ADOLESCENTS AND YOUNG ADULTS

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Purpose: Recent evidence suggests that adolescent users of long-acting reversible contraception are less likely to use condoms and more likely to have multiple partners than users of oral contraceptives. Such findings have prompted calls for strengthening messages that integrate unintended pregnancy and sexually transmitted infection (STI) prevention within the context of health education and clinic-based counseling. We conducted a content analysis of web-based health promotion information for young people to assess the extent to which public health/clinical messages about unintended pregnancy prevention also address STI prevention.

Methods: In February 2017, we implemented a systematic Google search using keyword combinations related to adolescents and sexual and reproductive health. Two coders independently reviewed unique URLs from the first five pages of each keyword search to identify eligible websites. A website was eligible for inclusion if it was operated by a public health and/or medical organization in the United States and the URL reviewed included: 1) original content; 2) about sexual and reproductive health; 3) explicitly for adolescents and/or young adults. One coder then reviewed each website and systematically selected sexual and reproductive health content for adolescents/young adults following a defined protocol. Content was uploaded into qualitative analysis software and analyzed thematically.

Results: We identified 33 websites operated by a variety of public health/medical organizations, ranging from local health clinics to national medical groups. Websites generally contained separate sections about birth control and STIs organized by specific types of each. Most websites included at least one message that simultaneously addressed both unintended pregnancy and STI prevention -- most commonly that abstinence and condoms prevent both outcomes. Birth control information generally stated if a particular method did not protect against STIs; however, STI prevention strategies often did not accompany this information. Overall, messages recommending condom use with more effective contraceptive methods were noticeably less common. A few sites promoted this strategy in relation to back-up contraception. In general, messages that addressed both pregnancy and STI prevention did not include STI/HIV testing, vaccination, or pre-exposure or post-exposure prophylaxis (PrEP or PEP, respectively) as STI prevention options. Messages promoting emergency contraception usually did not address STI/HIV testing or PEP.

Conclusions: Findings suggest that online sexual and reproductive health content for young people may not sufficiently: structure information to simultaneously address unintended pregnancy and STI prevention; promote condom use explicitly for STI prevention in conjunction with more effective contraceptive methods; or include comprehensive STI prevention messages beyond mention of abstinence and condoms. These may be missed opportunities for promoting STI prevention in the context of increasing awareness of and access to highly effective contraception. Assessing the extent to
which clinic-based messages address both unintended pregnancy and STI prevention may also help inform recommendations for a more integrated approach.

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45.

FACTORS INFLUENCING THE ENGAGEMENT OF ADOLESCENTS IN ANTENATAL CARE SERVICES: LEARNING FROM THE EXPERIENCES OF YOUNG MOTHERS IN GHANA AND TANZANIA
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Purpose: The voices and specific needs of adolescents are currently underrepresented in the literature on antenatal and maternity care. The most recent World Health Organization (WHO) guidelines recommend a shift towards a women-centred approach to antenatal care (ANC) and emphasize a “positive pregnancy experience”, however at present there is limited evidence on how current ANC delivery models address the needs and experiences of adolescents. This study helps to fill this research gap by exploring the experiences and perceptions of primiparous adolescent women who have accessed antenatal care services. Specifically, we aimed to understand the major motivators and facilitators of antenatal care utilization among this age group to inform recommendations designed to enhance adolescent-friendly health services and to promote improved health-seeking behaviours among adolescents.

Methods: This multi-site qualitative study employed 14 focus group discussions with 112 adolescents aged 15-19 years in Singida Region in Tanzania and Volta Region in Ghana who had accessed antenatal care services during their most recent pregnancy. Transcripts were analyzed using conventional content analysis. Emergent themes were initially framed with reference to constructs of the Health Belief Model (HBM). However, given the multitude of factors affecting ANC utilization identified by study participants that were beyond the control of individual adolescents, the HBM was adapted to incorporate additional constructs from The Theory of Planned Behaviour and ecological models of behavior change such as Social Cognitive Theory. This adapted model was used as a guide to organize emergent findings from focus group discussion transcripts.

Results: While adolescent women’s health-seeking behaviours can be highly individualized, they are also strongly shaped by sociocultural and health system factors. In the adapted HBM, we posit that an individual adolescent mother is defined by a set of underlying personal characteristics, and this individual engages in a decision-making process about a health-related behavior – in this case, whether to access ANC. The decision-making process is dependent on individual-level decision-making, but is also couched within a set of household- and community-level variables. The latter set of variables was added based on a review of existing literature and emergent findings from the present study. Health service delivery factors were also introduced to the model to represent constructs from ecological models of health service utilization. These variables correspond to the most distal health systems and policy-level factors, which are largely out of individuals’ control yet indirectly influence adolescents’ uptake of ANC services. While this study was not designed to assess the relevance of the WHO’s recently published
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Global Standards for Quality Health-care Services for Adolescents, it is pertinent to note that participant narratives resonated strongly with several of these recommendations.

Conclusions: Interpreting results through an adapted Health Belief Model demonstrates that adolescent health-seeking behaviours can vary widely among individuals and within communities, are shaped by the opinions of family members and peers, and are intrinsically influenced by broader health systems-level factors. While the model presented here focuses specifically on ANC utilization, it may have applications for understanding how adolescents engage with health services more broadly.

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46.

CHILD MARRIAGE AND UNDERWEIGHT IN SUB-SAHARAN AFRICA: A 35 COUNTRY CROSS-NATIONAL STUDY
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Purpose: More than 125 million girls and women alive in sub-Saharan Africa today were married before their 18th birthday. This practice of child marriage violates international and regional human rights agreements, and has been shown to have negative health consequences on reproductive and psychosocial health. However, limited research empirically examines associations between child marriage and nutritional status, and no identified research rigorously investigated these relationships across several sub-Saharan African countries. The aim of this study is to establish the extent to which child marriage contributes to female underweight status.

Methods: We compiled data of ever-married adult women from 1991 to 2014 using 103 Demographic and Health Surveys (DHS) across 35 African countries. Child marriage is measured as both a binary (before 18 years) and categorical (before 14, 14-15 years, 16-17 years) variable to account for early and very early marriages. Underweight is measured as a body mass index of less than 18.5, and we conducted additional analyses using a more extreme underweight status of body mass index of less than 16. We ran partially- and fully-adjusted multivariable logistic regression models to estimate associations and further conduct sensitivity analyses.

Results: More than 1 in 2 women (55%) married before their 18th birthday. Women married before age 18 had 19 times the odds of early motherhood (OR=18.7, 95% CI [18.1, 19.3], p<0.001), 69% reduced odds of completing secondary school (OR=0.308, 95% CI [0.288, 0.329], p<0.0010), and 10% reduced odds of being in the wealthiest quintile (OR= 0.895, 95% CI [0.847, 0.945], p<0.001), conditional on community fixed-effects and primary school completion. Despite these associations, child marriage was associated with 8% reduced odds of being underweight (OR=0.921, 95% CI [0.899, 0.944], p<0.01). This relationship was not consistently observed in country-specific models.

Conclusions: Although child marriage is associated with reduced socioeconomic status, it does not appear to substantially increase the risk of being underweight among ever-married women. However,
child marriage continues to occur during adolescence, a time where rapid development takes place that can have lasting impact on a woman's life. This research importantly highlights a need for further empirical research to understand the determinants of undernutrition in sub-Saharan Africa and to investigate the intersection between socioeconomic status and women.

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47.

THE HEALTH PROFILE OF MALAYSIAN ADOLESCENTS FROM 1990-2015: A SYSTEMATIC ANALYSIS OF BURDEN OF DISEASE DATA

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Purpose: Major shifts in health profiles of adolescents due to the rapid epidemiological transition experienced in developing countries signals timely reporting and effective strategies are required. In this study, we report the health profile of Malaysian adolescents aged 10-24 years from 1990 to 2015 using mortality, disability, injuries and health risk factors.

Methods: Data were extracted from the Global Burden of Diseases, Injuries, and Risk Factors Study 2015 (GBD 2015) for all-cause mortality, cause-specific mortality, years-lived with disability (YLD), disability-adjusted life years (DALYs) and health risk factors from 1990-2015, for 10-14, 15-19 and 20-24 years, for both sexes. We then assessed how observed levels of DALYs differed from expected trends calculated with the Socio-demographic Index (SDI), a composite indicator constructed from measures of income per capita, average years of schooling, and total fertility rate.

Results: All-cause mortality, YLD and DALYs decreased between 1990 and 2015 for all age groups and sexes. By 2015, all-cause mortality and all-cause DALYs was highest in young men aged 20-24 years (140.7/100,000 and 41,345.8/100 000 respectively), while YLD was highest in females aged 20-24 years (8247.7/100 000). Motor-vehicle accidents were the principal cause of deaths for adolescents aged 15-19 and 20-24 years of both sexes. Anxiety disorders were the leading cause of disability for males and females aged 15-19 years and for 10-14 year old females, with iron deficient anaemia (IDA) as the leading cause of disability in 10-14 year old males. There has been increased disability due to intestinal nematode infections in female adolescents, with prevalent disability due to major depressive disorder, conduct disorder, bipolar disorder and schizophrenia in adolescents of both sexes. The prevalence of overweight and obesity increased to 22.6% and 21.7% for male and female adolescents respectively, while the daily smoking rate decreased to 18.6% in males. Observed DALYs were above expected levels for neglected tropical diseases and malaria, diarrhea, lower respiratory infections, neonatal disorders
and maternal disorders for all age groups and sexes. In contrast, observed DALYs fell below the level expected for nutritional deficiencies, HIV/AIDS and tuberculosis and physical disorders.

**Conclusions:** The health status and wellbeing of adolescents in Malaysia is improving. These data highlight the need to ensure health actions address the high mortality and morbidity from injuries and NCDs. The impact of IDA and intestinal nematode infections to communicable diseases in adolescents warrant expanding cost effective intervention including supplementation and food fortification. Coordination across sectors is needed to address the broader determinants of adolescent health.

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48.

**PERSPECTIVES ON THE USE OF A HEALTH SURVEILLANCE SYSTEM FOR GUATEMALAN YOUTH: A STAKEHOLDER ANALYSIS**

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**Purpose:** In Guatemala, adolescent health indicators are collected using the Sistema Informático del Adolescente (SIA), an approximately 180-item clinical survey developed by the Pan American Health Organization (PAHO/WHO). Recent analysis of measures revealed significant gaps in data, limiting the ability of clinicians, public health officials, and policy makers to effectively address health disparities. The objective of our study was to qualitatively explore adolescent health stakeholders’ perceptions of the SIA health surveillance system.

**Methods:** We conducted in-depth, individual, semi-structured interviews with clinic personnel involved in implementation of the SIA questionnaire. Participants were recruited by purposeful sampling from six dedicated Adolescent Health clinics throughout Guatemala. Groups of stakeholders included: (1) multi-disciplinary adolescent health providers responsible for administering the questionnaire, and (2) key database personnel involved in data entry and system oversight. Interviews were conducted in Spanish, recorded, and transcribed verbatim. A coding scheme was developed using a grounded, inductive technique; data was classified using these codes, and NVIVO program was used for analysis.

**Results:** Twenty participants were interviewed; 80% were female, and 25% were practicing primarily at the main clinic site in Guatemala City. Four major themes emerged during interviews: (1) Perceived mixed utility of the current data collection system. Participants felt that although the SIA questionnaire was burdensome to complete, there was value in collecting baseline health data from adolescent patients. They reported that the SIA questionnaire provided opportunities to identify issues such as food insecurity and mental health concerns that may otherwise not have surfaced during the clinic visit. (2)
Challenges in data collection. Participants identified several key factors that made survey completion difficult, including provider or patient discomfort with sensitive questions, difficulty interpreting certain questions, and lack of confidentiality with parents/guardians of adolescents remaining present throughout most patient encounters. In addition, participants overwhelmingly reported that the lengthy duration of survey administration impacted survey completion. (3) Lack of provider motivation. Providers expressed frustration with not consistently being shown results from the SIA survey despite their dedication to survey administration. They noted that survey results did not appear to impact clinical care in any way. Although they acknowledged potential for research opportunities with such robust data collection, the system itself posed significant technical challenges in data entry and extraction. (4) Potential to improve current system for future use. The majority of participants responded in favor of an abbreviated, user-friendly web-based survey system, which would streamline data collection and minimize disruption of clinic flow.

Conclusions: Multiple barriers including length of survey, lack of confidentiality, and minimal provider buy-in contribute to gaps in comprehensive and accurate adolescent health data collection in Guatemala, despite use of a standardized country-wide system. Even with these barriers, stakeholders are highly receptive to collecting adolescent health indicators in a clinical setting. Efforts to refine the system using stakeholder input may reduce these gaps in data, and have the potential to enhance adolescent health surveillance, ultimately leading to improved quality of care in this vulnerable population.

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model of drop-in, group-based reproductive health events where young people receive sexual health education and have the option to see a clinician for birth control or STI testing. In Atlanta, GA, the project is developing a coordinated care model that incorporates a health center and a refugee resettlement agency. In Tucson, AZ, the project is implementing a telehealth model of providing care to youth from community youth-serving organizations. This project is funded by an anonymous private foundation.

Results: Challenges and lessons learned from the initial year of project implementation in three communities, including needs assessment and focus group findings will be presented, including experiences expanding youth-friendly services, LARC access through pediatric clinics, creating formal linkages and referrals between youth-serving organizations and clinics, and tailoring services to youth with specific needs, such as foster care youth, homeless youth, and recently arrived refugees.

Conclusions: Despite national decreases in the rate of unintended teen pregnancy, additional strategies are needed to reach youth who are at increased risk or who face increased barriers to obtaining information and clinical services. This project aims to develop strategies to reach vulnerable populations through collaborations between clinics, youth-serving organizations, and youth themselves, and to disseminate models and lessons learned to other communities and organizations.

Sources of Support:

50.

NATURAL LANGUAGE PROCESSING APPROACHES TO UNDERSTAND HPV VACCINATION SENTIMENT
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Purpose: The widespread use of social media data presents a unique opportunity for researchers, clinicians, and policymakers interested in having an impact on HPV vaccination. These data provide dynamic insights that can be used to develop new strategies to increase vaccination rates and combat false narratives prevalent throughout social networks. This exploratory study uses natural language processing (NLP) techniques to examine the ways in which people use social media to talk about HPV vaccination. We have developed and automatic processing algorithm to score tweet sentiment, to better understand how positive and negative messages are spread about HPV vaccination and to begin to identify strategies for effectively combating incorrect information.

Methods: R was utilized to scrape publicly available twitter data based on keywords related to the terms “HPV” as well as “vaccines.” A comprehensive cleaning process was performed that removed tweets that were not in English, tweets that had been retweeted, and removed any identifying information. This dataframe was then used both qualitatively and quantitatively for algorithmic development. Qualitative analysis involved a comprehensive reading of tweets to ensure that they met the inclusion criteria as well as development of a sentiment dictionary that would help to automatically process and score tweets based on positive and negative feelings about HPV vaccination. Quantitatively, Ngram frequency clouds were developed based on the lemmatized words in the corpus of tweets to show
frequencies of different words and word combinations. Finally, each tweet was analyzed based on this new HPV Vaccine Sentiment Dictionary to score and classify the tweet as positive or negative sentiment.

**Results:** 500 unique HPV vaccination tweets were used as a test set to develop a dictionary of terms that would help a machine learning (ML) algorithm understand if a tweet was generally about pro or anti-vaccination ideas. Qualitative insights were then generated to understand types of words and hashtags that could be used to help a ML system understand the difference. After those results were included in the algorithm, a larger group of tweets was pulled using this refined method resulting in 5,000 tweets from 06/2017-08/2017. After sentiment analysis, the full corpus was found to have 34% positive sentiment about vaccination, 41% neutral/non classified sentiment, and 25% negative sentiments.

**Conclusions:** There appears to be more positive sentiment being expressed around HPV vaccination than negative. However, it is possible that negative sentiments are having a broader and deeper impact than positive tweets. While the language used on twitter can be challenging, it is possible to automatically process HPV vaccine related tweets to understand if they are pro or anti-vaccine. This system could be fed into an autonomous AI chatbot system, similar to ones shown to be effective in reducing hate speech, bullying, and depression, that could appropriately respond to negative sentiments about HPV vaccination and respond by offering factual information to counter untrue statements as well as providing information on local resources for those who may be questioning the value of HPV vaccination.

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