



**UNIVERSITI PUTRA MALAYSIA**

***A COHORT STUDY COMPARING THE NEW MATERNAL HEALTH  
CARE PROGRAM WITH THE STANDARD PROGRAM IN QAZVIN  
PROVINCE, IRAN***

**ZINAT JOURABCHI**

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**DOCTOR OF PHILOSOPHY**

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By

**ZINAT JOURABCHI**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra  
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**Doctor of Philosophy**

**June 2012**

**A COHORT STUDY COMPARING THE NEW MATERNAL HEALTH  
CARE PROGRAM WITH THE STANDARD PROGRAM IN QAZVIN  
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**ZINAT JOURABCHI**

June 2012

**Chairman: Prof. Dato' Lye Munn Sann, PhD**

**Faculty: Medicine and Health Sciences**

Maternal morbidity and mortality continue to exert a severe toll on mothers worldwide and bring into sharp focus the quality of maternal health care especially in developing countries.

This cohort study compared the outcome of maternal health care from two programs, one with preconception care, lower number of prenatal care visits, a formalized referral process and postpartum care named integrated maternal health care (IMHC) and the other without these characteristics (Standard program). The main objective of study was aimed at evaluating the impact of these programs on gestational complications and birth outcomes in two cities of Qazvin Province, Iran. Alvand City started the new program or IMHC (with preconception care) in 2007.

Of 940 mothers (16-35 years of age) screened at eight maternal care health clinics in each city, 484 were found to be eligible for study. Of these, 450 mothers consented and were followed up from the time of registration at the maternal health care clinic until six weeks after delivery.

Of the 450 mothers, 147 (63.4%) had preconception care, all of whom resided in Alvand city. In the IMHC, the number of prenatal care visits were less than in the standard program (a mean of 5 versus 9 visits,  $p = 0.001$ ). During first and second trimesters, proportionately more referrals of pregnant mothers to specialized care were made in the IMHC (25.5 % in the first trimester and 39.4% in the second trimester for Alvand and 6.8 % and 12.9 % respectively for Qazvin) ( $p < 0.05$ ).

Anemia during pregnancy was significantly more in the IMHC for the second and third trimesters ( $p < 0.05$ ). Gestational hypertension was significantly lower in the IMHC during second and third trimesters ( $p < 0.05$ ). Rate of low birth weight (<2500gr) was 11.0 % in the standard program versus 6.9 % in the IMHC. Preterm birth (< 37 week) was significantly less in the IMHC program and most maternal and neonatal complications were less in the IMHC as well. Neonatal mortality was not significantly different ( $p < 0.05$ ). No maternal mortality reported in any group.

In addition, there was a significant association between type of program and the risk of the gestational hypertension. The risk of gestational hypertension in the IMHC was significantly lower than in women in the standard program (adjusted OR=0.164; 95% CI =0.053, 0.506). Moreover, an association was observed between type of program and the risk of the birth outcomes. There was less risk of

preterm birth (OR= 0.478; 95% CI= 0.240, 0.952), maternal complication (OR= 0.532; 95% CI=0.344, 0.823) and neonatal complication (OR= 0.503; 95% CI= 0.318, 0.796) in IMHC program. Preconception care had the significant association with gestational hypertension, preterm labor, preterm birth, low birth weight, maternal complication and neonatal complication.

The findings of the present study indicated advantages of a new program (IMHC) that associated with lower rate of gestational complication or adverse birth outcomes. Therefore, it is necessary to emphasize benefits of IMHC, including the preconception care, low number of prenatal visits, formulized referral process and postpartum care.

**KAJIAN KOHORT MEMBANDINGKAN PROGRAMME PENJAGAAN  
KESIHATAN MATERNAL DENGAN PROGRAMME RUTIN DI  
WILAYAH QAZVIN, IRAN**

**Oleh**

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Morbiditi dan mortaliti maternal terus menyumbang tol yang parah ke atas ibu-ibu di seluruh dunia lantas membawa kepada penumpuan ke atas kualiti penjagaan kesihatan ibu terutamanya di negara-negara membangun.

Kajian kohort ini membandingkan dua programme penjagaan kesihatan ibu; satu dengan rawatan pra-konsepsi dan satu lagi tanpa rawatan bertujuan untuk menilai impak program tersebut ke atas komplikasi kehamilan dan hasil kelahiran dua bandar di wilayah Qazvin, Iran. Bandar Alvand melancarkan program baru tersebut (penjagaan pra-konsepsi) pada 2007.

Daripada 940 ibu (berumur di antara 16 – 35 tahun) yang melalui saringan di lapan klinik penjagaan kesihatan ibu di setiap bandar, 484 ibu didapati memenuhi syarat

untuk kajian. Daripada jumlah tersebut, 450 ibu telah bersetuju untuk menyertai kajian di mana perkembangan mereka dipantau dari mula mendaftar di klinik kesihatan ibu sehingga 6 minggu selepas bersalin.

Daripada 450 ibu, 147 (32.7%) dari mereka mendapat penjagaan pra-konsepsi dan kesemuanya adalah tinggal di bandar Alvand. Dalam program baru, jumlah kunjungan penjagaan pra-natal adalah kurang daripada standard program (min kunjungan 5 versus 9,  $p=0.001$ ). Ketika trimester pertama dan kedua, perkadaran lebih merujuk kepada ibu mengandung untuk mengkhususkan penjagaan telah dibuat untuk program baru (25.5% bagi trimester pertama dan 39.4% bagi trimester kedua untuk Alvand dan 6.8% dan 12.9% masing-masing untuk Qazin) ( $p<0.05$ ).

Anemia ketika kehamilan adalah ketara lebih dalam program baru bagi trimester kedua dan ketiga ( $p<0.05$ ). Hypertensi semasa kehamilan adalah ketara rendah dalam program baru bagi trimester kedua dan ketiga ( $p<0.05$ ). kadar kelahiran dengan berat badan rendah ( $<2500\text{gr}$ ) adalah 11.0% dalam program standard versus 6.9% bagi program baru. Kelahiran pramatang ( $< 37$  week) adalah ketara kurang dalam kumpulan baru dan kebanyakan komplikasi bagi ibu dan bayi baru lahir adalah kurang dalam program baru juga. Kematian bayi baru lahir adalah tidak ketara berbeza ( $p<0.05$ ). Tiada kematian ibu dilaporkan untuk sebarang kumpulan. Tambahan pula, terdapat hubungan yang signifikan di antara jenis program and risiko hipertensi semasa kehamilan. Risiko hipertensi semasa kehamilan bagi program baru adalah lebih rendah berbanding dengan program standard (OR = 0.164; 95% CI = 0.053, 0.506). Selain itu, terdapat juga hubungan di antara jenis



program and risiko kelahiran, di mana jenis program mempunyai hubungan dengan kelahiran pramatang (OR = 0.478; 95% CI = 0.240, 0.952, komplikasi bagi ibu (OR = 0.532; 95% CI = 0.344, 0.823) and komplikasi bagi bayi (OR = 0.503; 95% CI = 0.318, 0.796). Terdapat hubungan yang signifikan di pra-konsepsi and risiko hipertensi semasa kehamilan, kelahiran pramatang, komplikasi bagi ibu komplikasi bagi bayi,

Penemuan hasil daripada kajian ini menunjukkan faedah program penjagaan kesihatan ibu yang baru merangkumi penjagaan pra-konsepsi serta perkaitannya dengan kadar komplikasi kehamilan yang rendah dan pengurangan hasil kelahiran yang bermasalah.

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I certify that a Thesis Examination Committee has met on 7/6/2012 to conduct the final examination of **Zinat Jourabchi** on her thesis entitled “**A cohort study comparing the new maternal health care program with the standard program in Qazvin province, Iran**” in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the PhD.

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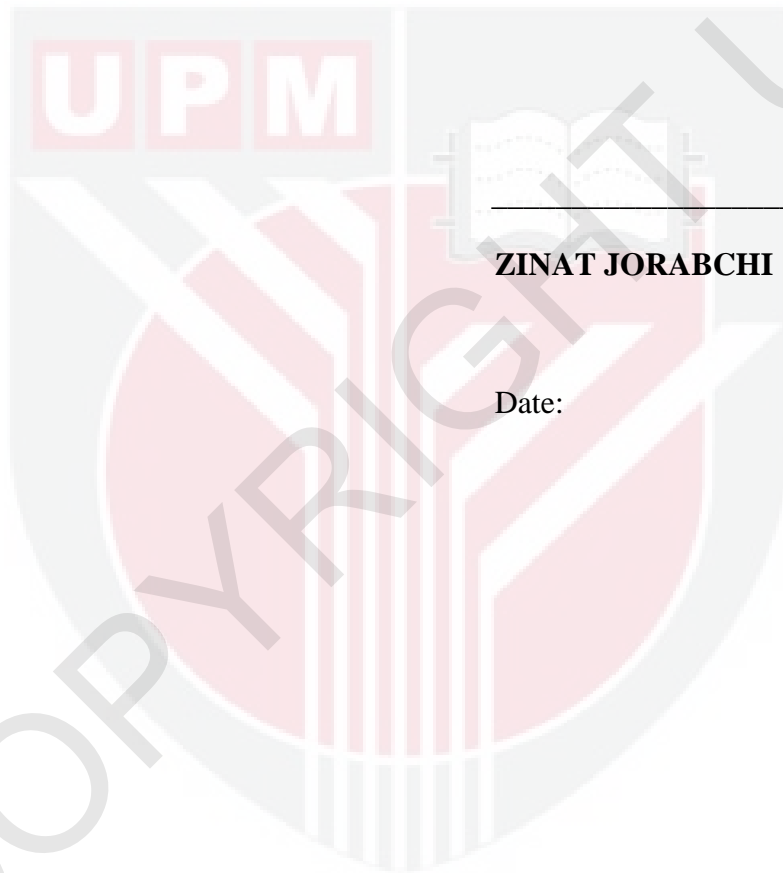
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## DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.



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## TABLE OF CONTENTS

	<b>Page</b>
<b>ABSTRACT</b>	<b>iii</b>
<b>ABSTRAK</b>	<b>vi</b>
<b>ACKNOWLEDGEMENTS</b>	<b>ix</b>
<b>APPROVAL</b>	<b>x</b>
<b>DECLARATION</b>	<b>xii</b>
<b>LIST OF TABLES</b>	<b>xvii</b>
<b>LIST OF FIGURES</b>	<b>xix</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xx</b>

### **CHAPTER**

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
	1.1 Background of the problem	1
	1.2 Statement of the problem	5
	1.3 Objectives	10
	1.3.1 General Objective	10
	1.3.2 Specific Objectives	10
	1.4 Research Hypothesis	10
	1.5 Conceptual framework	12
<b>2</b>	<b>LITERATURE REVIEW</b>	<b>15</b>
	2.1 Introduction	15
	2.2 The Content of Maternal Health Care (MHC)	16
	2.3 MHC in the world	19
	2.4 Recent trends in Maternal care	25
	2.4.1 THE WHO Suggestion	25
	2.5 The most important aspects of prenatal care	27
	2.5.1 The value of the preconception visit	28
	2.5.2 Number of visits	37
	2.5.3 Sufficiency of the Content of MHC	41

2.6	Maternal care utilization and outcomes of pregnancy and delivery	44
2.6.1	Early prenatal care	47
2.7	Latest Recommendation of WHO (2009)	48
2.8	Expanded objectives of maternal care	50
2.9	General information about Iran	51
2.10	Specific information about Qazvin province	54
<b>3</b>	<b>METHODOLOGY</b>	<b>57</b>
3.1	Study location	57
3.2	Study Design	59
3.3	Sampling method	59
3.4	Sampling Process	62
3.5	Comparison of the two programs	66
3.6	Data collection	73
3.7	Measurements	74
3.7.1	The Demographic Characteristics	74
3.7.2	Maternal Medical History	75
3.7.3	Obstetric History	75
3.7.4	Preconception measurements (Only for Alvand)	75
3.7.5	Prenatal measurements	75
3.7.6	Perinatal measurements	76
3.7.7	Post-partum measurements	76
3.8	Definition of Variables	76
3.9	Quality Control	79
3.9.1	Validity and Reliability	80
3.9.2	Testing of Instrument	80
3.10	Research Ethics	80
3.11	Statistical Analysis	81
<b>4</b>	<b>RESULTS</b>	<b>82</b>
4.1	Descriptive analysis on the both programs	82
4.1.1	Demographic characteristics	82
4.1.2	Maternal Medical History	85
4.1.3	Obstetric History	87

4.1.4	Description of Preconception care for IMHC program	87
4.2	Comparison of usual prenatal care in new (IMHC) and standard Program	94
4.2.1	Number and duration of prenatal care visits	94
4.2.2	Gestational age at first visit of prenatal care	95
4.2.3	Laboratory tests during prenatal care	96
4.2.4	Patterns of weight gain during pregnancy	100
4.2.5	Blood pressure values during prenatal care	101
4.2.6	Referrals to high risk level	102
4.2.7	Gestational complication during prenatal care	104
4.3	Comparisons during perinatal between IMHC and standard programs	107
4.3.1	Gestational age and birth weight at delivery in new and standard programs	107
4.3.2	Mode of delivery	108
4.3.3	Obstetric complications during perinatal	109
4.4	Birth outcomes	111
4.4.1	Low birth weight and preterm births	111
4.4.2	Maternal and Neonatal mortality	112
4.5	Post-partum period in new (IMHC) and standard programs	113
4.5.1	Duration of post-partum care and number of post-partum visits	113
4.5.2	Postpartum care in the two groups	113
4.5.3	Postpartum complications	114
4.6	Predictors for gestational complications using multiple logistic regression	118
4.7	Predictors for birth outcomes using multiple logistic regression	118
4.8	Proportion of gestational complications and birth outcomes in two Programs	121
4.9	Predictors for gestational complications using multiple logistic regression in woman how had preconception care in IMHC	122
4.10	Predictors for birth outcomes using multiple logistic regression in mother with preconception care in IMHC program	124
<b>5</b>	<b>DISCUSSION</b>	<b>126</b>



5.1	Preconception care in new program or IMHC	126
5.2	Comparison of new and standard programs	128
5.2.1	Number of prenatal care visits	129
5.2.2	Gestational age at first visit of prenatal care	132
5.2.3	Patterns of weight gain during pregnancy	135
5.2.4	Referral of high risk pregnancies to specialized care	137
5.2.5	Gestational complication during prenatal care	138
5.2.6	Mode of delivery	143
5.2.7	Birth outcomes	143
5.2.8	Effect of type of program on gestational complications and birth outcomes, adjusted for mother's age, gravida, education level	152
5.2.9	Post partum care	154
5.3	Strengths and limitation of the Study	<b>153</b>
5.4	Limitations of the Study	157
6	<b>CONCLUSION</b>	<b>159</b>
6.1	Summary and Conclusion	159
6.2	Recommendations	160
6.3	Population targets	162
6.4	Suggestions for Future Research	162
	<b>REFERENCES</b>	<b>164</b>
	<b>APPENDICES</b>	<b>176</b>
	A: Recomprogrammed Interventions for Improving Maternal and Newborn Health	<b>176</b>
	B: Sample of clinical forms of new in Alvand	<b>179</b>
	C: Sample of clinical forms of standard in Qazvin	<b>191</b>
	D: Screening Sheet	<b>195</b>
	E: Information sheet	<b>197</b>
	F: Consent letter in English	<b>199</b>
	G: Consent letter in Farsi	<b>200</b>
	H: Questionnaire of study in English	<b>201</b>
	I: Questionnaire of study in Farsi	<b>211</b>
	J: Sample of laboratory test	<b>221</b>

K: Ethic Committee Letter of Qazvin University of medical sciences	222
L: Ethic Committee Letter of Qazvin University Putra Malaysia	223
M: Permission letter for data collection	224
<b>BIODATA OF STUDENT</b>	<b>225</b>



## LIST OF TABLE

<b>Table</b>	<b>Page</b>
Table 2.1 Clinical Practice Guideline for Routine Prenatal and Postpartum Care	20
Table 2.2 Summary of Recommendations to Improve Preconception Health and Health Care	33
Table 2.3 Topics to be reviewed in preconception care	34
Table 2.4 Routine antenatal care visits	40
Table 2.5 Demographic and health indicators in Iran	53
Table 2.6 Health Indicators, Qazvin province	54
Table 2.7 Specific prenatal information in Qazvin Province	55
Table 2.8 Delivery and Post-partum indicators in Qazvin province	56
Table 3.1 More information on Qazvin and Alvand cities	58
Table 3.2 Comparison of the new and standard programs	68
Table 3.3 The limits of weight gain during pregnancy	77
Table 4.1 Number of mothers screen and eligible to participate	82
Table 4.2 Demographic characteristics of IMHC and standard program groups	85
Table 4.3 Demographic characteristics of IMHC and standard program groups	86
Table 4.4 Maternal Medical History in IMHC and standard groups	89
Table 4.5 Obstetric history for new and standard program	90
Table 4.6 History of obstetrics complications in two groups	91
Table 4.7 Women with preconception care in IMHC program	91
Table 4.8 Number of mothers who had preconception visits and supplementation status in IMHC group	92

Table 4.9 Body mass index and blood pressure of mothers in the IMHC during preconception period	92
Table 4.10 Laboratory tests for mothers in the IMHC in preconception period	93
Table 4.11 Laboratory tests for mothers in the IMHC in preconception period	94
Table 4.12 Number and duration of prenatal care visits in both groups	95
Table 4.13 Mean gestational age (weeks) at first visit of prenatal care in both groups	96
Table 4.14 Routine laboratory tests during prenatal care in two groups	97
Table 4.15 Routine laboratory tests during prenatal care in two groups (contd.)	98
Table 4.16 Additional laboratory tests during prenatal care	99
Table 4.17 Additional laboratory tests during prenatal care (contd.)	100
Table 4.18 Weight gain (kg) during three trimesters	101
Table 4.19 Systolic blood pressure (mm Hg) during three trimesters	102
Table 4.20 Diastolic blood pressure (mm Hg) during three trimesters	103
Table 4.21 Referrals to special care during prenatal care	103
Table 4.22 Anemia during three trimesters	104
Table 4.23 Gestational hypertension during three trimesters	105
Table 4.24 Pre-eclampsia during three trimesters	106
Table 4.25 Abortion, still birth and preterm labor during prenatal period	107
Table 4.26 Gestation age and birth weight at delivery	108
Table 4.27 Mode of delivery	109
Table 4.28 Obstetric complications during perinatal	109
Table 4.29 Details of other maternal complications during perinatal	110
Table 4.30 Neonatal complications perinatal	111
Table 4.31 Low birth weight and preterm birth at delivery	112

Table 4.32 Maternal and neonatal mortality	112
Table 4.33 Duration and number of postpartum visits	113
Table 4.34 Postpartum care during three visits in new and standard programs	115
Table 4.35 Family planning during postpartum period in both groups	116
Table 4.36 Postpartum complications	117
Table 4.37 Effect of IMHC on gestational complications, controlling for mother's age, education and gravida using multiple logistic regression	110
Table 4.38 Effect of IMHC on birth outcomes, controlling for mother's age, education and gravida using multiple logistic regression	120
Table 4.39 Proportion of gestational complications and birth outcomes in two programs	121
Table 4.40 Effect of preconception care on gestational complications, controlling for mother's age, education and gravida using multiple logistic regression	123
Table 4.41 Effect of preconception care on birth outcomes, controlling for mother's age, education and gravida using multiple logistic regression	125

## LIST OF FIGURS

<b>Figure</b>	<b>Page</b>
Conceptual Framework	14
<b>Antenatal care uses by region</b>	<b>24</b>
Location of study	58
Selection of clinics and study population	65
Selection of women from maternal health care clinics	83



## LIST OF ABBREVIATIONS

ACOG	American College of Obstetricians and Gynecologists
BG	Blood Group
BMI	Body Mass Index
BP	Blood Pressure
CBC	Complete Blood Count
CDC	Centers for Disease Control and Prevention
CPC	Content of Prenatal Care
CS	Caesarean Section
FBS	Fasting Blood Sugar
HB	Haemoglobin
HCT	Hematocrit
HIV	Human Immunodeficiency Virus
IMHC	Integrated Maternal Health Care
IMPAC	Integrated Management of Pregnancy and Childbirth
MDG	Millennium Development Goals
MHC	Maternal Health Care
MPS	Making pregnancy safer
NVD	Normal vaginal delivery
OR	Odd Ratio
PCC	Preconception counseling
PNC	Prenatal Care
STD	Sexually Transmitted Disease

UA      Urine Analysis  
UC      Urine Culture  
VDRL    Venereal Disease Research Laboratory  
WHO    World Health Organization





## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the problem

“Maternal health refers to the health of women during pregnancy, childbirth and the postpartum period. While motherhood is often a positive and fulfilling experience, for too many women, it is associated with suffering, ill-health, and even death (WHO 2010a).” Thus the World Health Organization (WHO) has recommended a special slogan - “Making pregnancy safer (MPS)” - in recent years (WHO 2010b). The WHO Division of MPS helps to improve maternal health assists countries to ensure skilled care before, during and after pregnancy as well as delivery and strengthen the national health systems in order to achieve the Millennium Development Goals (MDG) 4, 5 and 6. The major aim of MDG is to decrease newborn mortality and maternal mortality significantly by 2015 (WHO 2010b).

Another important recommendation is the American College of Obstetricians and Gynecologists (ACOG)’s recommendations for Pregnancy-Related and Infant Care that consists of: preconception evaluation, pregnancy diagnosis, prenatal care, essential immunizations and laboratory work, mental health screening and services, substance abuse, counseling and treatment, abortion services,

prescription drugs, labor and delivery, postpartum evaluation and services, social and other support services, health services for newborns.

Each title of ACOG's recommendation often includes a subtitle encompassing prenatal care, for example: fetal evaluation, nutrition, parenting, breastfeeding and childbirth education, coordination of prenatal care with delivery services, care for conditions that affect pregnancy, including HIV, other STDs (ACOG, 2008).

The above definition showed that Maternal Health Care (MHC) includes the medical and health care recommendations for women before, during, and after pregnancy. The aim of adequate MHC is to detect any potential problems early, to prevent them if possible and to guide the woman to appropriate centers if necessary. Although MHC is used in many countries today, but according to WHO "The major direct causes of maternal morbidity and mortality include hemorrhage, infection, high blood pressure, unsafe abortion, and obstructed labor (WHO, 2010a)."

The content of MHC, number of prenatal visits, preconception visit, and delay in prenatal care has been important aspects of MHC in the recent decade. These aspects have played a part in reducing maternal and neonatal mortality rates as well as morbidity such as low birth weight and other preventable infant problems in the world.

Today, some of the guidelines that were suggested for MHC or CPC are being adopted by many centers mentioned above (WHO and ACOG) therefore; WHO and ACOG suggested a new guideline. In recent decades, maternal health has been a foundation of a strategy for improving pregnancy outcomes. Consequently, the boundaries of MHC expanded and maternal health care before pregnancy has been extended to include preconception and inter-natal care. Improving delivery and pregnancy outcomes hence needs promoting maternal health not only during pregnancy, but also before and between pregnancies. The identification of the importance of maternal health care before pregnancy has led to increase attention in preconception care (Johnson, *et al.*, 2006b).

Inter-natal care refers to a program of healthcare and additional services offered to a woman and her family from the birth of one child to the birth of her next child. For low-risk mothers, inter-natal care offers a chance for wellness promotion between pregnancies. For high-risk mothers, inter-natal care supplies plans for risk reduction before the next pregnancy (Lu, *et al.*, 2006).

Furthermore, as mentioned above, in recent years, WHO (2010) has announced a new rallying call “Making Pregnancy Safer” (MPS). The aim of making pregnancy safer is to guarantee that governments and health organizations receive guidance and practical services. MPS interventions help to make stronger health systems, including improving quantity and quality of health services, and increase individuals, families and communities competences to respond better to

needs, and to ensure that mothers and their babies have access to appropriate care when they need it (WHO, 2010d).

For most families having a baby, it is a positive and satisfying experience. For some however, pregnancy and childbirth can be associated with mortality and morbidity. Interventions are known that can prevent maternal and newborn morbidity and mortality and can be accessed even in low socio-economic situations. In "The World Health Report 2005, Make every mother and child count," WHO estimated that of the more than 136 million births a year worldwide, less than two-thirds of mothers in less-developed countries and only one-third in the developed countries were delivered by a skilled person. The report says this can affect the level of health indicators if morbidity and mortality arise. About 530,000 mothers a year die during pregnancy or delivery, more than three million pregnancies led to stillbirth, more than four million neonates die in the first days or weeks after birth.

In addition overall 10.6 million children die before their fifth birthday a year, according to WHO's latest reports (WHO, 2005). The report says these outcomes can be reduced through the use of specific interventions and a "continuum of care" approach for mother and child who starts before pregnancy and continues after delivery. The report emphasizes on the developing countries where development in maternal and child health is slow or has even gone into reverse in recent years. Within such countries, of about half of the mothers and newborns that receive care, most of them receive less than what they need. "Make every mother and

child count” is a comprehensive siege on the risk factors affecting the health of mothers before and during pregnancy, in delivery, and in the weeks, months and years that follow for them and their babies. The report adds that setting in place the health personnel needed for scaling up maternal, newborn and child health services towards universal access is the first and the most serious task (WHO, 2005).

## **1.2 Statement of the problem**

Maternal health is a clinically useful for decreasing adverse outcomes such as preterm delivery and low birth weight. Today, MHC has become relatively unfocused in which its goals include family planning, reducing the incidence of unwanted birth, encouraging breastfeeding, promoting good nutrition and healthy behaviors for women and their families, preparation for labor and delivery and for caring for a new infant at home, monitoring for and treating postpartum depression, and screening for domestic violence. Modern MHC has focused on many of these goals, with some great successes and some notable failures (Gregory, Johnson, Johnson, & Entman, 2006; Peter S. Bernstein, 2003).

Modern health care needs an innovative approach to reinvigorate the specialty and better achieve the goals of prenatal care. Therefore, some of the research centers supported new models of the prenatal program. One of this is a multicenter randomized controlled trial that compared the standard model of antenatal care in

improving maternal or neonatal outcomes with fewer clinic visits. Their results show that for women without previous or current complications, a reduction in the number of visits was not associated with increased risk for them or their infants. Villar, *et al.*, (2001) suggested for less developed countries, the goal should be to extend coverage to all pregnant women with the programs shown to be effective and to avoid setting impracticable goals. All the activities of the basic content should always be accessible to all mothers, as well as the necessity of special care for mothers with complications or emergency conditions. In addition, the new program should include other activities known to be helpful or relevant to some populations (e.g. malaria programs). For more developed countries, each activity included in standard prenatal care should be examined or tested for verification of its efficacy before being retained in the standard program. If this plan is systematically applied, a simpler program with a reduced number of visits will be recognized. There is sufficient evidence now showing that the new program with a reduced number of prenatal visits does not increase cost maternal and neonatal complication and in some locations decreases the cost. Consequently, new maternal health care was accepted by users and providers (Villar, *et al.*, 2001a).

It is important to emphasize that the basic component of the previous antenatal care model is intended only for the management of pregnant women who do not have evidence of pregnancy-related complications, medical conditions, or major health-related risk factors. For the management of women who have such conditions, health providers are advised to follow the recommended established procedures of their clinic or hospital.

Other most important aspects that have been associated with the new programs of prenatal care are preconception visit, postnatal visit, and numbers of prenatal care visits. Many interventions to prevent poor pregnancy outcomes are most effective when they are delivered before or during the first few weeks of pregnancy when a woman may not realize she is pregnant. Effective preconception care interventions are critical to improving maternal and infant health outcomes. Several preconception care plans have reduced adverse outcomes and improved health outcomes. By increasing support of preconception care, strategy makers have a chance to promote broad-based programs and services designed at improving the health of mother, children, and families (Atrash, *et al.*, 2008b). A new research shows that there are several interventions that have been proven to improve the pregnancy outcomes effectively when provided as preconception care. Preconception counseling offers the opportunity for improved cooperation with women, increased planned pregnancies, and decreased termination of pregnancy. It also leads to cost savings due to fewer hospitalizations for the mother, fewer anomalies for the fetus, etc. For the future; preconception care must become for each visit of a reproductive-age woman to a health-care provider. Programs for preconception health and task forces should be in place. Research should continue to define the evidence-based content with preconception care, appropriate interventions, and their cost effectiveness (Berghella, Buchanan, Pereira, & Baxter, 2010). We need to understand how best to think globally, but act locally, at the individual level (Curtis, 2008).

The percent of women obtaining preconception counseling should be tracked, with the aim to bring it as close as possible to 100%, as we expect for prenatal care. Chosen preconception health elements (folic acid, smoking, obesity, diabetes, vaccinations, etc.) should be examined to follow successful improvements in health (Berghella, *et al.*, 2010). After preconception care, women had more knowledge on obtaining crucial information on maternal and child care before pregnancy, and more women were found to have changed their behavior to reduce adverse pregnancy outcomes (Elsinga, *et al.*, 2008). Based on a systematic review of the effectiveness of preconception care for women with epilepsy to reduce adverse pregnancy outcomes, it is obvious that further effort is needed to develop a theory and model for major confounders, and recognize fundamental mechanisms and to conduct well-designed randomized trials to address the safety and efficacy of preconception care in reducing adverse outcomes. Prospective cohort studies, cross-sectional studies, and pre- and post-intervention studies, along with qualitative studies, are necessary to provide valid scientific evidence for the content of preconception care and the best delivery approach (Winterbottom, Smyth, Jacoby, & Baker, 2009).

Generally, according to a study that had indicated a relationship between the use of prenatal care services and birth outcomes (Gregory, *et al.*, 2006) maternal care has been associated with improved birth weights and the reduction in the risk of preterm delivery. On the other hand, the inadequate use of maternal care had been associated with increased risks of low-birth-weight, premature births, neonatal mortality, infant mortality, and maternal mortality.



Therefore, Ministry Health of Iran suggested that routine maternal care requires modification in order to focus on many goals of MHC, and that MHC should be changed in Iran. For that reason in recent years, the Ministry of Health in Iran has published a new document on MHC and commenced implementation of a new program according to the latest recommendations of WHO and other scientific organizations for Iranian mothers (Jafari, Valafar, & Radpoyan, 2006). This program is started as pilot program in some of the provinces in Iran. In this study, we attempted to compare the new maternal health care (IMHC) with the standard program in Qazvin province.

In Iran, routine maternal health care usually is started in early pregnancy up to the end of pregnancy. The delivery services are generally separated from maternal health care. Therefore, there are two gaps during routine maternal care in Iran before pregnancy and after pregnancy. In addition, the content of routine maternal care is likely inadequate in Qazvin province, because prenatal coverage is 99.1 percent but rate of using of prenatal care is 58.0 percent for governmental clinics and 42.0 percent for private clinics. Finally, complete preconception care is very low (1.70%) and rate of at least 6 visits during pregnancy is 96.0 percent versus 11 or 14 visits are recommended by some centers such as WHO and ACOG. Therefore, the routine maternal care in Iran needs modification in order to focus on the many goals of maternal care. In this study programs of maternal health care in two cities will be compared, from preconception until 6 weeks after delivery; the impact of these programs on outcomes of pregnancy and delivery will be analyzed. It is hoped that this study will lead to the development of better

maternal health care programs for pregnant women. Future research will be able to use this data in order to investigate further the problems related to MHC.

### **1.3 Objectives**

#### **1.3.1 General Objective**

The general objective is to compare gestational and birth outcome of the intergareted maternal health care (IMHC) (in Alvand) with the standard program (in Qazvin) in Qazvin province of Iran.

#### **1.3.2 Specific Objectives**

1. To measure the baseline parameters among participants of the two programs including:
  - a. Demographic characteristics
  - b. Maternal medical history
  - c. Obstetric history
  - d. History of gestational complications
2. To measure the following during preconception care in new program:
  - a. Number of visits
  - b. Systolic and diastolic blood pressure,

- c. Body mass index (BMI)
- d. types of supplements given
3. To follow up women during prenatal care until delivery in both programs with respect to the following:
  - a. The timing of the first visit during gestational weeks
  - a. The results of routine laboratory tests
  - b. The patterns of weight gain among pregnant mothers
  - c. The mean systolic and diastolic blood pressure
  - d. The referral patterns during the prenatal period
  - e. The mean number of prenatal visits
4. To compare the differences of gestational complications between participants of the two programs including:
  - a. Anaemia
  - b. Gestational hypertension
  - c. Pre-eclampsia, and eclampsia
  - d. Preterm labor
5. To compare the mode of delivery and any complications during delivery such as mal-presentation and obstructed labour
6. To compare the outcome of delivery between participants of the two programs including:
  - a. Preterm birth
  - b. Low birth weight
  - c. Maternal mortality
  - d. Neonatal mortality

7. To describe the postpartum care such as the number of visits and any complications in the new program.

#### **1.4 Research Hypothesis**

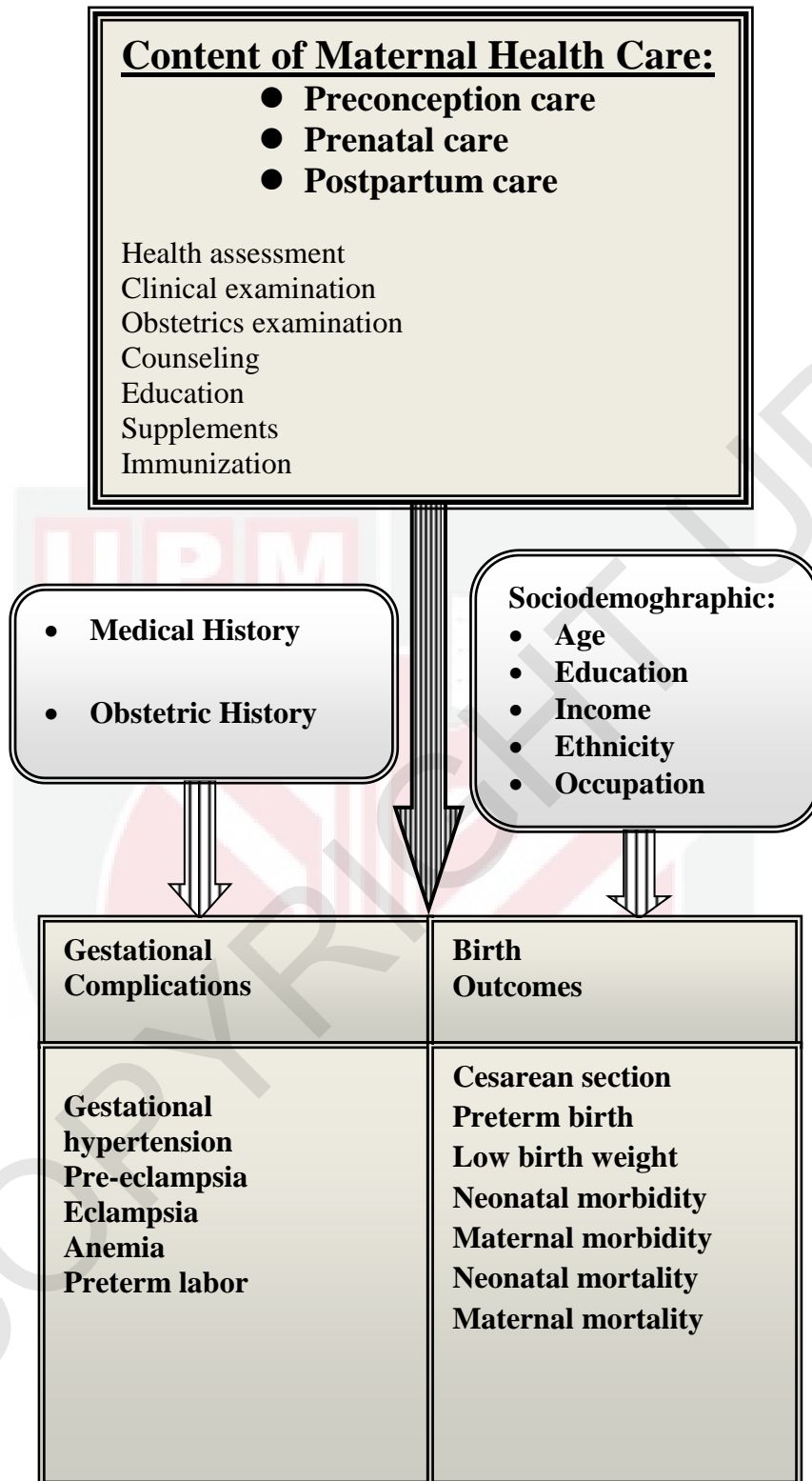
The new program of maternal health care (IMHC) in Alvand is more effective than the standard program in Qazvin in improving gestational and birth outcomes in pregnant women with respect to the indicators of gestational and delivery outcomes.

#### **1.5 Conceptual framework**

Proposed conceptual framework shows that the content of maternal health care includes preconception, prenatal and postpartum care can affect on outcome of pregnancy and delivery. Quantity and quality of maternal health care will improve these outcomes; an appropriate maternal health program reduces the adverse outcomes. Adverse outcome usually induced during pregnancy such as gestational hypertension, pre-eclampsia, eclampsia, anemia, preterm labor or during delivery such as cesarean section, preterm birth, low birth weight, neonatal morbidity, maternal morbidity, neonatal mortality, maternal mortality. On the other hand, it should be considered that demographic factors, socioeconomic status, medical and obstetric history have similar and synchronous effects. Consequently, it is

surmised effects that content of the maternal health care program contributes to complications during pregnancy and delivery (Figure 1.1).





**Figure 1.1 Conceptual Framework: impact of MHC on gestational complication and birth outcomes**

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