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ORIGINAL ARTICLE

Patterns of the utilization of prenatal diagnosis services among pregnant women, their satisfaction and its associated factors in Viet Nam

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Abstract
Objectives This study aimed at understanding the patterns of the utilization of prenatal diagnostic (PND) services among pregnant women, their satisfaction and its associated factors at three regional prenatal diagnostic centres in Viet Nam.
Methods A cross-sectional design was used, with a consecutive sampling method to recruit pregnant women who used PND services at the three biggest regional PND services centres in Viet Nam between January and June, 2014. A total of 298 participants, about 100 participants per centre were interviewed and included in data analysis. Descriptive analyses and logistic regression methods were applied to identify association between satisfaction of women and their socio-economic characteristics.
Results 80% of pregnant women received counselling on PND services, whilst 90% received ultrasonography services; 65.4% were satisfied with the PND services they used. Pregnant women, who were in a lower income group and received counselling but did not receive ultrasonography, were more likely to have higher satisfaction levels of PND services.
Conclusions A process to ensure that every pregnant woman receives sufficient PND counselling before and after receiving PND testing must be given careful and thorough consideration.

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Introduction

It is estimated that 7.6 million children are born every year with either severe genetic conditions or congenital malformations. Of them, more than 90% are in low or middle income countries (World Health Organization 2005). Technological developments for screening and diagnosis tests of congenital malformations are considered important public health interventions to reduce infant and childhood mortality and increase the quality of life of the population (Wertz and Fletcher 1993). Prenatal diagnosis services employ a variety of non-invasive and invasive techniques to determine the health and condition of an unborn foetus. The use of chorionic villus sampling (CVS) to obtain tissue for chromosomes or biochemical analysis, and the use of amniocentesis to obtain amniotic fluid for the analyses of chromosomes, enzymes, or DNA, are categorised as invasive techniques. In comparison, ultrasonography is an easy and safe non-invasive procedure and can be performed in routine programme checks, ultimately providing more choice for the reproductive autonomy of parents (Health Council of the Netherlands 2008).

In an attempt to improve the quality of life of the population, in recent years the Vietnamese government has paid attention to the increasing coverage of prenatal and new-born screening services, with a target to reach 15% of pregnant women receiving prenatal diagnostic (PND) services by 2015 and 50% by 2020 (Prime Minister 2011). The guidelines for prenatal screening and diagnoses for pregnant women in obstetric facilities were published in 2010 by the Ministry of Health (Viet Nam Ministry of

Health 2010). By 2014, three PND regional centres were established; one at the National Hospital of Obstetrics and Gynaecology (OBGYN) in Hanoi (in 2006); one at Tu Du Hospital in Ho Chi Minh City (HCMC) (2006); and one at Hue Medical Teaching Hospital (2010). These are the biggest PND centres and were responsible for providing technical PND support to provincial hospitals within the regions. The number of women receiving PND services in these centres is increasing. More than 100,000 PND services, which include screening, diagnostic and other specific genetic tests, were provided across the three PND centres in 2013 (Ha et al. 2016).

Despite the benefits of providing prenatal diagnostic services to pregnant women, there are various ethical issues to consider (de Jong et al. 2009, 2015; Edvardsson et al. 2015). There are large disparities in relation to accessibility and affordability of these technologically advanced treatments in environments with limited and out-dated resources (World Health Organization 2011). Prenatal diagnostic services that aim to detect foetal anomalies and pregnancy-related problems may violate the standard of non-directive counselling (de Jong et al. 2015). The issues of informed consent and the aim of prenatal screening have been researched and are debated (de Jong et al. 2015). In countries such as Vietnam, where preference is for the male sex, non-invasive prenatal diagnostic tests could be used to determine the sex of the foetus—which would enable sex-selective abortion (Belanger and Oanh 2009). Sex-selective abortion connected to ultrasound services in big cities such as Hanoi was reported (Gammeltoft and Nguyen 2007a, b).

This paper aims to outline the patterns of the use of prenatal diagnosis services among pregnant women, their satisfaction and its associated factors. Results reiterate the urgent need to improving the quality of prenatal diagnosis services in Viet Nam.

Methods

Study design

A cross-sectional design with a quantitative method approach was applied.

Study setting

The study was conducted in three regional PND centres: in the National Hospital of Obstetrics and Gynaecology (OBGYN) in Hanoi city; in Hue Medical Teaching Hospital in Hue city; and in Tu Du Hospital in Ho Chi Minh city. By 2014, Viet Nam only has three established regional PND centres (Ha et al. 2016).

Study subject

The subjects of this study were pregnant women, who visited three PND centres and received prenatal diagnosis services during the study periods (from February to May, 2014).

Sampling and sample size

The sample size was determined by a single population proportion formula with the following assumptions: level of confidence of the study 95%; sampling error tolerated 6%; proportion (p) of pregnant with PND services was 50%. The sample size was calculated as 267 pregnant women who were divided across the three centres. A consecutive sampling method was applied for recruiting women at the hospital.

Data collection

The first set of data was collected at the PND centre in the National Hospital of Obstetrics and Gynaecology (OBGYN) in Hanoi city, followed by data collection at the PND centre in Tu Du Hospital in Ho Chi Minh city, and finally at the PND centre in Hue Medical Teaching Hospital in Hue city. Pregnant women were asked to be involved in the survey after receiving PND services and finishing all related payments at the PND centre. The recruitment of participants for a quantitative approach was finished after a total of 298 pregnant women participated in the study with around 100 respondents for each centre. A female student, who was studying under master of public health graduated programme, was the interviewer under the supervision of the research team.

Variables

Prenatal diagnostic services were categorised into four groups of services: counselling, ultrasonography, maternal blood screening test and karyotyping by amniocentesis/Chorionic Villus Sampling (CVS).

The women were asked to indicate their satisfaction about the PND services they received using three scales: ‘yes’, ‘neutral’ and ‘no’. Their satisfaction levels about PND services were then split into ‘yes’ or ‘no’ by combining ‘neutral’ and ‘no’.

Socio-demographic characteristics of mothers included variables on age, educational level and monthly income. The cut-off age of 35-years was selected as the age of mothers that participated in the study, as women older than 35 would likely be considered as of an advanced maternal age (Christianson et al. 2006). High-school was used as the cut-off point for education level, as it is the universal education level in Vietnam (Decree No. 20/2014/ND-CP

on educational universalization). The average monthly income of the labour work-force of Vietnam in 2014 was 4.7 million VND (about $250), and because of this, this amount was used as the cut-off point for monthly income (General Statistics Office of Vietnam 2014).

Data analysis

Data were entered using EPI Data and analysed using SPSS statistical software (version 21). Frequency analysis was used to identify the pattern of services. Multivariate backward stepwise elimination logistic regression was performed to assess any links between the satisfaction levels of received PND services and other independent variables, including PND centres, age, miscarriage, educational level, monthly income and received PND services (counselling, ultrasonography, blood tests and Karyotyping). Odds ratios (ORs) were used to assess the magnitude of these associations, and 95% confidence intervals (95% CIs) are reported: p values <0.05 were considered statistically significant.

Ethical consideration

This study was approved by Ethical Review Board of the Hanoi School of Public Health (Ethnical reference No. 023/2014/YTCC-HD3, dated 03/03/2014). Informed consent was given to all respondents prior to the structured interviews that took place.

Results

Socio-economic characteristics of women undergoing prenatal testing

A total of 298 pregnant women that visited PND centres participated in the study. The socio-demographic characteristics of respondents are presented in Table 1. The mean age of the respondents was 31.3, ranging from 22 to 44 years, and 23.2% were above 35. About 37% of respondents had higher education and 33.6% had monthly income greater than 250 USD.

Patterns of prenatal diagnosis services utilisation among pregnant women

Patterns of PND services that pregnant women received are presented in Table 2.

Ultrasonography was the most common service that the majority of pregnant women received (89.6%), followed by counselling (81.2%), maternal blood screening tests (76.5%) and karyotyping (42.3%). The proportion of women who received services was highest in Tu Du hospital and lowest in Hue Medical Teaching Hospital, except the karyotyping. The proportion of women who received karyotyping was highest in National hospital of OBGYN (66%).

Women who visited PND centres received various types of PND services. The number of women who received all four services was the highest (35.6%), following those who received three services (32.2%), and the least was women receiving one service. About half of the respondents in the National hospital of OBGYN and Tu Du hospital received all four services (54 and 49.5%, respectively), compared to 3% in Hue Medical Teaching Hospital.

Satisfaction levels of PND services

Figure 1 presents the satisfaction levels of the pregnant women receiving PND services. About 65.4% of respondents were satisfied with the services provided. It was noted that the highest proportion of women who were satisfied with PND services was reported in Hue Medical Teaching Hospital (72.7%) and lowest satisfaction levels were reported in Tu Du hospital (57.5%).

Table 1 Socio-economic characteristics of pregnant women in Viet Nam in 2014

Characteristics	National hospital of OBGYN $n = 100$, %	Hue teaching hospital $n = 99$, %	Tu Du hospital $n = 99$, %	Total $n = 298$, n (%)
Age				
<35	73.0	84.8	72.7	229 (76.8)
≥35	27.0	15.2	27.3	69 (23.2)
Education				
High school and lower	49.0	62.6	77.8	188 (63.1)
Higher education	51.0	37.4	22.2	110 (36.9)
Monthly income				
<$250	68.0	70.7	60.6	198 (66.4)
≥$250	32.0	29.3	39.4	100 (33.6)

OBGYN obstetrics and gynaecology

Table 2 Prenatal diagnosis services received by pregnant women in Viet Nam in 2014

Services received	National hospital of OBGYN $n = 100$, n (%)	Hue teaching hospital $n = 99$, n (%)	Tu Du hospital $n = 99$, n (%)	Total $n = 298$, n (%)
Type of services				
Counselling	89 (89.0)	58 (58.6)	95 (96.0)	242 (81.2)
Ultrasonography	89 (89.0)	78 (78.8)	99 (100)	267 (89.6)
Maternal blood screening test	77 (77)	68 (68.6)	83 (83.8)	228 (76.5)
Karyotyping by Amniocentesis/chorionic villus sampling	66 (66.0)	6 (6.1)	54 (54.5)	126 (42.3)
Number of services received				
1	6 (6.0)	22 (22.2)	1 (1.0)	29 (9.7)
2	17 (17.0)	36 (36.4)	14 (14.1)	67 (22.5)
3	23 (23.0)	38 (38.4)	35 (35.4)	96 (32.2)
4	54 (54.0)	3 (3.0)	49 (49.5)	106 (35.6)

OBGYN obstetrics and gynaecology

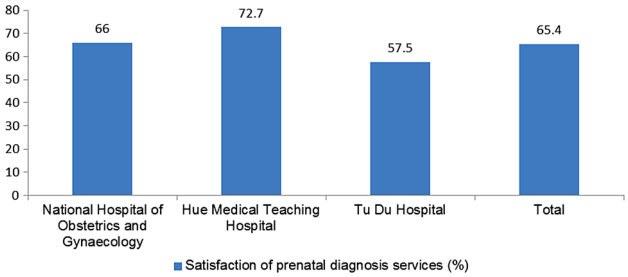

Fig. 1 Satisfaction of prenatal diagnosis services in Viet Nam in 2014

Factors associated with satisfaction of PND services

Table 3 reports variables retained from backward stepwise regression on satisfaction levels of PND services. After removing all other factors (i.e., PND centre, age, education and PND services received), being satisfied with PND services was significantly associated with monthly income, receiving counselling and receiving ultrasonography ($p < 0.05$). Pregnant women, who had monthly incomes of less than 250 USD/month were 2.1 times more likely to be satisfied with the PND services than those with higher incomes (OR = 2.10, CI 1. 22–3.62). Pregnant women who received counselling were 3.2 times more likely to be satisfied with services than those who did not receive counselling (OR = 3.20, CI 1.45–7.13). Pregnant women, who did not receive ultrasonography, were 2.45 times more satisfied with services than who did (OR = 2.45, CI 1. 01–6.01).

Discussion

The non-invasive screening tests, which included ultrasound, consultation and blood testing, were frequently provided in the three PND centres. The invasive tests (karyotyping) were less likely to be performed because this was only provided for those with identified risks after screening tests. These practices were in line with the procedure of prenatal and new-born screening and diagnosis that was stipulated by the Vietnam Ministry of Health in 2010 (Viet Nam Ministry of Health 2010). The highest number of karyotyping services was provided in the PND centre at National Hospital of OBGYN, suggesting that other centres should be prepared to improve their practices, because karyotyping requires more facilities and expertise. The lowest number of karyotyping services was provided in Hue Medical Teaching Hospital because this PND centre was limited in its capacity and resourcing to provide such services (Ha et al. 2016).

Genetic counselling has been internationally recommended as a standard of prenatal diagnostic procedures (Rubin et al. 1983). In Vietnam, genetic counselling needs to be implemented both before and after testing as indicated in the PND procedure (Viet Nam Ministry of Health 2010). However, through conducting this piece of research we found that it was poorly practiced across the three PND regional centres, particularly in Hue Medical Teaching Hospital. Previous studies in Viet Nam suggest that women who received ultrasonography to detect foetal anomalies did not receive sufficient counselling on the ultrasonography results (Gammeltoft and Nguyen 2007a). These results are comparable with the results from similar studies that have taken place in other resource-limited countries (Afroze and Jehan 2014). In Viet Nam, there are strong cultural and familial norms, such as referencing the birth of the male sex and stigmas against disabilities. This may affect decision-making during the prenatal period, and even render families vulnerable to being targeted by unethical or fraudulent "providers", potentially leading to financial

Table 3 Factors associated with satisfaction of prenatal diagnosis services in Vietnam in 2014

Characteristics	OR	(95% CI)		aOR	(95% CI)	
Monthly income						
≥$250	Ref			Ref		
<$250	1.81*	1.07	3.08	2.10*	1.22	3.62
Receiving counselling						
No	Ref			Ref		
Yes	1.96	0.99	3.84	3.20*	1.45	7.13
Receiving ultrasonography						
Yes	Ref			Ref		
No	1.34	0.63	2.83	2.45*	1.01	6.01

OR odd ratio, *aOR* adjusted odd ratio

* $p < 0.05$. Logistic regression model had constant = 0.552; p (Hosmer and Lemeshow test) = 0.584; $n = 298$

exploitation (Chandrasekharan et al. 2014). Therefore, there are various ethical issues surrounding prenatal counselling that should be carefully considered (Gammeltoft and Nguyen 2007b).

Although ultrasonography screening does not improve prenatal outcome (Alfirevic et al. 2015; Ewigman et al. 1993), ultrasonography has been recommended in routine obstetric care in many countries (Filly and Crane 2002). Other research suggests that two-dimensional ultrasonography could increase the detection of congenital heart problems from 65 to 81% (Verdurmen et al. 2016). Our study found that almost all pregnant women who visited a PND centre received ultrasonography across three PND regional centres. Yet, ultrasonography has been reported in previous studies in Viet Nam as a central tool in prenatal care in Vietnam (Edvardsson et al. 2015), and two-thirds of pregnancies overused ultrasound to reassure normal foetal development (Gammeltoft and Nguyen 2007a). Poor quality of counselling services provided with ultrasonography results, combined with the popular use of ultrasonography, confirms the need for more attention to be given to providing sufficient counselling to these women.

We found that the majority of pregnant women were satisfied with PND services; the highest was in Hue Medical Teaching Hospital and the lowest was in Tu Du hospital. Other research about satisfaction of prenatal diagnosis services also found that most of women satisfied with their prenatal care (Yan et al. 2007; Yotsumoto et al. 2016). However, although the clients appeared to be satisfied with services, they may not fully understand about the limitations of PND services, e.g., whether a negative non-invasive prenatal testing result ensures a healthy baby or eliminates the possibility of Down syndrome (Piechan et al. 2016). Counselling, proved its important as the most strengh associated factors with satisfaction of PND services. Other research also suggested that woman who had difficulty in understanding the counselling had less satisfied level (Yan et al. 2007).

The respondents with high incomes were inversely associated with satisfaction in this study. Although high income could facilitate pregnant women actively seeking PND services, it could lower the level of satisfaction. This finding was in line with a previous study (Galle et al. 2015) and could be partly explained by the theory of Fishbein and Ajzen (Fishbein and Ajzen 2011). In short, women with lower incomes have lower expectations about the care they will receive. These lower expectations are easier to fulfil and as a consequence women are more satisfied with the care they receive (Fishbein and Ajzen 2011).

There were a number of limitations in our study. For practical reasons, participants were recruited in hospitals by using a consecutive sampling method; therefore, the demography of participants may vary at different times of the year and not represent all pregnant women who seek care at three PND centres. The satisfaction levels of the respondents have not been assessed by a set of questions in a questionnaire which composed of multidimentional scale of PND services. Results of the PND testing possibly associated with level of services' satisfaction (Yotsumoto et al. 2016); however, it is not included in data collection and should be considered in further research.

Conclusion

This was the first study that depicts a pattern of prenatal testing, the participant's satisfaction and its associated factors in the three biggest PND centres in Viet Nam. Ultrasonography was the most popular method to detect foetal malformation among the participants. One-fifth of clients was not receiving counselling but was receiving other genetic testing. In addition, receiving counselling alongside PND services positively correlated with client's satisfaction levels. Careful consideration is needed to ensure the correct compliance of PND procedures,

which includes pre-test as well as post-test result counselling.

Compliance with ethical standards

The authors declare that they have no conflict of interest. No funding was received for this study. All procedures performed in studies involving human participants were in accordance with ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. This paper was a part of master's thesis. No funding was received for conducting this study.

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