# Pregnancy Status, Perinatal Care and Child Health:
## Application of A LISREL Model

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## Abstract

Mistimed or Unwanted Pregnancy, as one of fertility-related factors, affects many aspects of child and mother's lives (UNFPA, 1994). Issue of child health came under special attention at national and international levels after 1994 Cairo International Conference on Population and Development (ICPD). Its contribution to life expectancy at birth and the fact that infant and child mortality (or its complement, child health) increasingly is regarded as one of main indicators of development, make many demographers and public health specialists to investigate different aspects of the issue. Among other socioeconomic and demographic factors, Pregnancy Status and Perinatal Health Care Utilization can result in compounding consequences for Child Health (UNFPA, 1994). Parents of unwanted pregnancies, while having no specified plan to bear them, are less likely to utilize perinatal health care services.

Iran recently experiencing a rapid decline in its fertility, is witnessing large proportions of unwanted or mistimed pregnancies in both urban (22.7%) and rural (25.1%) areas (MOHME, 2000). In such a context, the effects of Pregnancy Status (wanted vs. unwanted ness) on utilization of Perinatal Health Care and Child Health is hardly investigated. This paper is an attempt to shed light into these somewhat complicated relationships among three mentioned variables, by taking effects of some SES variables into account. Main objective of the study is to investigate structural relations among four variables, namely; Socio-economic Status (SES), Pregnancy Status (P.status), Perinatal Health Care Utilization (P.care), and Child Health (Ch.health), with an application of Structural Equations Model.

The study makes use of Iranian Demographic and Health Survey (IDHS) data, which conducted by Ministry of Health and Medical Education in 2000. This data set provides useful health and demographic information by drawing nationally representative samples from rural and urban areas of Iran.

Findings are indicative of that unwanted pregnancies are less likely to be utilized from Perinatal Health Care services. SES increases the probability of a pregnancy to be categorized as unwanted, positively affects Perinatal Health Care utilization and negatively affects the children health! As expected, Perinatal health care utilization positively affects the health status of the child. Different model fit indices (all well above 0.090) indicate that the specified model is acceptable.

According to the findings, policies or social programs aim to improve child health, should take into account first; rising the level of health care utilization through better and qualified Perinatal Health Care services with especial attention to mothers or women of unwanted/mistimed pregnancies; secondly and more importantly, reduce the proportion of unwanted/mistimed pregnancies through providing effective family planning services. Policy implications of the study are discussed.

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**Introduction**

Improving child health and well-being is among those main objectives and concerns of any society, especially after 1994 ICPD, which highlighted the child health as a human right and as one of main indicators of sustainable development (UNFPA, 1994). This international concern, which reflected in Chapter VIII of ICPD plan of action under the headline of *child survival and health*, directed many efforts of national and international agencies (e. g. United Nations, United Nation Fund for Population Activities, World Health Organization, and etc) to shed light into both causes and consequences of child health. Attempt to reduce child mortality and improve their health status became one of those over-standing obligations of national and international responsibilities for public health.

Longo et al (1999) in their case-control study under the title of "An investigation of social and class differences in very-low birth weight outcomes: a continuing public health concern," examining the effects of non-medical factors; including socioeconomic status, social class, education, race, and social support on low birth weight, found the hypothesis *social and class factors are more predictive of low birth weight than medical factors*, supported. Comparison of two logistic models' performance with and without inclusion of social factors confirmed the importace of non-medical factors on birth outcomes.

Sable et al (1998) in a study, "Pregnancy intentions, pregnancy attitudes, and the use of prenatal care in Missouri," using data from 2378 mothers of live-born infants from the NICHD/Missouri Maternal and Infant Health Survey, examined the relationship between pregnancy intention and adequacy of prenatal care. They found that women's attitudes about their pregnancies are associated with inadequate prenatal care, including both inadequate initiation of care and inadequate receipt of services. According to their observations, women who were unhappy about their pregnancy (OR= 1.44), unsure that they wanted to be pregnant (OR= 2.81), or denied their pregnancies (OR= 4.82), were more likely to have inadequate prenatal care than women who did not have these attitudes. Women who were unhappy about being pregnant (OR= 1.86), unsure that they wanted to be pregnant (OR= 3.44), or who denied the pregnancy (OR= 6.69) were more likely to have inadequate initiation of care, too. They concluded that attitudes about pregnancy may be a psychosocial barrier to women obtaining early and continuous perinatal care. As a policy implication, they emphasized that pregnancy attitudes should be assessed and appropriate services provided to improve women's utilization of prenatal care.

Kost et al (1998) in their study, "The effects of pregnancy planning status on birth outcomes and infant care," observed that proportion of infants born with a health disadvantage is significantly lower if the pregnancy was intended than if it was mistimed or unwanted; proportion who receive well-baby care by age three months and who are ever breastfed, are highest if the pregnancy was intended. In analyses controlling for the

mother's background characteristics, however, they found that a mistimed pregnancy has no significant effect on any of these outcomes. According to them an unwanted pregnancy increases the likelihood that the infant's health will be compromised (odds ratio, 1.3), but the association is no longer significant when the mother's perinatal behaviors are also taken into account. Unwanted pregnancy has no independent effect on the likelihood of well-baby care, but it reduces the odds of breastfeeding (0.6).

Vintzileos et al (2002) in their study under the title of "The impact of prenatal care on neonatal deaths in the presence and absence of antenatal high-risk conditions," found that lack of prenatal care is associated with an increase in neonatal deaths, which was greater for infants born at > or =36 weeks of gestation (relative risk, 2.1; 95% CI, 1.8, 2.4). They observed that lack of prenatal care is also associated with increased neonatal death rates in the presence of preterm premature rupture of the membranes.

According to the literature, it could be concluded that pregnancy intentions affects their utilization of the perinatal health care and in turn, it can influence the general health status of the child. However, these relationships are mostly mediated by other socio-economic variables, mostly referred to as SES.

**Terms and Concepts**

In this paper some of concepts exploited for analytical purposes that are as followes:

*Child Health (Ch.health)* refers to the health status of the child, which operationally defined as the child's experience of any illness, having diarrhea and cough during the past two weeks, which asked from mother or main care giver of the child.

*Perinatal care* refers to utilization of the pregnant mother or her child after delivery, from related health services. This variable defined operationally as initiation of perinatal health care by the mother while being pregnant via referring to private or public health centers, to own a Tetanus or combined (DT) vaccination card by the pregnant mother, and to seek treatment or advice by the mother when the child is sick. First two indicators refer to health care utilization at the time of pregnancy and the third is related to seek for treatment for child's illness.

*Pregnancy Status* refers to the status of pregnancy (wnatedness vs. unwantedness). This factor operationally defined by the use of mother's and her husband's desire to have the pregnancy at the time of its occurrence. The desired ness of a pregnancy is asked only from the mother, probably leaving a little bias about the exact opinion of the father about the pregnancy status. However, in most of the cases decision to bring a child is taken jointly by both of the parents. A strong correlation between mother's and father's intentions to their pregnancy (Spearman's rho= 0.79; sig= 0.000) is indicative of this fact.

*Socio-economic Status,* as another latent variable in this paper, defined as exploitation of some household facilities (namely, refrigerator and TV sets, owning a car, and having

bathroom inside the residential unit), educational attainment of the mother and also her labor force participation (whether she is employed, unemployed or other), and the rural/urban residence. These indicators mainly used as proxies in some cases for SES of the mother. For example, household facilities are used as indicators for economic status.

The study model is specified in the way that Child Health status is under the influence of Perinatal Care and SES; Perinatal Care is affected by Pregnancy Status and SES, where Pregnancy Status itself is under the influence of SES. While unwanted or mistimed pregnancies are unplanned, they are more likely to suffer in terms of health care utilization during pregnancy, comparing to desired and planned pregnancies. Therefore, their health status supposed to be lower.

This paper is investigating the existence of these structural relationships among variables of interest. The main question of the study is that whether child health is influenced by the Perinatal Health Care and Pregnancy Status, while having SES variables in the model. This question is investigated in detail and possible answers are given and discussed.

## Data Preparation

Data for the study come from Iran-type DHS data conducted in 2000 by the Ministry of Health and Medical Education with financial and technical assistances of some national and international agencies. The data gathered by the use of a questionnaire including around 213 questions regarding different health, demographic, and socio-economic status of around 113957 households (537063 individuals). Samples are representatively drawn from rural and urban areas of 28 provinces, plus one additional sample from the capital city, Tehran. This metropolitan city has been residence place for more than 13 percent of total country households by the census 1996.

While in IDHS data set different variables of the study existed in separate data files, it was necessary to bring information from children, 10-49 ever married women, household, and members' files together. After compilation, data is generally explored and checked for possible errors and inconsistencies. Outliers, while not being too many, were generally excluded from the analysis. Data is refined by the SPSS and then organized data file imported into LISREL version 8.54 for further analysis. Analyses have been done by the use of information of around 3892 children of past 2 years, randomly selected among all were born in past two years.

Questions referring to indicators of each latent variable are as follows:

Child Health Status (Eta 1):
    Child's experience of any illness during past two weeks (C405C.2)
    Child's having diarrhea during past two weeks (C406C.2)
    Child's having cough due to illness during past two weeks (C410C.2)

Prenatal Health Care Utilization (Eta 2):

Seeking for advice or treatment for the child's illness (C412C.2)
Visiting any health center for check ups during pregnancy (w242.2)
Having a Tetanus or Combined (TD) vaccination card (W245.2)
Pregnancy Status (Eta 3):
Pregnancy intention of the mother (W238.2)
Pregnancy intention of the husband (W240.2)
Socio-economic Status (Ksi):
Mother's last academic achievement (Edu)
Wife's labor force participation (Employ)
Some facilities of the household (Faciliti)
Rural/urban residence (Settle)


**Application of SEM**

The specified model is run by the LISREL, using information of 3892 children in terms of 8 indicators defining 3 dependant latent variables, and 4 SES indicators defining the only independent latent variable of the model. Since most of the indicators have the property of 0/1 (having or not having a condition or characteristic), a covariance matrix is used as input matrix for LISREL model to read required information for the model to be run. As is the case in structural equation models, here also one of indicators of any of latent variables is set to be fixed with setting their values equal to 1. This could help the interoperability of the model since those fixed parameters are used as a reference for other estimates to be made.

Default LISREL specifications in terms of LY, LX, Beta, Gama, TE, and TD matrixes are modified to meet the necessities of the specified model. Two of those main modifications related the error terms of two indicators of P.care, and two indicators of SES, both having theoretical and conceptual justifications. These conceptual modifications are done to improve the fitness of the model, primarily. Estimations are derived by the use of maximum likelihood method.

Specified Structural Equation Model (SEM) determined around 29 parameters to be estimated, which include those components of LY, LX, Beta and Gama matrixes, plus measurement (TDs and TEs) and structural (Phi and Psi) error terms. Two additional parameters introduced by the authors to improve the fitness of the model. This specified model left around 47 Degrees of Freedom (DF). The results of application of this model are discussed in detail in the next section. For the reasons of economy, only the main parts of SEM output are presented here.


**Findings**

Specified LSREL Model converged at 30th Iteration. Main part of the SEM output relating to the structural model is shown by the graph 1. The graph provides each standardized

estimate of specified path on them and also related t values below the estimates within parentheses. T values above 1.96 are statistically significant at 0.05 level.

According to findings, mostly the latent variables could be effectively defined with employed indicators. All of Ch.health indicators, most of P.care indicators (the exception is W245.2's weak coefficient of 0.15), both of P.status indicators and most of SES indicators (exception is Employ with 0.04) have coefficients of around 0.5 or higher, indicating the appropriateness of selected indicators. Thought in the case of Employ (one of SES indicators) the related path coefficient is very low, however, because of the importance of this indicator for SES, the authors decided to include this indicator in the model.

The path coefficient relating SES to P.status is -0.16, indicating that women of higher socio-economic status are more likely to classify their pregnancies as unwanted than mothers of lower statuses. In other words, mothers whit higher levels of educational attainment, with higher levels of labour force participation and employment, and those have got larger number of household's facilities, were more likely to classify their pregnancies as unwanted comparing to those women were socio-economically disadvantaged.

As expected, SES affects P.care positively (reflected in the path coefficient of 0.32), means that children of higher SES mothers are distinguished by higher levels of perinatal health care utilization. This is not so interesting, since highly educated, employed and mothers of higher levels of socio-economic hierarchy, on the one hand have much knowledge and intention to pursue and practice the health issues, and on the other they have enough financial and other types of promises to actualize their health oriented intentions, including child and perinatal health.

However, SES shows an interesting effect on Ch.health. Related path coefficient is around -0.10, implying that children of mothers coming from higher SES have not as good health status as children of mothers' from lower statuses. This finding is not supported by the mainstream demographic and health research, which traditionally emphasized on better health condition of children of higher SESes.

Although SES gradient in health (including children health) is well documented in the health and demographic literature (Muhuri, 1995; Desai et al, 1998; Taffa et al, 2004; Maitra et al, 2006), the observed negative effect of SES on Ch.health could partially be explained. Less likely is that mothers of higher SES (being employed with higher levels of education) might work mostly out of home fully or part time. The mother absence from home, forgetting about their coping strategies for giving care to their children, can lead to health problems for their children.

However, another and more relevant explanation is that mothers of higher SES are more concerned about their children's health, and if so, are more likely to be aware and in turn report possible health conditions of their children, in comparison to illiterate or lower SES

mothers. therefore, higher concerns of mothers of higher SES can be translated into higher reports of children health conditions. This might be responsible for higher reported health problems by these mothers. However, being beyond the scope of this paper, an independent study should be carried on to investigate the existence of such relationship, and if so, to provide possible explanations.

Graph 1- Standardized Solutions and  related t values of Analytical Model: LISREL Path Diagram
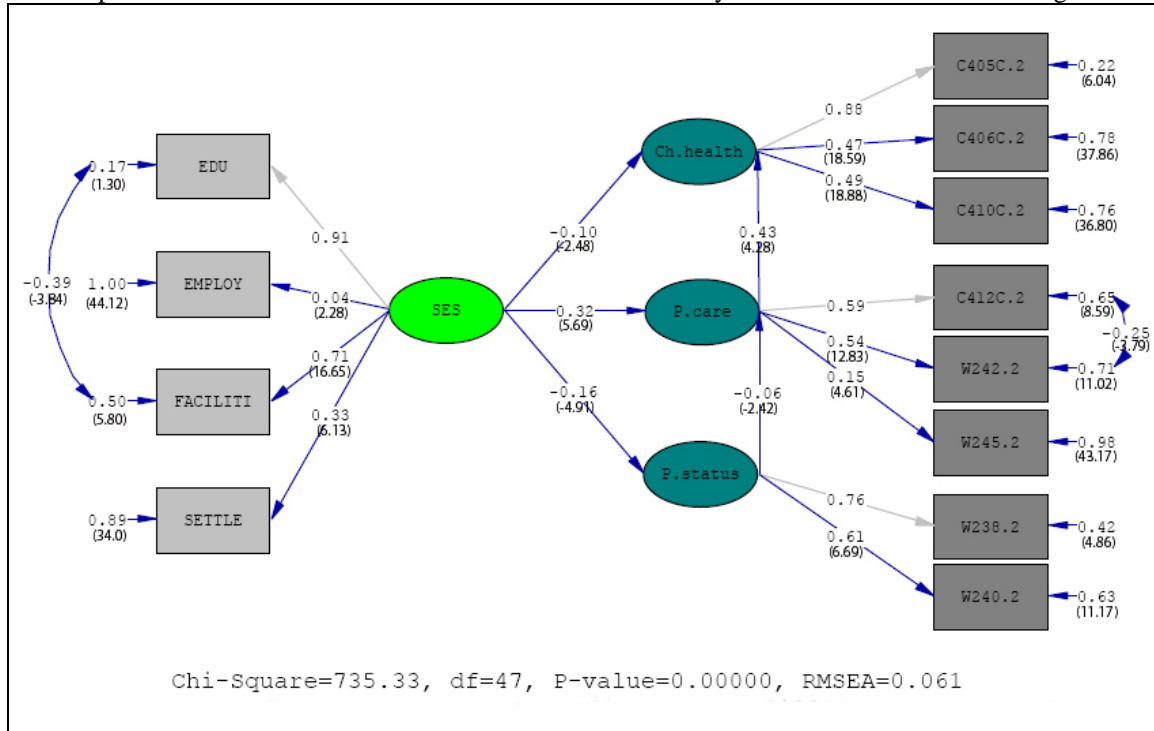


The effect of P.status (unwanted ness of the pregnancy in this case) on P.care is in the expected direction, though small (-0.06). It seems Unwanted Pregnancies are less likely to be utilized from health care than wanted pregnancies. Putting in other words, children of unwanted pregnancies suffer from lower health care services, possibly leading to lower health status for them.

When pregnancy is not planned (occurs in a wrong time or occurs when parents have already stopped their childbearing), mostly psychological factors can prevent mothers of unwanted pregnancies to use health care services at the time of pregnancy. Accordingly, children of unwanted pregnancies are also more likely to suffer from inadequate health care, though it could not be a rule for all children, however.

In comparison, P.care has fairly strong and positive effects on Ch.health, reflected in a moderate path coefficient for the corresponding path (0.43). Therefore, not interestingly, those children who get benefit of higher levels of health care services before and after their birth gain more of health care after delivery, too.

As mentioned before, two modifications are introduced into model in addition to default specifications in terms of relations between measurement errors. One is letting the error

terms for two indicators of P.care (variables: visiting any health center at the time of pregnancy and the other: seeking treatment for ill child) to be correlated. This is conceptually justified. Mothers with high intentions to use prenatal care, somehow will use higher levels of health care services after delivery, too. This path coefficient (C412C.2 and W242.2) also come to be statistically significant at 0.05 level. The other is correlated errors of educational attainment and household facilities (Edu and Faciliti), which can co-vary with each other, conceptually.

Almost all of the estimates (path coefficients) are statistically significant at 0.05 level, This is true with respect to all components of the measurement model. Ironically, this is true in the case of almost all of error terms (except for education), referred to as measurement errors. High measurement errors, although not statistically affect the magnitude of the estimates, however, can make estimates somewhat unreliable (Garson, 2006). In this regard, the results should be used with cautious.

Squared Multiple Correlations for Structural Equations (output not shown) indicates that around 48 percent of variations in Ch.health could be accounted for by the latent independent variables. This proportion for the latent variable P.care is 21 percent and for P.status near to zero percent. Especially in the case of Ch.health, fairly good amount of variation could be explained by latent independents.

Though the fitness of the model not preserves the first priority here, however, model fit indices being well above 0.90, all are acceptable in statistical terms. Nonetheless, LISREL out put provides many model fit indices, though a handful of them found extend references in practice. Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), and Root Mean Square Error of Approximation (RMSEA) are three of mostly used indices to evaluate general model fit. These indices for the specified model of the study are; 0.97, 0.95, and 0.061 respectively, showing a good model fit. According to Garson (2006) goodness of fit indices should be above 0.90 for a model to be acceptable. RMSEA for a good fitting model is below 0.05, though models with 0.08 or smaller RMSEA will have adequate fit to data. RMSEA for model of study is well below 0.08, providing adequate fit to data for the model.

**Conclusion**

Among different child health risk factors, which include a very wide rage list from genetic, behavioral, personal, familial, and socio-political to community level factors (Committee on Evaluation of Children's Health, 2004), this paper examined the structural relationships among some fertility-related and at the same time important factors (namely; Pregnancy Status, Perinatal Health Care, and SES) and child health. According to the literature, SES, P.status, and P.care are important factors affecting the Child's health status.

Analyzing Iranian Demographic and Health Survey data, the study provided some evidences on the existence of such structural relationships. Mothers of higher socio-economic status are more likely to classify their pregnancies as unwanted, utilize much more from Perinatal health care services, and have more reported child health conditions, comparing to mothers of lower SES. Concerns about the children health could be a partial explanation for higher levels of reported health conditions with socio-economically better-off mothers.

Prenatal care is significantly and negatively influenced by the pregnancy status, i.e., unwanted pregnancies are less likely to be utilized from perinatal health care services and Perinatal care significantly and positively affects the child health status. These relations are expected according to the literature, in terms of observed directions.

In Iran, which experienced a rapid fertility decline during past one or two decades, proportion of pregnancies reported as unwanted is almost high that can bring lots of problems into lives of mothers and children. For mothers, unwanted pregnancies, whether carried to term or terminated by resorting to abortion, will bring about different health threatening conditions into existence. For a child, however, the main consequence of being born from an unwanted pregnancy is not utilizing the health care more often than not. Various socio-economic factors can prevent a mother or her young baby from utilizing the usual health care, what is evident by findings of this study.

After the 1994 Cairo ICPD and following international concerns about the child health, mainly reflected in the ICPD plan of action and Millennium Development Goals (MDGs), national and international attempts targeted to reduce the child mortality and morbidity are increased. Here in Iran, though outstanding achievements brought about by the national health care and family planning programs, still there is room for improvements.

To this end, and according to findings of the study, two sets of services are required to improve the health status of Iranian Children. One is to provide much more effective family planning and contraceptives to prevent unwanted pregnancy, which have lower chance of being utilized from the health care. The other is to provide perinatal health care for all Iranian mothers and women, especially for mothers of unwanted pregnancies. Provision of active perinatal health care for mothers of unwanted pregnancies, which are less likely to utilize health care services, can improve the health status of unwanted pregnancies and children.

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