Measuring maternal health literacy in adolescents attending antenatal care in a developing country – the impact of selected demographic characteristics

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Abstract

Aims and objectives. The aim of this paper is to describe how selected demographic characteristics "explain" the observed variance in the distribution of maternal health literacy (MHL) estimates in adolescents attending antenatal care in Uganda, as estimated by the "Maternal health literacy scale" (MaHeLi scale).

Background. By the age of 20 years more than 60% of Ugandan females are mothers. In the Busoga region of Uganda, the percentage of pregnant adolescents and adolescent mothers is at its highest (above 30%).

Design. Validated questionnaire survey.

Methods. The MaHeLi scale was administered to 384 adolescents aged 15–19 years attending antenatal care in Jinja and Iganga districts of the Busoga region during the period of July 2013–December 2013. The Mann-Whitney U test in SPSS20 was used to determine if the two levels of

dichotomized person factors (demographic characteristics), not following normal distributions, relate to "significantly" different mean MHL estimates as measured by the MaHeLi scale.

Results. The person factors; age, education level, pregnancy order and pre–pregnancy awareness about conception explained approximately 12% of the observed variance in MHL estimates.

Conclusions. Pre–pregnancy awareness about conception was the single most contributory factor to the observed variance in estimated maternal health literacy levels. More research on women of child-bearing age is warranted to explore the impact of further demographic characteristics on the MHL in pregnant adolescents.

Relevance to practice.

Using the person factors found to show ~~"significantly"~~ "significant" impact on MHL in pregnant adolescents, target-specific interventions aimed at improving MHL in pregnant adolescents can be formulated. By accounting for these factors in reproductive health policy designs, one might take preventive actions to curb the prevalence of adolescent pregnancies in both developing and developed countries.

"What does this paper contribute to the wider global clinical community?"

- This paper contributes to the international knowledge base on the motivations and abilities of pregnant adolescents in developing countries to gain access to, understand, and use information in ways that promote and maintain their health and that of their children. This issue is of great international interest and concern and relevant to a wide spectre of clinical practice.

- By applying multiple correlations (R squared) with maternal health literacy level for groups of demographic variables, the combined effect of several demographic variables is identified.

- Findings from applying the MaHeLi scale to adolescents that share socio–demographic characteristics can be used to isolate possible social and cultural predictors of pregnancy during adolescence. This information can be vital in the development of appropriate preventive–approaches by key policy makers in developing countries. Findings from this study can hence be applied on an international level, across a number of fields related to

maternal, adolescent, reproductive health, health communication and health literacy. In the field of health communication, these findings can be used to design target–specific messages that focus primarily on the challenges faced by female adolescents.

Introduction

Health literacy, especially in adolescents in developing countries, is fast becoming an issue of public health concern (World Health Organization 2012). Relatedly, is maternal health literacy (MHL) in female adolescents, which is attributed to the increasing prevalence of adolescent pregnancies. It is of key importance therefore that the factors associated with variability of MHL in these adolescents are isolated and used as premises to devise approaches aimed at reducing the undesirable health–related outcomes of pregnancy during adolescence. This paper gives an insight into the significance of selected demographic characteristics, or "person factors", on MHL in pregnant adolescents in Uganda – a low/middle income developing country in East Africa.

With 18% of the overall world population being adolescents – defined by the World Health Organization as individuals aged 10–19 years (World Health Organization, 2012); the focus on adolescent reproductive health is of key importance. Coupled with this is adolescent pregnancy, which has been described both as a "development issue" and a "health issue" (United Nations Population Fund 2013, p.1). With up to 11% of all global annual births being by adolescents aged 15–19 years, 95% of whom are in low and middle income countries, this is indicative of the magnitude of the issue (World Health Organization, 2012).

Background

With adolescent birth rates as high as 24% in countries like Uganda, a lot remains to be done to reduce the number of adolescent pregnancies. A demographic and health survey in Uganda revealed that by the age of 20 years, 63% of women were already mothers (Uganda Bureau of Statistics & ICF International 2012). These findings were attributed to an inter–play of "social, economic and cultural norms" that encourage marriage and childbearing at an early age (Sekiwunga & Whyte, 2009). While it might be supposed that the existence of these norms should make adolescent pregnancy acceptable, this is not the case. Adolescent pregnancy in Uganda is still considered a problem because of the negative health and societal impact it has on both the personal level – the adolescents and their children – and the social level – the local communities and the public as a whole.

The prevalence of adolescent pregnancy is reflective of the exposure to sexually transmitted diseases and is a predisposing factor to complications such as obstetric fistula and post-abortion

complications. Coupled with this is poor mental health and the high mortality rate associated with adolescent pregnancy; with up to 13% of adolescent deaths attributed to maternal-related conditions (Mangiaterra et al. 2008). The health of the newborn is also impacted negatively with higher rates of morbidity and a 50% higher rate of perinatal deaths reported among babies born to mothers aged less than 20 years as compared to those born to mothers aged 20-29 years (World Health Organization, 2011). Furthermore, these infants are pre-disposed to diseases that are associated with fetal origins of adult disease. The societal impact of adolescent pregnancies can't go unnoticed with increased population growth rates, increased poverty among adolescent mothers, and high rates of dropout from school, being attributed to adolescent pregnancy (Mangiaterra et al. 2008).

While pregnancy during adolescence, in comparison to pregnancy at an older age, might confer health related benefits to the mother and child like reduced pregnancy complications and lower risk of stillbirths. However, the negative implications seem to outweigh and pose greater challenges. It is therefore judicious that the rise in adolescent pregnancies in both developed and developing countries be curbed.

Several person factors have been suggested as possible contributory factors to the observed levels of health literacy in adolescents in developing countries. These include among others; the possession of basic literacy skills in reading and writing, which has been associated with (functional) health literacy, defined as the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use the information in ways which promote and maintain good health (Nutbeam, 2000).

Level of education is a strongly related factor to "basic literacy skills" and a low level of education has been identified as a contributory factor to the occurrence of adolescent pregnancy (Wallace, 2011). Literature further supports this notion with evidence obtained during the development and validation of the REALM–Teen, a health literacy assessment tool for adolescents, in which students who had a higher level of education were found to score higher on the assessment tool (Davis et al., 2006). This strengthens the premise that "the higher the level of education one attains, the higher the level of health literacy one attains". Further, access to

reproductive health information has been found to have a positive impact on the health literacy in adolescents (Paek et al. 2010).

Social support, a compound of "social network", "support behaviour" and "perceived support" has been identified as a prerequisite to foster and promote psychosocial development among adolescents and to help them negotiate development tasks (Mercer, 2004). Raatikainen et al. (2005) suggested that perceived social support might help adolescents to share their pregnancy related burdens, thus helping them to cope with the pregnancy. Similarly, Logsdon and Davis (2003) attribute the abilities to seek and apply additional health-related information to adolescents' levels of perceived social support.

Self-efficacy, defined by Bandura (1997) as the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations, has been cited as a determinant of how people think, behave and feel. Associations between positive self–perceptions of parenting and a high degree of hope and vision for the future of the new–born, have been reported in literature (Spears, 2001). This supports the notion who have high self–perceptions are better motivated to be better parents (DeVito, 2007).

Owing to the impact of health literacy on the overall outcome of one's health, Borzekowski (2009) argues the need for adolescents to be equipped with health literacy skills early in life as only then are they best equipped to make positive heath choices. These skills, when utilized by pregnant adolescents, would translate into MHL, defined as the cognitive and social skills which determine the motivation and ability of women to gain access to, understand and use the information in ways to promote and maintain their health and that of their children (Renkert & Nutbeam, 2001).

Various measurement tools have been developed to measure health literacy in adults. Based on these, some adolescent–appropriate tools have been derived. These include the REALM–Teen, based on the Rapid Estimate of Adult Literacy in Medicine (REALM) and The test of Functional Health Literacy in Adults (TOFHLA) (Davis et al. 2006, Davis et al. 1993, Parker et al. 1995). The use of these tools is limited as they focus on word recognition and reading comprehension, and don't assess other aspects of health literacy such as critical thinking skills (Nielsen–Bohlman, et al. 2004). These instruments therefore can't be applied to adolescents that are unable to read and write. As no appropriate MHL questionnaire assessment instrument

exists, the "Maternal health literacy scale" (MaHeLi scale) was developed (Authors, 2013), applied and validated (Authors, 2014). The aim of this paper is to describe how selected demographic characteristics "explain" the observed variance in the distribution of MHL estimates in adolescents attending antenatal care (AC) in Uganda, as estimated by the MaHeLi scale.

Method

The target population of this study was pregnant adolescents aged 15-19 years that attended AC in the health centres in the Jinja and Iganga districts of the Busoga region in the East-Central part of Uganda during July 2013-December 2013. This part of Uganda is of particular interest as it has the highest percentage (above 30%) of pregnant adolescents and adolescent mothers in Uganda (Rutaremwa, 2013). For this reason, it was judicious that the study be conducted in this part of the country.

To determine the "critical" sample size – the least number of respondents necessary to be able to generalize from a randomly selected sample to the population – the 'online sample size calculator' (Creative Research Systems, 2011) was used. By setting a 95% confidence level, the resultant sample size was estimated to 384 individuals. Even though the sample of respondents in this study not was randomly selected, this number was used as a guideline for a "representative" sample of sufficient size.

For practical reasons the data had to be collected during the period July 2013-December 2013 using a paper-and-pencil questionnaire. It was decided to include ten health centres to collect the sufficient number of respondents within the available time interval. To help reach a representative sample of individuals, the health centres were randomly selected from lists provided by the District Health Officer in the respective districts. In each district, three categories of health centres – the centre at the main referral hospital located at the district level, one centre at the county level, and three centres at the sub county level – were purposively selected based on the structure of the Uganda health care system.

Our sample might accordingly be recognised as "randomized clusters of individuals". However, the similarities, or homogeneity, between the individuals in a cluster is not believed to significantly reduce the variability of responses as data were collected on the first antenatal visit at the health centre (i.e., the visit at which the female is clinically diagnosed as being pregnant).

Hence, no individual had yet been affected by antenatal attendance so no homogeneity should be imposed. Collecting respondents on their first antenatal visit also helped avoiding repeated counting of individuals.

Data collection

To guarantee that only pregnant adolescents were included in the study, nurses at the health centres provided a list of names of pregnant females aged 15–19 years to the research assistants.

Due to possible cases of low reading literacy, trained research assistants fluent in both English and Lusoga, administered the questionnaires by reading and offering further examples and statements for the respondents. To ensure uniform interpretation and translation of the statements from English to Lusoga, guiding examples or statements were issued for selected items which, during a pilot study in the period of 8th–11th July 2013, were found to need clarification.

Ethical considerations

The health authorities in Uganda granted approval to conduct this study. The lists of names of possible respondents (pregnant adolescents) were handled appropriately to ensure confidentiality by assigning a unique code to each possible respondent. The de-identified data was used in the analyses reported from the study. The adolescents had to give written consent before participation in the study. The consent form was offered in the native language, Lusoga, to ensure that the respondents fully understood the purpose of the study.

The assessment instrument

The 12-item version of the MaHeLi scale reported in this study (Authors, 2014) includes two subsets of items (see Table 1) assessing the "appraisal of health information" (AHI) aspect and the "competence and coping skills" (CCS) aspect of MHL. The Health belief model and the Integrated health literacy model (Glanz et al. 2002; Sørensen et al. 2012) formed the basis for item development. In addition, information on demographic and reproductive health factors was collected using five additional items.

The AHI aspect of MHL encompasses cognitive skills like comprehension, analysis, synthesis and evaluation that enable one to understand the relevance and application of

information provided. The lack of health information appraisal skills has been attributed to inadequate health literacy With regard to health literacy, inadequate health literacy has been found to compound the issue of lacking information appraisal skills (O'Dell, 2012). Accordingly, the items measuring the AHI aspect of the MaHeLi scale emphasized the cognitive skills relevant in the interpretation, application and evaluation of health information.

The competence and coping skills, particularly perceived maternal role competence, refer to the self-evaluative judgments that mothers have about their ability to accomplish their maternal role tasks in pursuit of attaining adequate health status for themselves and their children (Pintrich & Schunk, 1996). In addition, well balanced and interdependent family relationships have been associated with increased wellbeing and positive health behaviour among pregnant adolescents (Stevenson et al. 1999). The items in the CCS subscale of the MaHeLi scale aimed at evaluating the adolescents' cognitive abilities and their perception of social support accorded to them during pregnancy. The cognitive skills included problem–solving competences, coping skills, decision making competences, and social skills as interpersonal and communication skills.

TABLE 1 IN HERE

Data analysis

The data, collected by applying the MaHeLi scale, had earlier been validated (Authors, 2014) by applying the partial credit parameterization of the polytomous unidimensional Rasch model using the software RUMM2030. The key Rasch analytical techniques conducted were i) tests of fit to the Rasch-model, ii) tests for bias within items referred to as "differential item functioning (DIF)", iii) ordering of response categories, and iv) analyses of local independence.

Results supported the use of a 12-item version of the original 20-item version of the MaHeLi scale (Authors, 2014). Using RUMM2030, MHL estimates were computed based on responses to the 12-item version of the MaHeLi scale. Importing the estimates to SPSS20, Mann-Whitney U tests were applied to determine if the two levels of the selected dichotomised person factors had "significantly" different mean MHL estimates. One example is the two levels "Completed

Primary 5" and "Less than Primary 5" of the person factor "education level". As the respondents were not randomly selected, a distribution of proficiency estimates will not follow a normal distribution. The Mann-Whitney U test, which is a non-parametric version of the "t-test", was therefore applied.

Results

Based on the descriptive demographic characteristics, the study sample was reasonably representative; with half of the respondents (49%) aged 15 years and half were aged 16-19 years. Almost two-thirds (62%) of the respondents had attained at least primary five school–level education, primary five level of school education while (38%) had attained less than primary five school–level education. For the majority of the respondents (70%) this was their first pregnancy, while 30% reported that they had been pregnant before.

TABLE 2 IN HERE

Correlations with MHL estimates for single demographic variables and multiple correlations for groups of variables (R squared model)

A summary of the results of the Mann–Whitney U tests are shown in Table 2. "Significant" different mean MHL estimates, as measured by the 12-item version of the MaHeLi scale, were observed (see Table 2) for the dichotomised person factors "age" (to the 5% level), "education level" (to the 1% level) and "pregnancy order" (to the 1% level). As age influences both the pregnancy order and the education level of adolescents, the bivariate correlation between MHL estimates and the person factors "pregnancy order" and "education level" were adjusted by calculating the partial correlations controlling for "age" (see Table 3). Using simultaneous regression (R squared model) all variables were treated simultaneously and on an equal footing. The result showed that the four person factors reported in Table 3 "explained" approximately 12% of the observed variance in MHL estimates. The single person factor "Pre–pregnancy awareness about conception" accounted alone for 8% of the variance.

TABLE 3 IN HERE

Discussion of results

Similar to findings from a study done by Paek et al. (2010), in which adolescents who had a higher frequency of getting health information were found to have a higher level of health literacy, this study showed that the person factor "pre-pregnancy awareness about conception" correlated positively and strong with MHL estimates as measured by the MaHeLi scale. This was indicative that access to, and application of, reproductive health information might be associated with higher level of health literacy in adolescents.

The number of times that a woman has been pregnant, referred to as "pregnancy order" in this study, was seen to be the person factor that contributes least to MHL in adolescents. These findings are consistent with results from studies related to AC seeking practices which indicated that women who had been pregnant more than once sought AC services later than their counterparts, for whom this was a first pregnancy (Ochako et al. 2010). This signifies the notion of "perceived self–efficacy" whereby the mothers feeling competent enough to meet their health needs and those of their children.

Associated with the person factor "age", this study revealed a "significant" difference in mean MHL estimates in adolescents aged 15 as compared to those who were 16-19 years old. The older adolescents had higher mean MHL estimates than their younger counterparts. As reflected in previous studies, younger adolescents lack the knowledge and motivation to utilize available health services for themselves and their children (Kamal et al., 2013). In comparison, older adolescents tend to have a higher level of "self-efficacy" and are more competent in the navigation of health services and application of the health information given to ensure more positive health outcomes for themselves and their children (DeVito, 2007).

A significant difference was also noted among the adolescents in relation to the person factor "level of education attained"; categorized in this study as 'completed primary five' or 'completed less than primary five'. Adolescents that had completed at least primary five, were found to have better health information appraisal skills than those that had not attained as much as primary five level education. It can thus be presumed that health seeking and health-system navigation skills

are conveyed to school-going children while in upper primary. This finding is in support of previous studies in which adolescents with a higher level of education were found to have a higher health literacy score (Davis et al., 2006).

From these findings, a key observation is made; in relation to MHL, older adolescents that have attained up to primary five level of education and have access to pre-pregnancy awareness about conception have an advantage compared to their younger, less educated counterparts. These findings therefore highlight the need to make available to younger adolescents timely and appropriate information about conception, using other channels besides formal primary school education; to ensure that their MHL skills are equally enhanced.

The four person factors assessed in this study showed themselves to account for approximately 12% of the observed variance in MHL estimates as measured by the MaHeLi scale.

This was attributed to the limited range of person factors that were sought out in this study. The range was somewhat limited as the study was conducted in a sample with shared demographic and socio–environmental characteristics. Inclusion of more varied person factor determinants of health literacy, that are applicable to a more diverse sample, would most probably give a better insight into the demographic characteristics that have an impact on the MHL in pregnant adolescents.

Limitations of the study

The study was carried out among pregnant adolescents attending antenatal clinics run at health facilities. By virtue of the fact that the adolescents were already at the health centres, this was an indicator that they had some level of health literacy in terms of health seeking behaviours. An ideal method of sampling would be random; in which the adolescents are found within their communities.

The study was self–reported and relied on the adolescents' ability to recall happenings that occurred prior to the pregnancy. This introduced a certain degree of "recall–bias" into the study. In addition, it might be possible that the respondents gave answers influenced by social desirability.

Relevance of study

Findings from the overall assessment program, which aimed at developing and validating a MHL scale for pregnant adolescents attending AC and explain observed variance in MHL estimates, can be applied on an international level, and across a number of fields related to maternal, adolescent, reproductive health, health communication and health literacy.

Findings from applying the MaHeLi scale to other groups of adolescents that share certain socio–demographic characteristics might be used to isolate possible social and cultural predictors of pregnancy during adolescence. This information can be vital in the development of appropriate preventive–approaches by key policy makers. In the field of health communication, these findings can be used to design target–specific messages that focus primarily on the challenges faced by adolescents during pregnancy.

Further, based on the scores obtained from the MaHeLi scale, individual health–care providers can use the instrument as a screening tool to identify female adolescents with low MHL, who might need support to utilize the health information for the benefit of themselves and their children.

The observed gap that seems to exist between knowledge about contraceptive use and the use of contraceptives can be addressed using findings based on applying the MaHeLi scale. A holistic approach that involves caregivers, adolescent boys and adolescent girls, needs to be adopted in order to warrant the use of contraceptives among sexually active adolescents. Provision of free contraceptives and information on its use at points where especially female adolescents can discreetly access it, is a starting point, as this would eliminate the stigma associated with procurement of contraceptives.

To ensure that adolescents have access to appropriate reproductive health information, schools can be used as a point of entry. Early inclusion in the school curriculum of reproductive health education will avail the adolescents with the information required to make health promoting decisions. Coupled with the above is community peer–tutoring, especially for those adolescents that might not be enrolled in the formal education system. Engaging adolescents in community activities that are geared towards educating adolescents about reproductive health might create a sense of trust among many of the adolescents since their peers are involved.

Conclusion

While the newly developed and validated 12–item MaHeLi scale has been found to be well–targeted and applicable to pregnant adolescents, further research on clinical samples is warranted to explore the impact of further person factors on pregnant adolescents' MHL.

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LIST OF TABLES

Table 1. The wording of the items in the AHI subscale (items 7 and 9–14) and in the CCS subscale (items 15–19) of the 12–item version of the MaHeLi scale. Items originally stated in English.

Item	Wording
7	In addition to scheduled hospital visits, I take initiative to seek for health information
9	I can explain with ease health information received to others
10	Based on the health information received, I can identify and interpret symptoms of health risk
11	I am able to follow written health instructions
12	I have an idea about what to expect during pregnancy and postnatal period
13	I can discern pregnancy–related myths from accurate health information
14	I find it easy to recall health information previously received
15	I feel confident that I can independently follow health recommendations correctly
16	I feel that my input into the planning for the care of the child is valued
17	I can comfortably rely my health concerns to the people around me
18	I can use the health information to monitor and self–regulate my health
19	I have remained active in social gatherings as I did before the pregnancy

Table 2: Results of tests for significant difference using the Mann–Whitney U test

Person factor	The two person factor levels (n persons)	Mean MHL estimates (Rasch model estimates in logits)	Mann–Whitney U test
Age	15 years old (189)	−0.112	0.028*
	16–19 years old (194)	0.094	
Pregnancy order	First (266)	−0.030	0.430
	Other (114)	0.045	
Education level	Completed Primary 5 (237)	−0.252	0.000**
	Less than Primary 5 (147)	0.147	
Pre–pregnancy awareness about conception	Yes (299)	0.131	0.000**
	No (85)	−0.483	

Significance is reported to the 95% level (*) and the 99% level (**)

Table 3: Correlations with MHL estimates for single demographic variables and multiple correlations for groups of variables (R squared model).

Person factor	The person factor levels and their associated variable values	Bivariate correlation with MHL	Partial correlation with MHL controlling for age	Bivariate correlation squared and multiplied by 100 (% explained variance)
1) Age	15 years old = 1 16–19 years old = 2	0.235	N/A	5.52
2) Pregnancy order	First = 1 Other = 2	0.038	–0.004	0.14
3) Education level	Completed Primary 5 = 1 Did not complete Primary 5 = 2	0.216	0.159	4.67
R squared person factor 1–3				**8.0**
4) Pre–pregnancy awareness about conception	no = 1, yes = 2	0.283	0.243	8.00
R squared person factor 1–4				**12.2**