

**Low compliance with Iron-folate supplementation among postpartum mothers of
Nepal: an analysis of Nepal Demographic and Health Survey 2011**

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Abstract

Background: One in five maternal deaths are directly attributable to anaemia in the world. The World Health Organization (WHO) recommends iron supplementation from the second trimester of pregnancy to 45 days after delivery. The aim of this study was to determine the compliance rate of iron-folate consumption and the factors associated with iron-folate consumption among post-natal mothers in Nepal.

Methods: This study utilised the data of Nepal Demographic and Health Survey (NDHS) 2011. The NDHS 2011 is a cross sectional and nationally representative survey.

Results: Of the 4148 respondents, only 20.7 % consumed iron throughout the post-natal period for 45 days. Mothers who had higher and secondary education [adjusted Odd ratio (aOR) 3.101; 95% CI (2.268-4.240)]; had attended four or more antenatal care visits [aOR 9.406; 95% CI (5.552-15.938)]; lived in Far-western development region [aOR 1.822; 95% CI (1.387-2.395)]; delivered in health facility [aOR 1.335; 95% CI (1.057-1.687)]; and attended postnatal care [aOR 2.348; 95% CI (1.859-2.965)] were more likely to take iron for 45 days of postpartum.

Conclusion: Intervention to increase the compliance with the post-partum iron-folate supplementation are required to avoid adverse pregnancy outcomes associated with poor iron status with especial focus on the mothers who delivered at homes and did not attend post-natal check up.

Key words: Anaemia, Cross sectional survey, Iron deficiency, Nepal, Postpartum period

Introduction

Iron deficiency anaemia is one of the neglected issues in developing countries affecting mainly pregnant women and children (Yakoob & Bhutta, 2011). It is estimated that 293 million pre-school children, 56 million pregnant women, and 468 million non-pregnant woman suffer from anaemia (Balarajan, Ramakrishnan, Özaltın, Shankar, & Subramanian, 2011). In South Asia, the prevalence of iron deficiency anaemia is 80% (Balarajan, et al., 2011; Yakoob & Bhutta, 2011). Anaemia is associated with a number of negative health outcomes including impaired work performance; endurance and productivity; and increased risk of morbidity and mortality which have negative impact on social and economic development (Casey et al., 2009; Child Health Division & Ministry of Health and Population, 2004; Horton & Ross, 2003). Pregnant and postpartum women are at increased risk of anaemia leading to negative birth and infant outcomes (Casey, et al., 2009). One in five maternal deaths are directly or indirectly attributable to anaemia in developing countries (Balarajan, et al., 2011) .

Anaemia can be prevented with interventions such as routine deworming of children and pregnant, iron or iron-folic acid supplementation, and dietary modifications (Yakoob & Bhutta, 2011). The World Health Organization (WHO) (2006) recommends a daily dose of 60 mg of iron in pregnant, non-anaemic women for six months; and to increase the dose to 120 mg if the mother is anaemic; if iron deficiency anaemia is prevalent; or if the duration of supplementation is shorter. Similarly, a 400 µg or lower dose of folic acid is also recommended along with iron tablets. In many developing countries, folic acid has been combined in the iron tablets as iron-folate tablets.

In Nepal, the prevalence of anaemia was 78% among the school children and 35% among women but only 32% preschool children received iron supplementation. Similarly, only 29%

of pregnant women received iron-folate supplementation (Child Health Division & Ministry of Health and Population, 2004). These data indicate that iron-folate supplementation in Nepal is not adequate. In Nepal, anaemia is mainly due to iron deficiency. Inadequate iron intake, inadequate dietary iron absorption, worm infestation, higher requirement during pregnancy and growth, blood loss such as menstruation are major causes of iron deficiency anaemia among women in Nepal and other developing countries (Balarajan, et al., 2011; Child Health Division & Ministry of Health and Population, 2004; WHO, 2001). The National Nutrition Strategy of Nepal (Child Health Division & Ministry of Health and Population, 2004) aims at reducing the iron deficiency anaemia among women and children to less than 40% by the year 2017. Therefore, the distribution of iron-folate tablets to pregnant women and lactating mothers through health facilities and Female Community Health Volunteers are major strategies to reduce iron deficiency anaemia in these groups (Child Health Division & Ministry of Health and Population, 2004). Iron-folate tablets (60 mg iron and 400 mcg folic acid) are distributed free of cost to all pregnant mothers starting in second trimester, and after delivery as routine micronutrient supplementation activity. Christian et al. (2009) reported that antenatal/postnatal iron/iron-folic acid supplementation proved to be beneficial in reducing iron deficiency anaemia in Nepal. Despite having free supply of iron-folate supplementation, only 73% pregnant women received such supplements at least once during pregnancy in 2011 (Ministry of Health and Population, 2011). The duration and frequency of iron-folate supplementation to mothers remains largely unknown (Ministry of Health and Population, 2011). Since the majority of deliveries occur at home in Nepal, it is likely that not many women receive such iron-folate supplementation during postpartum period. Further, the factors associated with the compliance with the recommended usage of iron-folate supplementation have not been studied. Therefore, the aim of this study was to examine the usage pattern and the factors

associated with the compliance with the use of recommended iron-folate supplementation among postpartum mothers in Nepal.

Methods

Data and sample

Data used in this study come from birthrecode dataset of Nepal Demographic and Health Survey (NDHS) 2011 (Ministry of Health and Population (MOHP) [Nepal], New ERA, & ICF International Inc, 2012). The NDHS is a cross sectional study which used two stage sampling to obtain the household samples from the entire country. The NDHS used three sets of questionnaires (household, mother's and men's questionnaires) to obtain information. Further details of sampling and questionnaire can be obtained from the NDHS full report (Ministry of Health and Population (MOHP) [Nepal], et al., 2012).

Information regarding maternal health were completed from all the eligible mothers having 0-59 months children. Out of 5306 children and mother pairs included in the survey sample, information regarding the consumption of iron supplementation during postpartum period were available for 4148 (78.17%) post-partum mothers.

This survey obtained ethical approval from Nepal Health Research Council and the ethical review board of ICF Macro International. The study obtained written informed consent from the respondents. The personal identifiers were removed from the dataset which are publicly available for further study, and analyse for research purpose. This secondary data analysis proposal was approved from the Ethics Committee on Human Research, Curtin University, Western Australia [protocol approval-SPH-16-2012]. Permission from Macro international was obtained for the use of dataset.

Outcome variable

Two questions were asked to assess consumption of iron-folate supplementation during postpartum period in the survey (Ministry of Health and Population (MOHP) [Nepal], et al., 2012): (i) After delivery were you given or did you buy any iron/folic acid (Iron-folate) tablets?; and (ii) After delivery, for how many days did you take the tables? We coded the response from these questions: 1 if iron-folate was consumed for 45 days or more and 0 if not consumed or consumed < 45 to define the outcome variable of our study.

Explanatory variables

Explanatory variables used in this study are explained in the NDHS survey and similar study based on NDHS (Khanal, Adhikari, & Karkee, 2013; Ministry of Health and Population (MOHP) [Nepal], et al., 2012). Ethnicity is categorized into three sub categories; advantaged, relatively disadvantaged (Janjati) and relatively disadvantaged (Dalit) (Bennett, Dahal, & Govindasamy, 2008; Khanal & Sauer, 2013). Advantaged group includes the higher caste groups such as Brahmins, Chhetri, Newars. Relatively disadvantaged (Janjati) included the indigenous groups which are relatively less developed. Relatively disadvantaged (Dalit) included a group of skilled caste groups who deal with iron work, gold work, carpenting, sewing, leather goods, and other traditional manual skills. Ecological region is horizontal sections of the country based on the altitude and climate (Ministry of Health and Population (MOHP) [Nepal], et al., 2012). The plain area bordering to India is Terai; North to the Terai, middle hilly area, is called Hill; and the North area covered with snow and bordering with China is called the Mountain. Administratively Nepal is divided into five development region having sections from North to South; starting from the East- Eastern region, Central region, Western region, Mid-western region and Far-western region (Ministry of Health and Population (MOHP) [Nepal], et al., 2012).

Statistical analysis

The prevalence of consumption of iron-folate tablets during postpartum period is reported as proportion. Weighted analysis were performed to report the prevalence to account for the sampling weight as recommended by the Guide to DHS Statistics (Rutstein & Rojas, 2012). The association between the outcome variable and the independent variables was examined by using Chi-square test. The significant independent variables ($p < 0.05$) were then analysed by stepwise backward logistic regression. P-value ≤ 0.05 was considered statistically significant.

Findings

Characteristics of the respondents

Table 1 presents the characteristics of the respondents. The majority of the mothers (63.6%) were from 20-29 years age group and slightly less than half (43.9%) were illiterate. More than half (58.2%) were involved in agriculture. Three out of ten mothers were the first time mothers. Most of the mothers were from relatively advantaged (44%) followed by relatively disadvantaged Janajatis (39.3%). Only 15% of the mothers were from the richest households (richest quintile). Majority (89.9 %) of the mothers were from rural area. Around one third (31.2%) of the mothers were from Central development region and majority (52.4 %) were from Terai. In relation to husband's educational status, less than half (43.6) of them had completed secondary level education.

About 50% of the mothers had utilized complete antenatal care (ANC) services whereas 58.2% mothers had attended ANC within first trimester of pregnancy. Similarly, six out of ten (61.5%) mothers had home delivery. Only 43.2 % of the mothers attended postnatal care (PNC) services and majority of them attended PNC services within 24 hours of delivery.

Consumption of iron-folate supplementation for 45 days of postpartum

Of the 4148 respondents, only 20.7 % of the respondents consumed the iron-folate supplementation for 45 days. Figure 1 shows the consumption trend. Less than half mothers (41.01%) consumed iron-folate supplementation at the first day of delivery and only 1.28% consumed for the full two months.

Factors associated with consumption of iron for 45 days of postpartum

In univariate analysis, maternal education, development region, frequency of ANC visit, place of delivery and receiving postnatal care for mothers were significantly associated with compliance with the recommended 45 days iron-folate supplementation consumption.

Furthermore, the results of multivariable logistic regression are presented in Table 3.

Maternal education, development regions, attending ANC, place of delivery and attending PNC visits were significantly associated with the compliance of iron-folate supplementations after controlling for other variables in the model. Mothers having higher secondary or above [aOR 3.101; 95% CI (2.268-4.240)] and secondary [aOR 1.824; 95% CI (1.469-2.264)] education were more likely to comply with iron-folate supplementation than mothers with no education. Similarly, mothers from Far-western development region [aOR 1.822; 95% CI (1.387-2.395)] were more likely to consume iron-folate during postpartum than remaining four development regions. Mothers who attended 4 or more visits [aOR 9.406; 95% CI (5.552-15.938)] were more likely to consume iron-folate than the mothers who did not attend ANC visit. Mothers who delivered in health facility [aOR 1.335; 95% CI (1.057-1.687)] and who received PNC service [aOR 2.348; 95% CI (1.859-2.965)] were more likely to take complete 45 days of iron-folate during postpartum period.

Discussion

This study found that only one in five mothers took iron-folate supplementation during their postpartum period up to 45 days. Though there is active implementation of safe motherhood programmes including birth preparedness and post-natal counselling, this could not be translated into increased post-natal service utilisation and iron-folate supplementation. This might be due to the fact that most deliveries still take place at homes and women do not seek health post-natal check up until there is a perceived post-partum health problem (Ministry of Health and Population (MOHP) [Nepal], et al., 2012). Besides, health facilities may be far off to reach or regular supplies of iron-folate may not be maintained at the facilities.

This study found that maternal education, region of the country, antenatal services, facility delivery and postnatal care were associated with folate iron consumption. Mother's education has been consistently found as a significant determinant of maternal health and increased health service utilisation (Doku, Subas Neupane, & Doku, 2012; Neupane & Teye Doku, 2011). Education also enables mothers to understand and use the health information effectively, to comply with the advice, and to take an informed choice for themselves. A number of previous studies have reported the effect of education on higher utilisation of services similar to our finding (Dhakal et al., 2007; Doku, et al., 2012).

Women were provided antenatal counselling during antenatal visit that includes status on her blood haemoglobin level and importance of iron-folate tablets (Doku, et al., 2012; Neupane & Teye Doku, 2011). Similarly, women who deliver at facility are provided post-natal counselling. So it could be expected that ANC attendance and having delivered at facility increased the likelihood of iron-folate compliance during post-natal period which is

demonstrated by several other studies (Chakraborty, Ataharul Islam, Chowdhury, & Bari, 2002; Dhakal, et al., 2007; Doku, et al., 2012; Kerber et al., 2007).

Surprisingly, this study found that mothers from low-socioeconomic regions that includes the Far-western development region of Nepal were more likely to comply with the recommended iron-folate supplementation for 45 days of postpartum. Further research is needed to explain spatial variation in compliance of iron-folate in Nepal.

Our study have some public health implications. First, it provides an evidence that there is need to focus on the ways of increasing utilisation of post-natal care to increase the iron-folate supplements. Existing delivery mechanisms including the Primary Health Care Outreach Clinics and Female Community Health Volunteers might need further support (Child Health Division & Ministry of Health and Population, 2004). The second, utilisation of antenatal and delivery services including iron-folate supplementation consumption should be highly advocated to have better maternal outcomes. Peer counseling and increased awareness activities through mother's group would be feasible option in Nepal (Simkhada, Porter, & Teijlingen, 2010). In Nepal, a mother needs to live in an isolated place as a cultural practice for about two week. This is likely to restrict care seeking for post-natal issues. Further, the mothers-in-law or other senior women in the household usually make the decision on maternity care and nutrition (Simkhada, et al., 2010). The mothers-in-law, due to their lower education status and traditional beliefs, are less likely to be aware of the iron supplements. Therefore, future awareness program should also target the senior women of the community who can make significant contribution on maternity care (Masvie, 2006). Social marketing has been proved effective to increase the access and utilisation of family planning in Nepal; and iron supplementation in Vietnam (Casey, et al., 2009; Ministry of Health and Population (MOHP) [Nepal], et al., 2012). This could be a complementing approach to increase the use of iron-folate supplementation in Nepal.

The current study is nationally representative, the analysis accounted for multistage sampling by performing weighted analysis, and the findings are generalizable for the entire country (Rutstein & Rojas, 2012). However, there are some limitations of current findings. The cross sectional nature of the study precludes from drawing causal inferences. The information was based on recall method; therefore, some biases might have been unknowingly introduced such as recall and memory bias. The other limitation of the study is that although the response rate of the NDHS 2011 was >95%, the response rate of the outcome variable of this study was only 78.17% (4148 of 5306) (Ministry of Health and Population (MOHP) [Nepal], et al., 2012). However, reasonably large sample size and being the best possible available data currently, our study does reflect the national status.

Conclusion

This study found that about one in five women complied with the recommended iron-folate supplementation for 45 days of postpartum. Mothers who have lower education, did not attend any antenatal care visit, had their delivery at home and did not attend any postnatal care were likely not to comply with iron-folate supplementation. Increasing antenatal and postnatal visits, facility delivery and educational intervention might increase the rate of postnatal iron-folate compliance rate.

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Tables

Table 1: Characteristics of respondents

Factor	Total N (=4148)	Percentage
Maternal factors		
Mother's age (in years)		
15-19	333	8.0
20-29	2639	63.6
30-34	670	16.1
>=35	507	12.2
Maternal education		
No education	1822	43.9
Primary	835	20.1
Secondary	1229	29.6
Higher	263	6.3
Mother's occupation		
Not working	1153	27.8
Agriculture	2416	58.2
Working (paid)	580	14.0
Birth order		
First	1302	31.4
Second or third	1895	45.7
Fourth or more	952	22.9
Sociodemographic factors		
Ethnicity		
Relatively advantaged	1824	44.0
Relatively disadvantaged (Janjati)	1632	39.3
Relatively disadvantaged (Dalit)	693	16.7
Religion		
Hindu	3444	83.0
Others	704	17.0
Wealth quintile		
Poorest	979	23.6
Poor	899	21.7
Middle	873	21.0
Richer	748	18.0
Richest	649	15.7
Place of residence		
Urban	418	10.1
Rural	3730	89.9
Development region		
Eastern	999	24.1
Central	1293	31.2

Western	818	19.7
Mid -Western	598	14.4
Far-Western	440	10.6
Ecological region		
Mountain	306	7.4
Hill	1669	40.2
Terai	2174	52.4
Partner's education		
No education	894	21.6
Primary	984	23.7
Secondary	1809	43.6
Higher	461	11.1
Health care related factors		
ANC visit (Times)		
No ANC visit	629	15.2
1-3	1442	34.8
4 or more	2078	50.1
Timing of ANC (n=629)		
Late ANC (4-9 months)	1460	41.5
Early ANC (<=3 months)	2060	58.5
Place of delivery		
Home	2551	61.5
Health facility	1598	38.5
Post natal care for mother		
No	2358	56.8
Yes	1791	43.2
Timing of Postnatal care (n=1791)		
After 24 hours	93	5.2
withing 24 hours	1698	94.8
Postnatal care provider (n=1791)		
Others	78	4.4
Health worker	1712	95.6

The number of missing values may vary for each variable. The percentages presented are valid percentages.

Table 2: Factors associated with compliance of iron-folate supplementation for 45 days of postpartum period.

Factors	Not consumed for 45 days	Consumed for 45 days	p- value
Maternal factors			
Mother's age (in years)			<0.001
15-19	244(79.6)	62(20.3)	
20-29	1980(75.9)	628(24.1)	
30-34	525(79.4)	136(20.6)	
>=35	441(87.5)	63(12.5)	
Maternal education			<0.001
No education	1548(87.7)	217(12.3)	
Primary	653(79.9)	164(20.1)	
Secondary	849(69.3)	376(30.7)	
Higher	140(51.5)	132(48.5)	
Mother's occupation			<0.001
Not working	723(74.9)	242(25.1)	
Agriculture	2029(81.1)	473(18.9)	
Working (paid)	438(71.6)	174(28.4)	
Birth order			<0.001
First	890(71.3)	358(28.7)	
Second or third	1436(77.7)	411(22.3)	
Fourth or more	864(87.8)	120(12.2)	
Sociodemographic factors			
Ethnicity			<0.001
Relatively advantaged	1443(73.8)	512(26.2)	
Relatively disadvantaged (Janjati)	1162(82.4)	248(17.6)	
Relatively disadvantaged (Dalit)	585(81.9)	129(18.1)	
Religion			<0.001
Hindu	2695(78.2)	750(21.8)	
Others	594(84.4)	110(15.6)	
Wealth quintile			<0.001
Poorest	861(87.9)	118(12.1)	
Poor	753(83.8)	146(16.2)	
Middle	710(81.3)	163(18.7)	
Richer	549(73.4)	199(26.6)	
Richest	417(64.3)	232(35.7)	
Place of residence			<0.026
Urban	314(75.1)	104(24.9)	
Rural	2976(79.8)	755(20.2)	
Development region			<0.001
Eastern	781(78.2)	218(21.8)	

Central	1102(85.2)	191(14.8)	
Western	623(76.2)	195(23.8)	
Mid -Western	482(80.6)	116(19.4)	
Far-Western	302(68.5)	139(31.5)	
Ecological region			0.258
Mountain	597(80.5)	145(19.5)	
Hill	1288(77.8)	368(22.2)	
Terai	1305(77.6)	376(22.4)	
Partner's education			0.258
No education	679(89.2)	82(10.8)	
Primary	842(85.1)	147(14.9)	
Secondary	1349(74.3)	466(25.7)	
Higher	320(62.3)	194(37.7)	
Health care related factors			
ANC visit (Times)			<0.001
No ANC visit	595(97.4)	16(2.6)	
1-3	1145(86.9)	172(13.1)	
4 or more	1450(67.4)	701(32.6)	
Timing of ANC (n=			<0.001
Late ANC (4-9 months)	1141(81.4)	265(18.8)	
Early ANC (<=3 months)	1453(70.5)	608(29.5)	
Place of delivery			<0.001
Home	2088(84.7)	376(15.3)	
Health facility	1102(68.2)	513(31.8)	
Post natal care for mother			<0.001
No	1992(86.9)	299(13.1)	
Yes	240(68.2)	112(31.8)	
Timing of Postnatal care			0.825
After 24 hours	62(66.0)	32(34.0)	
withing 24 hours	1136(67.1)	558(32.9)	
Postnatal care provider			0.645
Others	55(64.7)	30(35.3)	
Health worker	1143(67.1)	560(32.9)	

Table 3: Factors associated with compliance of iron-folate supplementation during postpartum period, Adjusted and unadjusted odds ratio

Factors	Total	Consumed iron-folate for 45 days	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Mother's age (in years)			p<0.001	p=0.317
15-19	333	62(20.3)	1.00	1.00
20-29	2639	628(24.1)	1.197(0.899-1.594)	1.175(0.863-1.600)
30-34	670	136(20.6)	1.105(0.795-1.535)	1.342(0.932-1.931)
>=35	507	63(12.5)	0.563(0.383-0.824)	1.021(0.660-1.579)
Maternal education			p<0.001	p<0.001
No education	1822	217(12.3)	1.00	1.00
Primary	835	164(20.1)	1.610(1.282-2.023)	1.150(0.902-1.468)
Secondary	1229	376(30.7)	3.297(2.734-3.976)	1.824(1.469-2.264)
Higher	263	132(48.5)	6.690(5.051-8.862)	3.101(2.268-4.240)
Mother's occupation			p<0.001	p=0.285
Not working	1153	242(25.1)	1.00	1.00
Agriculture	2416	473(18.9)	0.692(0.583-0.821)	0.928(0.757-1.139)
Working (paid)	580	174(28.4)	1.200(0.955-1.507)	0.815(0.632-1.050)
Development region			p<0.001	p<0.001
Eastern	999	218(21.8)	1.00	1.00
Central	1293	191(14.8)	0.621(0.501-0.769)	0.673(0.533-0.848)
Western	818	195(23.8)	1.123(0.901-1.399)	1.063(0.840-1.346)
Mid -Western	598	116(19.4)	0.865(0.672-1.13)	1.061(0.808-1.393)
Far-Western	440	139(31.5)	1.645(1.280-2.114)	1.822(1.387-2.395)
Ethnicity			p<0.001	p=0.091
Relatively advantaged	1824	512(26.2)	1.00	1.00
Relatively disadvantaged (Janjati)	1632	248(17.6)	0.610(0.517-0.720)	0.902(0.749-1.085)
Relatively disadvantaged (Dalit)	693	129(18.1)	0.482(0.380-0.610)	0.752(0.579-0.975)
Wealth quintile			p<0.001	p=0.627
Poorest	979	118(12.1)	1.00	1.00
Poor	899	146(16.2)	1.414(1.089-1.836)	0.997(0.743-1.338)
Middle	873	163(18.7)	1.668(1.291-2.157)	0.975(0.722-1.316)
Richer	748	199(26.6)	2.638(2.051-3.392)	1.149(0.829-1.594)

Richest	649	232(35.7)	4.051(3.154-5.204)	1.218(0.838-1.769)
Place of residence			p=0.024	p=0.065
Urban	418	104(24.9)	1.00	1.00
Rural	3730	755(20.2)	0.762(0.602-0.964)	1.281(0.986-1.664)
Birth order			p<0.001	p=0.850
First	1302	358(28.7)	1.00	1.00
Second or third	1895	411(22.3)	0.728(0.618-0.859)	0.982(0.804-1.198)
Fourth or more	952	120(12.2)	0.349(0.276-0.441)	0.908(0.647-1.274)
ANC visit (Times)			p<0.001	p<0.001
No ANC visit	629	16(2.6)	1.00	1.00
1-3	1442	172(13.1)	5.682(3.357-9.617)	4.567(2.686-7.766)
4 or more	2078	701(32.6)	18.381(11.025-30.647)	9.406(5.552-15.938)
Timing of ANC (n=629)			p<0.001	p=0.175
Late ANC (4-9 months)	1460	265(18.8)	1.00	1.00
Early ANC (<=3 months)	2060	608(29.5)	1.789(1.518-2.109)	1.137(0.944-1.369)
Place of delivery			p<0.001	p=0.015
Home	2551	376(15.3)	1.00	1.00
Health facility	1598	513(31.8)	2.572(2.207-2.998)	1.335(1.057-1.687)
Post natal care for mother			p<0.001	p<0.001
No	2358	299(13.1)	1.00	1.00
Yes	1791	112(31.8)	3.527(3.008-4.135)	2.348(1.859-2.965)

-2loglikelihood ratio: 3642.549; df: 11

Independent variables entered in the initial model: mother's age, occupation, education, ethnicity, wealth quintile, place of residence, development region, ANC visit, timing ANC, place of delivery, postnatal care for mother, birth order. CI: Confidence interval

Figure 1: Decline in iron-folate consumption as a percentage (%) by increasing days of delivery (N=4148)

