Ilkogretim Online - Elementary Education Online, 2020; Vol 19 (Issue 4): pp.5235-5250
http://ilkogretim-online.org
doi: 10.17051/ilkonline.2020.04.764932

Inequality of Opportunity in Access to Antenatal Care in Districts of Punjab, Pakistan

Hafiz Ghulam Mujaddad, PhD Scholar and Lecturer Economics (Department of Economics, University of the Punjab, Lahore-Pakistan), ghulam.eco@pu.edu.pk
Dr. Mumtaz Anwar, Professor of Economics and Chairman (Department of Economics, University of the Punjab, Lahore-Pakistan), mumtaz.anwar@pu.edu.pk

Abstract- Inequality in the use of antenatal care (ANC) has long been a barrier to obtain universal access of the service. The aim of this work to analyze the inequality of opportunity in access toANC in districts of Punjab, Pakistan and explore the circumstance variables that contribute the most to the inequality. The study isconducted using Punjab's Multiple Indicator Cluster Survey 2017-18 and the data analyzed are taken from women with a live birth in the last 2 years who have had at least one ANC visit. The Human Opportunity Index is used to measure the coverage rate, inequality and universal access of opportunity across the districts of Punjab.It is noted that most of the southern districts of Punjab (Rajanpur, Bhakkar, Muzaffargarh and others) have poor coverage rates and low universal access for the ANC and northern districts (Rawalpindi, Jhelum, Lahore and others) have high coverage and universal access for the ANC.There is also higher inequalityin southern and central districts of Punjab.Further, Shapley Decomposition is utilized to identify the contribution of the circumstance variables to the inequality. It is found that household wealth status, birth order, birth interval, household head education, ethnicity, media access and residence were the most significant factors leading to inequality of opportunity in the accessibility of ANC services across the districts of Punjab. On the basis of the results, some policies are suggested to the Government at end.

Key Words: Inequality; Human Opportunity Index; Antenatal Care; Punjab.

I. INTRODUCTION

Divergence from the widespread belief on trickledown effect theory call for promising role of public policy through direct intervention by the government in order to ensure inclusive growth. Progress in health care is a yardstick to gauge socio-economic development in any society. The world has made great progress in health care indicators including life expectancy, infant mortality and maternal mortality (Wang et al., 2016), whereas, developing countries including Pakistan are lagging far behind particularly in maternal and neonatal mortality. The global maternal mortality rate (MMR) and neonatal mortality rate (NMR) have been 216 per 100,000 live births and 18.6 per 1000 live births respectively while prevalent rate in Pakistan has been 178 per 100,000 live births and 45.6 per 1000 live births respectively (World Health Statistics, 2018).

The situation of maternal mortality is very bad in Pakistan particularly in Punjab. Punjab is the most populous province with 53.4 percent of country's population. Despite of vast network of health care facilities, Punjab has relatively performed worse in maternal health as the MMR is 180 per 100,000 live births in 2018 (MICS, 2017-18). Antenatal care (ANC) can be utilized as one of the best strategy to reduce the MMR ((Hong and Ruiz-Beltran, 2007; Nuraini and Parker, 2005). An approximate 74 percent of cumulative maternal deaths can be avoided if access to maternal health services is universal (Carroli et al., 2001; Wagstaff, 2004). Furthermore, ANC tends to improve the use of postnatal health care facilities (Chakraborty et al., 2002). Unfortunately, there are just 52.9% of Punjab women who make 4 ANC visits during pregnancy (MICS, 2017-18). So there is a need to focus on ANC to reduce the maternal and neonatal mortality in lower middle income countries (LMICs).

Punjab is characterized by significant variation in uptake of ANC among its various districts e.g., there are only 27.2 % of women who have made 4 or more visits of ANC in the district of Rajanpur while on the other

side it is 81.3 % in district of Jhelum and rest of the districts are in between these two numbers. It represents that there is huge inequality in access to opportunity within the province, it may be due to various reasons. Whatsoever the reasons may be, it indicates very serious problem because promoting maternal health and health equity is one of the key targets of the WHO (Marmot et al., 2008) and among the main targets of SDGs.

Indeed, one of the key goals of public health interventions is to ensure equity in utilization of health care services independent of socio-economic class (Wagstaff and Van Doorslaer, 2000) because improving health equity means not only reducing gaps in health status between different regions / groups, but also health disparities between groups within countries / provinces or districts of a particular province (Braveman and Gruskin, 2003). Surprisingly, the assessment of health inequality in LMICs has been less studied, partially due to the dearth of adequate data (Braveman and Tarimo, 2002; Rannan-Eliya and Somanathan, 2006; Gwatkin, 2009). Therefore, present study is of great practical significance as it provides evidence on access of ANC in all districts of Punjab along coverage rate and inequality of opportunity using most appropriate statistical tools.

Inequality of opportunities (IOPs) is always found unfair and policy interventions in terms of compensation or other affirmative measures may be needed. However, any policy intervention can only occur if the magnitude of this disparity can be measured systematically. In this perspective, statistical tool that can guide the government to make it a reality is Human Opportunity Index (HOI) which is the pioneer conceptualization of linking Inequality of opportunity (IOP) with human development. This was introduced by Barros et al. (2009) and is the most recent development in the literature. In addition, the decomposition method suggested by Shorrocks (2013) is used to calculate the contributions of various circumstance factors to the IOP.

It is pertinent to mention that ample literature is available worldwide on IOP in maternal health. However, in case of Pakistan in general and Punjab in particular, this literature is very scant and limited to: IOP for household head's income, labour earnings and household income per capita (Pervaiz and Akram, 2018; shaheen et al., 2016). Majority of studies are related to find out the determinants of maternal and child health in Pakistan such as, Agha (2000), Bhutta et al. (2013), Nisar and Dibley (2014), Bugvi et al. (2014), Di Cesare et al. (2015), Bhutta and Hafeez (2015), Tariq et al. (2018). There is hardly any study that measured the IOP in the districts of Punjab. Therefore, this study adds significant value to existing literature on subject matter. The objectives of this study are (i) to measure the IOP by using the HOI for all districts of Punjab. (ii) to decompose the relative contribution of circumstance factors to IOP by using the Shapley Decomposition.

The rest of the article is structured as, following introduction, conceptual framework along the identification of circumstance variables are discussed in section 2, methodology and data source are given in section 3, results are reported in section 4, lastly conclusion and policy recommendations are given in section 5.

II. CONCEPTUAL FRAMEWORK

The discussion about the normative context of the IOP starts from Rawls (1971) and Sen (1980). The idea of Rawls'(1971) equality of primary social goods and Sen's(1980) equality of capacities far away from the social objective of human wellbeing. They suggest that if primary products or capacities are uniformly distributed then all remaining inequality may be due to the individuals' own preferences[1]. Dworkin (1981a) argued that equity of welfare is not a valid criterion because it does not make individual responsible for their own choices. So the issue is to find the dispersal of resources that can compensate individuals for their dissimilar endowments while making them responsible for their choices. This rational makes sense for Dworkin (1981b) to suggest the criterion of equality of resources. Cohen (1989) criticizes the idea of Dworkin by showing that parting between choices and resources can be intractable in practice: Should one be held accountable for childhood preferences that are mainly introduced by one's social environment? This discussion reinforced the major developments in the philosophy of social choice, which based these new theories on analytical structure called an approach to equal opportunities.

[1]Means individual will be responsible for any inequality

There is, however, some analytical appeal to the notion of rating social states on the basis of calculating opportunities by taking the inherent worth of human rights into account. Rosa Dias (2014) briefly addressed Roemer's (1998, 2002) proposed workhorse of applied literature on IOP in health. Roemer model categorizes all variables which influence the individual achievement between effort and circumstance factors. An adult health production function is the combination of effort and circumstances. Evidence has been established in medical science that early health determinants has emphasized the importance of circumstance factors. The life course models[2] and pathway models[3] explain illness risk later in life.

Therefore, previous research attempting to differentiate the impact of efforts from circumstances has led to the development of the "Human Opportunity Index" concept. It refers to a quantitative measure of disparity in opportunity suggested for the first time by Sen's (1976) social welfare function and formed by the Word Bank in 2006. First time, this index is used by De Barros et al. (2009) to estimate the disparity in opportunity in access to specific services in the Latin American Caribbean. This method has the advantage of providing an understanding of the degree of accessibility of any service offered by a given population and of the degree of disparities in the sample in terms of access to that service.

Measuring the IOPs as a policy of regulation needs circumstances where social policy decisions could have a conceptual effect on the situation and its relationship to the degree of consequence. As known, the circumstances are factors beyond the control of individuals, which can affect the outcome results. In this case, the outcome can be enhanced by means of social policy choices, such as providing a person with access to the best basic needs. Under this context, the relation between the outcome and the circumstances of the person can be conceptually changed by means of social policy choices, such as providing adequate education for all citizens, improving job opportunities at a fair pay level or other affirmative action programs. This method is interesting because the choice of social policy can be conceptually enhanced or can change both the degree of outcome and the circumstances of a person.

2.1 Identification of Circumstances

Circumstance factors are identified in the light of literature for maternal health care (MHC) i.e. ANC in this study. ANC is recommended for all pregnant women because it reduces the perinatal mortality in LMICs (Pallikadavath et al., 2004) and attainment of ANC leads to use of Skilled birth attendant (Berhan and Berhan, 2014). This indicates the value of ANC, which contributes to the use of many other MHC facilities in order to minimize the MMR.

Conceptual framework of determinants of ANC is shown below in **figure 1**. There are many factors which influence the ANC but we are considering only those factors which are beyond the control of individual woman called circumstances. Household environment affect ANC positively/negatively according to their characteristics. Studies suggest that women with a higher socioeconomic class tend to benefit from more maternal health services than women of a lower socioeconomic status (Babalola, 2014; Karkee et al., 2014; Dahiru and Oche, 2015; Rahman et al., 2017; Nwosu and Ataguba, 2019). In India, Pakistan, Nepal, Ghana, Zimbabwe and multi-country studies similar results were found (Houweling et al., 2007; Ronsmans et al., 2006). Sex of household head was considered an important factor in utilization of maternal health (Rurangirwa et al., 2017; Dahiru and Oche, 2015) because it can be seen that men provide financial support, housing, and even permission for women to visit a health center in developing societies (Kagunaand Nuwaha 2000; Waiswa et al., 2008). Vallieres et al. (2013) reported a substantial gap in professional birth attendance between heads of household with some primary education and heads of household with some secondary or higher education. Ethnicity also played important role in order to enhance/reduce the ANC in both developing and developed countries and create inequalities among the groups (Rowe and Garcia, 2003; Mohmand and Gazdar, 2007; Kabeer et al., 2010; Abor et al., 2011).

Demographic factors associate with ANC and source of IOP. Births that happened after an age of more than three years earned more regular ANC visits than those in which the prior birth happened within two years (Terefe and Gelaw 2019; Magadi et al., 2000). Previous research found clear relationships between parity and

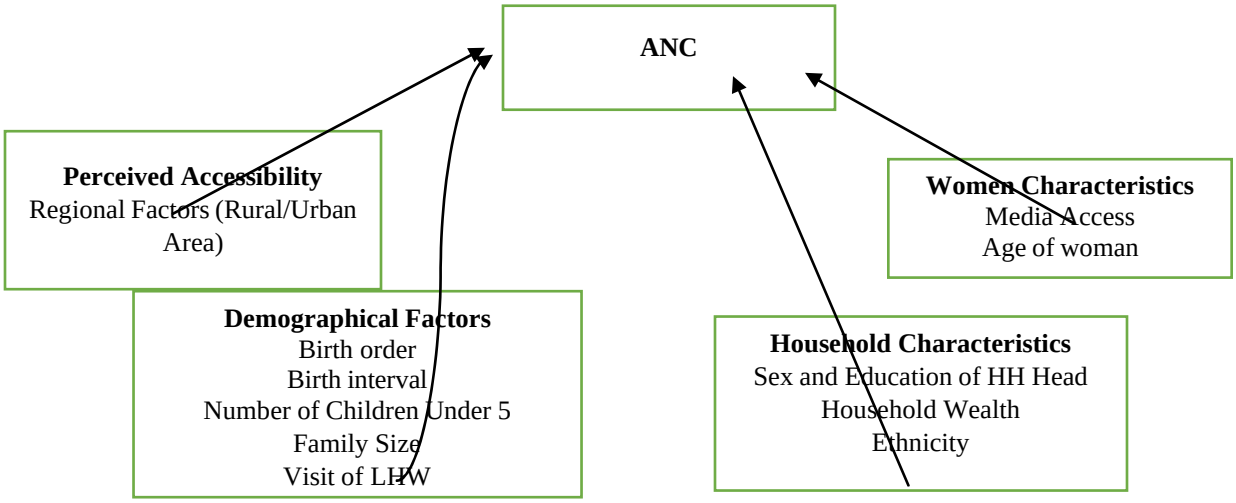
[2]Emphasize the effect of childhood deprivation on adult wellbeing and survival

[3]address that health is important in early life, primarily because it will influence the socioeconomic status in early adulthood

use of ANC. Higher parity has traditionally become an obstacle to adequate use of ANC (Erci, 2003; Overbosch et al., 2004; Sharma, 2004; Paredes et al., 2005). The size and composition of the family appeared to be important factors in the use of ANC in several studies. Large family size is generally associate with poor ANC (World Health Statistics, 2014; McCray, 2014) because women with large family sizes are required their income, time and other resources. (Abor et al., 2011). The visit of lady health workers (LHWs) is very important factor in order to enhance the ANC utilization (khan et al., 2019; Mumtaz et al., 2014; Ahmad, 2010) and also play significant role in reduction of MMR (Global Health Workforce Alliance, 2008).

A statistically significant element found in multiple studies was the place of residence. Women used ANC rather than rural women in urban areas (Tiruaynet and Muchie 2019; Sahito and Fatmi 2018; Paredes et al., 2005; Sharma, 2004; Obermeyer and Potter, 1991).

Figure 1: Conceptual framework of determinants of ANC



Source: Authors' own compilation on the base of literature

Women's characteristics include women age, education[4] and media exposure etc. Studies have shown that exposure to mass media (especially television and radio) greatly predicts the use of ANC. ANC was more likely to be obtained by women with high exposure levels of media (Navaneetham&Dharmalingam 2002). A systematic review and meta-analysis is done by Tekelab et al., (2019) and found that exposure to mass media is strongly associated with utilization of ANC and the same strong association is also found by (Simkhada et al., 2008; Birmeta et al., 2013; Girmaye&Berhan 2016). Age is one of the major indicators of the utilization of MHC services. Various studies have found that women in older reproductive ages appear to use facility services less than those in younger reproductive ages when it comes to delivery care (Thind et al., 2008; Desta et al . , 2017; Shahabuddin et al., 2017). Some studies have shown that older women (i.e. 30 years of age and older) are much more likely than younger women to use ANC (Babalola, 2014; Dahiru&Oche, 2015).

III. Methodology and Data Source

In economic literature, the Lorenz curve is widely used for comparisons of spatial and temporal inequalities but it is susceptible to the welfare disparities (Anand 1983; Chakravarty 1990). Disparity interventions by Theil (1967) and Atkinson (1970) were proposed by analysts to make social action programs. Lambert and Aronson (1993), Silber (1999), Atkinson and Bourguignon (2000) and recently Barros et al. (2009) have developed new methods to consider the disparities between groups. Recently the use of Human Opportunity Index in public health research has got importance.

[4] We are not considering women education in this model due to the involvement of "effort" element and only circumstance variables are considered.

The Human Opportunity Index (HOI) estimates the overall provision of social resources, opposes the inequitable allocation of such resources among the population. This is done by estimating the C-Rate of a given service and then adjusting it along with how equitably the services available are distributed between groups of circumstances. Empirically, the HOI of a given basic service or opportunity is the C-Rate ($\bar{P}$), adjusted for difference in its access:

$$HOI = \bar{P}(1 - \hat{D}) \quad (1)$$

Where $\hat{D}$ is a dissimilarity index (D-Index) that calculates inequalities in access to a given specific service for groups identified by circumstances compared to the average access rate for the same service for the population (Barros et al. 2009). The first component of HOI is $\bar{P}$, the C-Rate, can be calculated using household survey data. "$\hat{D}$"can be interpreted as a share of the overall amount of opportunities that need to be reallocated between groups of circumstances in order to assure fair access. $(1 - \hat{D})$ will be equal to 1 if access to opportunity is independent of the circumstances, in which case HOI will be equal to the average C-Rate ($\bar{P}$).

After identification of circumstances, woman's predicted probability of access to an opportunity is obtained after estimating the logistic model as preliminary step for D-Index. Then $\bar{P}$and $\hat{D}$ are computed for final step as following:

$$\bar{P} = \sum_{1}^{n} W_i \hat{P}_i \quad (2)$$

and

$$\hat{D} = \frac{1}{2\bar{P}} \sum_{i=1} W_i |\hat{P}_i - \bar{P}| \quad (3)$$

It is worth remembering that both the D-Index ($\hat{D}$) and HOI vary between 0 and 100.

Decomposition methods are employed in many areas of economics to help disentangle and measure the effect of multiple causal factors. No attempt has been made to integrate the various strategies into a similar overall framework. We use the decomposition method of Shorrocks (2013), who introduced a single common paradigm, Centered on the concept of Shapley value in cooperative games, to calculate the contribution of various circumstance factors to the IOP. To explain the method, we relate it to the MHC service (ANC), and approximate the relative contributions to each circumstances to the reported variation in MHC service.

The D-Index ($\hat{D}$), as defined in equation 3, measures the IOP following the Barros et al. (2009). The value of $\hat{D}$ is dependent on considered set of circumstances. In addition, they have the essential property which always increases the value of ($\hat{D}$) by including further circumstances. The effect of adding a circumstance A is given by:

$$D_{A} = \sum_{S \subseteq N \setminus \{A\}} \frac{|S|!(n-|S|-1)!}{n!} [D(S \cup \{A\}) - D(S)] \quad (4)$$

and the contribution of circumstance A to the dissimilarity index is defined as:

$$\emptyset_A = \frac{D_A}{D(N)} \quad (5)$$

Where $\sum_{i \in N} \emptyset_i = 1$

In other terms, the total of all circumstances' contributions to the index of dissimilarity add up to 100 per cent, a crucial property achieved by the Shapley decomposition.

3.1 Data Source and Variables' Description

The study breakdown the analysis on the district level in Punjab and used the data from Punjab's Multiple Indicator Cluster Survey (MICS, 2017-18), it is very rich data set in terms of the variables to be used in the study. Table 1 provides a detailed description of the variables.

Table 1: Description of Variables

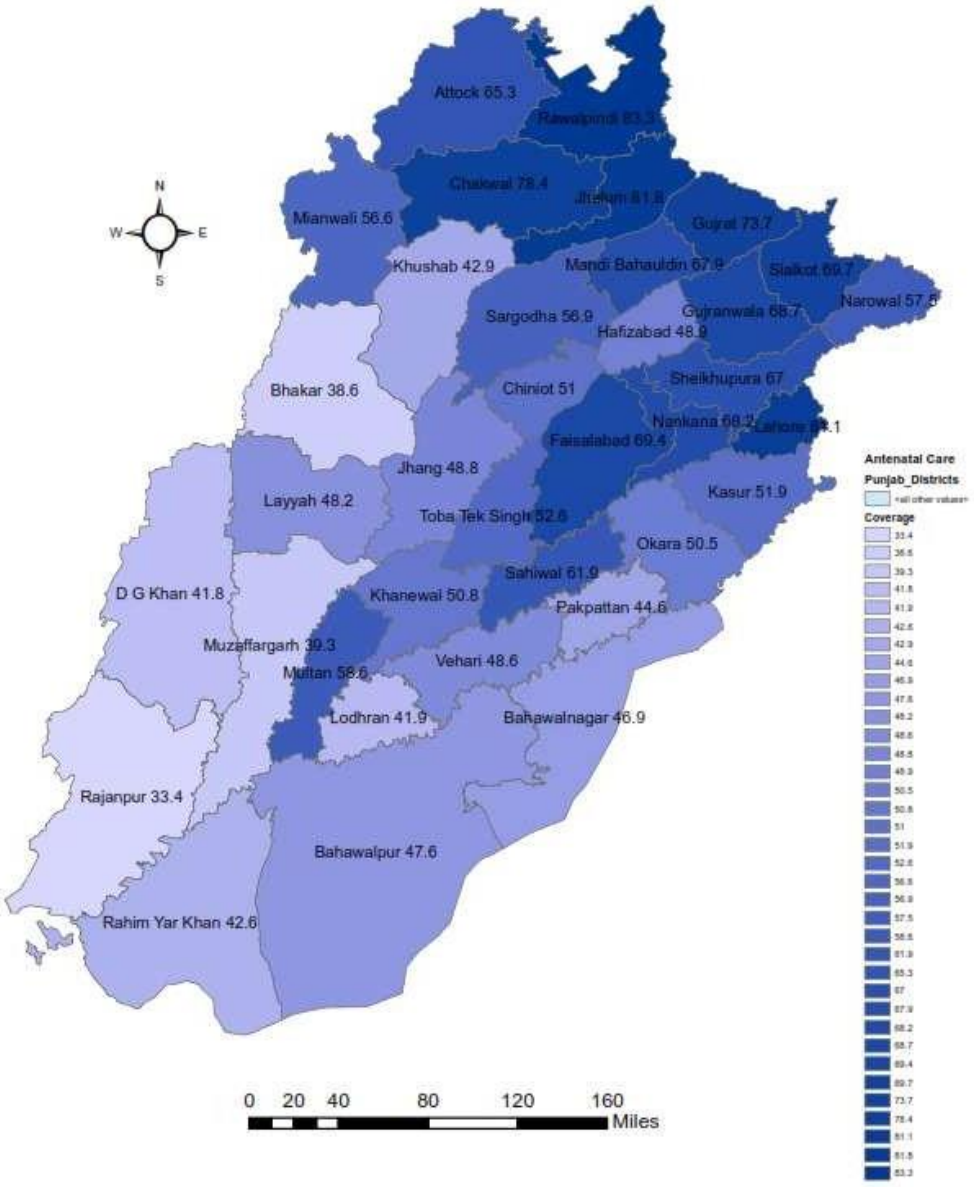
Variable	*Description*
ANC Visits during Pregnancy	By integrating the WHO guideline that pregnant women should make at least four ANC visits to a professional provider, a binary variable is created. The responses are grouped into a binary outcome variable based on this criterion, with a value of 0 if ≤3 ANC visits and 1 if > 3 ANC visits.
Sex of Household Head	It is binary variable. It is equal=1 if HH head is male and 0 for female.
Education of Household Head	This variable is based on categories; No education=0, Primary=1, Middle=2, Secondary=3, Higher=4
Ethnicity	This variable is based on categories; it is equal=0 for Urdu, 1 for Punjabi/Potohari, 2 for Saraiki and 3 for otherwise
Birth order	This variable is based on categories; 1 for having first order birth, 2 for having 2-3 order birth, 3 for having 4-6 order birth, and 4 for having 7 and above birth order.
Birth Spacing/interval	It is birth interval with previous birth. It is categorized as = 0 if the birth is first, = 1 if birth interval is less than 2 years, =2 if the interval is 2years, =3 if 3 years and =4 if 4 years and above
Maternal Age	It is age of woman and it is taken as continuous variable
Media Access	A composite measure that incorporates whether respondents read a newspaper or a magazine, listen to the radio and watch TV. Classified as 0 for having no media access, 1 for having less than once a week, 2 for having medium media access (at least once a week) and 3 for having high media access nearly every day.
Household Wealth Status	A composite index of household possessions, assets, and amenities, derived using principal component analysis, grouped as: Poorest=1; Second=2; Middle=3; Fourth=4 and Richest=5.
Children U5 in HH	It is taken as continuous variable
Place of Residence	It is binary variable. It is equal=1 if the place of residence is urban and 0 if rural.
Family Size	It is taken as continuous variable and derived from number of household members
Visit of LHW	A binary variable is generated; If the LHW visit during last month=1, otherwise=0

Source: Authors' own compilation by reviewing

IV. RESULTS AND DISCUSSION

The C-Rate, D-Index and HOI were measured separately for each district of Punjab using MICS Punjab 2017-18 (Pakistan). The results of C-Rate, D-Index and HOI of ANC are presented in figure 2, 3 & 4 respectively. The results are interesting regarding the districts of Punjab. It is found that C-Rate of ANC is very low in south-west belt of the Punjab province and high C-Rate in north and north-east districts of the Punjab as can be seen in **figure 2**.

Figure 2: Coverage Rate of ANC across the Districts of Punjab



Source: By using the ArcGIS 10.3.1

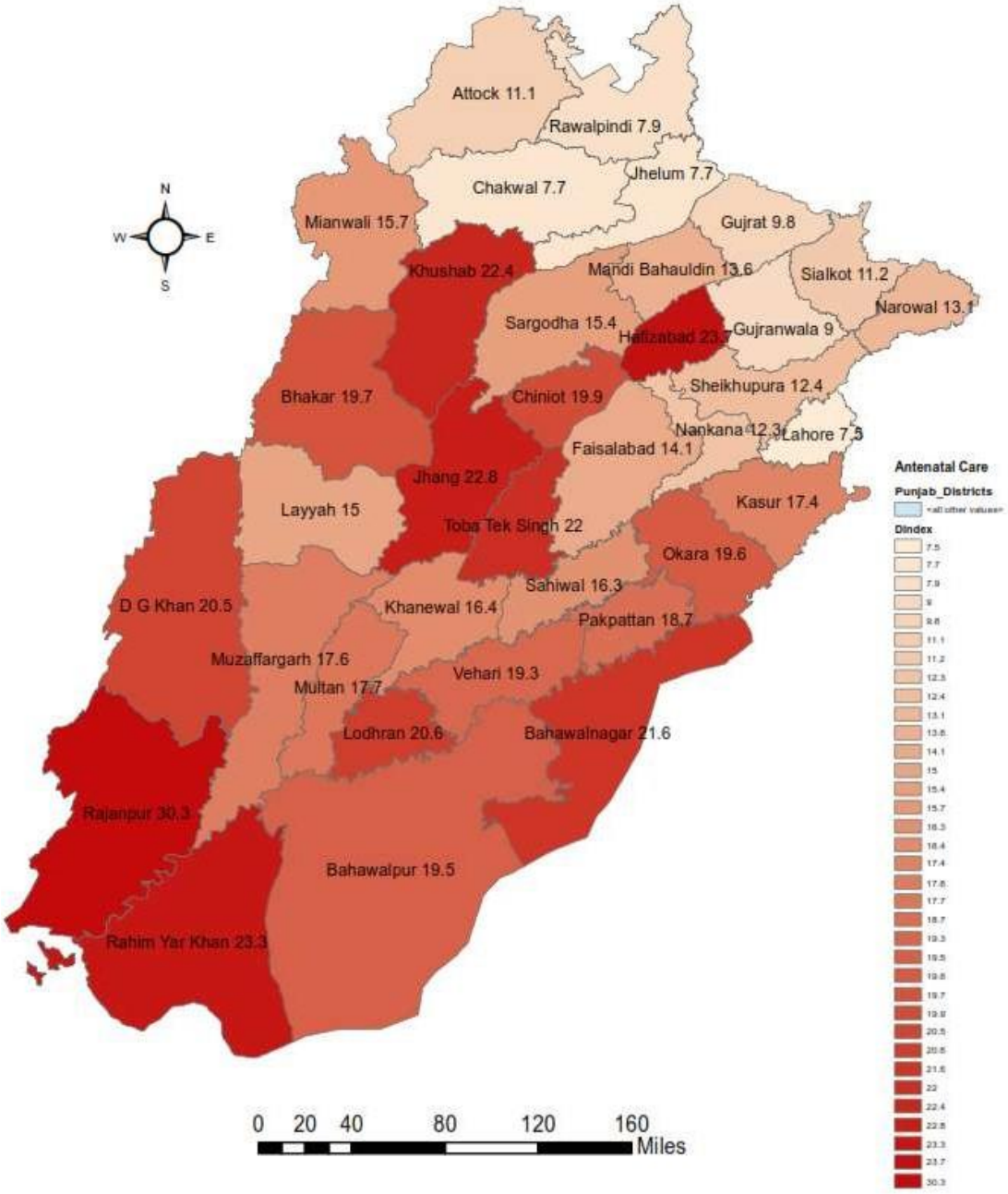
The C-rate values are shown using such a unique color scheme that it shows a higher C-rate as the color gets darker. For more clarity the values of C-rate have been appended on the districts in shapefile of Punjab. The lower C-Rate (33.45) is shown in Rajanpur district which exist in southern part of the Punjab and higher C-Rate (83.28) is shown in Rawalpindi district which exist in northern part of Punjab. There is a lot of variation among the districts of Punjab. It can be noticed that all districts in south have less coverage rate while high

coverage rate in north and center of the province which shows unequal distribution of resources across the districts.

D-Index measures whether existingopportunity is allocated equitably by comparing different circumstance groups' probabilities for accessing a given opportunity. It tells us that the share of opportunity that would have to be "reallocated" across women from different circumstance groups in a district to restore equal opportunity for all women. We found that D-Index, which measures IOPs related to the specific outcome variable across the districts of Punjab, is decreasing from southern Punjab to Northern part of the Punjab as it can be observed in figure 3. The unique color scheme is used to show inequalities and to distinguish among districts as a dark part of the map shows higher inequalities. The values of D-Index are also appended for quick understanding and clarity.
The D-Index is very high in south-west region of province as Rajanpur is on top of the list with the inequality score of 30 as well as Rahim Yar Khan and D-G Khan with the score of 23.28 and 20.51 respectively. ANC services are notequitably distributed among the selected groups in central Punjab as well due to the high inequality as can be seen in **figure 3**. Results show that only northern districts i.e. Rawalpindi, Jhelum and Chakwal and Lahore in central region of the province have access to more equitable distribution among the selected groups. Inequality tells that 30 % of the specific opportunity needs to be reallocate among the different groups of women to restore equal opportunity for all women in the district of Rajanpur while only 7.47 % of the specific opportunity needs to be reallocate among the different groups of women to restore equal opportunity.

The HOI is a composite indicator which measures both the coverage of the basic service and the distribution of access (equality of opportunity) to the service, indicating whether the distribution of coverage relates to the individual's circumstances. The combined result of a reduction in the overall coverage rate and the disparity in opportunities across the districts of Punjab using the Human Opportunity Index describes the decline in the rate of access to the ANC. In simple words, we can say that HOI is coverage corrected for equity. The HOI runs from zero to 100; a society that has achieved universal coverage of specific service would score at 100.

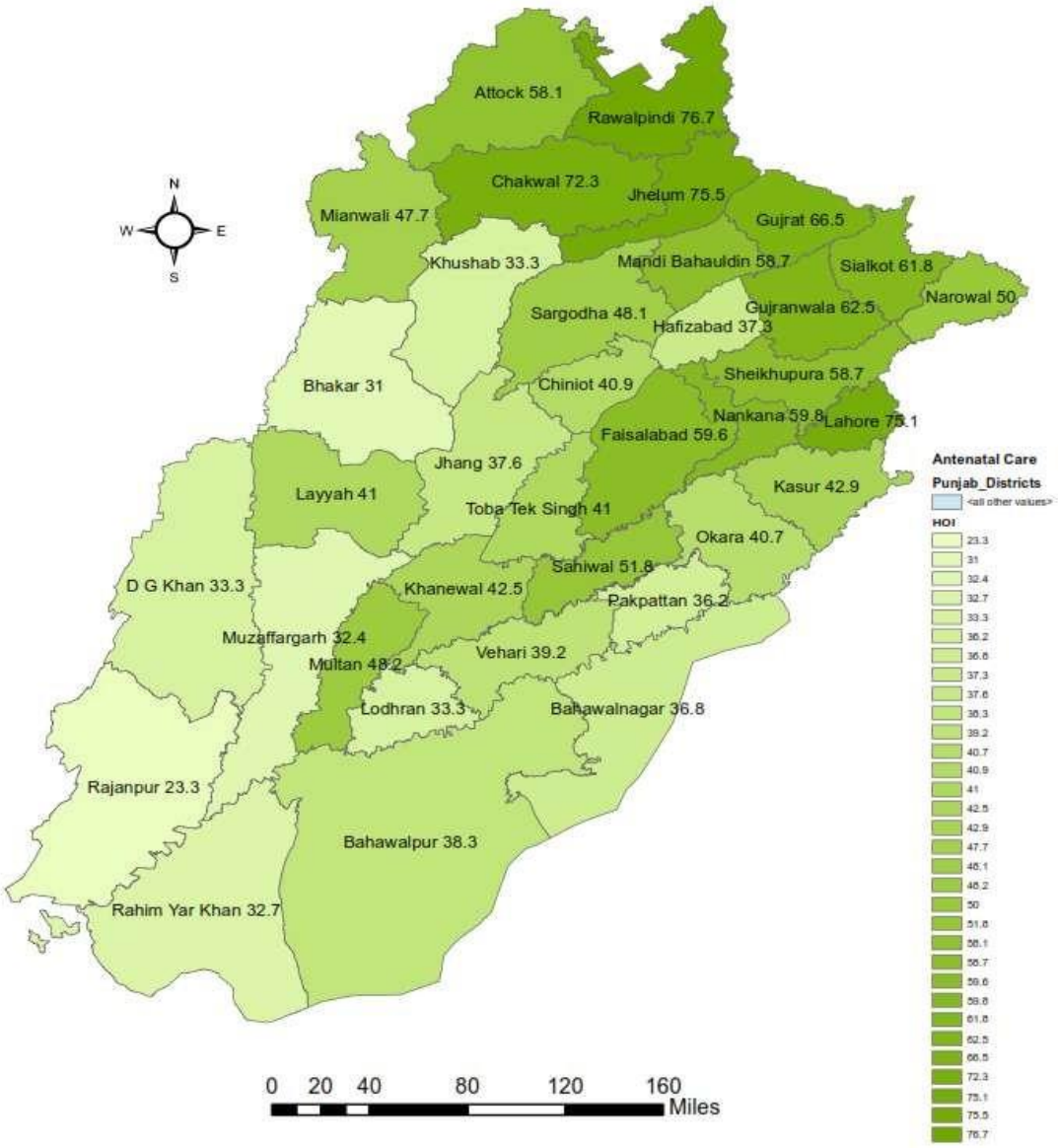
Figure 3: IOP of ANC across the Districts of Punjab



Source: Source: By using the ArcGIS 10.3.1

The HOI across the districts of Punjab is shown in **figure 4**. The Punjab shapefile is used to demonstrate ANC's universal access (HOI) through the districts of Punjab for clearer and simpler interpretation in the panoramic view. A unique color scheme is again utilized to determine the HOI level across the districts of Punjab and values are appended on map for further understanding the distinction among districts. There is lowest HOI in district of Rajanpur with the score of 23.31 which tells that this district around 74 % far away from universal access while district of Rawalpindi has higher HOI value (76.67) and only around 23% far away from universal access of ANC and rest of the districts lie between these two.

Figure 4: Human Opportunity Index for ANC across the Districts of Punjab



Source: Source: By using the ArcGIS 10.3.1

4.1 Shapley Decomposition

The decomposition of the dissimilarity index indicates that the household wealth status, birth order, birth interval, education of household head, ethnicity, media access and residence are most important factors contributing to the inequality in the use of ANC service across the districts of Punjab. The findings show certain variations in the contributions of these variables to inequality across the districts. The detailed results about contribution of each variable of circumstances (Percentage explained by each variable) to the inequality of ANC across the districts of Punjab are presented in table 2.

Table 2: Contribution of Circumstance Factors in IOP in access to ANC across theall Districts of Punjab

Districts / Variables	Children U5 in HH	Family Size	Age of woman	Edu of HH Head	Sex of HH Head	Ethnicity	Birth order	Birth Interval	Media Access	HH Wealth Status	Place of Residence	Visit of LHW
Attock	**4.2**	**2.9**	**3.3**	**10.4**	**0.9**	**5.8**	**10.3**	**16.2**	**14.4**	**21.4**	**1.5**	**8.6**
Bahawalnagar	**0.4**	**1.3**	**2.2**	**6.7**	**0.1**	**2.4**	**10.1**	**8.5**	**11.3**	**38.3**	**3.1**	**15.7**
Bahawalpur	**9.4**	**1.1**	**1.5**	**6.9**	**1.2**	**8.4**	**6.0**	**11.5**	**8.7**	**28.9**	**14.3**	**2.2**
Bhakkar	**1.1**	**3.9**	**4.7**	**16.0**	**1.3**	**7.6**	**5.0**	**7.1**	**10.5**	**33.9**	**3.4**	**5.5**
Chakwal	**5.0**	**2.1**	**0.7**	**5.1**	**7.1**	**5.1**	**13.8**	**7.7**	**15.6**	**34.3**	**3.0**	**0.6**
Chiniot	**1.2**	**4.9**	**0.5**	**15.9**	**0.2**	**2.3**	**9.3**	**16.4**	**8.9**	**32.0**	**7.1**	**1.3**
D G Khan	**2.0**	**0.4**	**6.3**	**8.8**	**2.1**	**2.6**	**14.5**	**12.8**	**15.0**	**23.1**	**7.2**	**5.1**
Faisalabad	**1.1**	**1.5**	**1.6**	**14.6**	**0.6**	**0.4**	**12.6**	**10.9**	**7.7**	**35.1**	**12.6**	**1.3**
Gujranwala	**9.6**	**4.3**	**2.5**	**13.4**	**1.7**	**1.2**	**12.4**	**10.0**	**6.2**	**36.1**	**2.2**	**0.4**
Gujrat	**0.5**	**2.5**	**8.6**	**8.3**	**7.6**	**1.5**	**11.0**	**19.3**	**9.8**	**27.1**	**1.8**	**2.2**
Hafizabad	**2.4**	**1.4**	**4.5**	**10.8**	**0.2**	**5.4**	**6.0**	**23.5**	**5.9**	**31.6**	**3.9**	**4.4**
Jhang	**1.3**	**3.3**	**4.0**	**6.2**	**0.6**	**2.9**	**7.9**	**10.6**	**13.6**	**38.8**	**7.7**	**3.2**
jhelum	**1.9**	**1.3**	**4.7**	**8.4**	**0.9**	**2.4**	**13.8**	**15.9**	**11.0**	**26.6**	**11.5**	**1.6**
Kasur	**2.2**	**1.1**	**1.7**	**18.8**	**2.8**	**7.9**	**2.4**	**7.2**	**6.3**	**30.1**	**12.9**	**6.7**
Khanewal	**2.2**	**5.0**	**4.9**	**5.9**	**0.9**	**7.7**	**9.5**	**10.2**	**14.7**	**27.8**	**4.3**	**7.0**
Khushab	**4.6**	**2.0**	**3.1**	**22.6**	**0.5**	**8.4**	**11.0**	**11.4**	**4.1**	**27.9**	**1.5**	**2.9**
Lahore	**2.2**	**0.7**	**1.7**	**13.6**	**0.5**	**2.9**	**9.5**	**11.6**	**6.8**	**50.2**	**NA**	**0.5**
Layyah	**2.4**	**2.0**	**1.1**	**11.2**	**3.9**	**3.1**	**16.2**	**24.0**	**5.6**	**22.6**	**4.0**	**3.9**
Lodharan	**4.7**	**3.7**	**0.4**	**7.8**	**0.5**	**6.1**	**2.9**	**13.9**	**18.4**	**28.1**	**1.9**	**11.6**
MandiBahauddin	**2.4**	**3.9**	**1.2**	**18.7**	**2.7**	**0.9**	**14.1**	**10.3**	**4.2**	**35.9**	**4.2**	**1.4**
Mianwali	**3.3**	**1.4**	**1.5**	**5.7**	**2.3**	**6.1**	**8.4**	**15.1**	**15.8**	**22.6**	**17.3**	**0.5**
Multan	**0.8**	**0.2**	**2.0**	**10.8**	**0.3**	**9.0**	**8.5**	**7.6**	**9.7**	**34.3**	**16.3**	**0.5**
MuzaffarGarh	**12.0**	**6.9**	**6.0**	**17.2**	**1.1**	**2.0**	**8.1**	**18.1**	**8.9**	**16.2**	**2.9**	**0.7**
Nankana	**4.1**	**1.7**	**1.9**	**14.8**	**0.8**	**1.0**	**14.8**	**15.6**	**7.1**	**36.7**	**1.2**	**0.3**
Narowal	**3.8**	**0.6**	**5.1**	**8.1**	**0.9**	**2.1**	**23.7**	**9.7**	**10.6**	**16.3**	**2.9**	**16.2**
Okara	**0.6**	**2.9**	**1.8**	**13.5**	**2.2**	**1.4**	**6.2**	**5.2**	**13.3**	**45.8**	**5.9**	**1.2**
Pakpattan	**1.4**	**7.0**	**2.2**	**15.2**	**0.5**	**2.6**	**9.4**	**20.0**	**10.0**	**24.8**	**3.9**	**3.0**
Rahim Yar Khan	**8.3**	**0.9**	**1.0**	**11.9**	**0.3**	**8.8**	**1.3**	**6.8**	**18.7**	**29.4**	**4.6**	**7.9**
Rajanpur	**2.7**	**2.6**	**4.9**	**13.7**	**1.4**	**4.5**	**8.5**	**5.7**	**10.9**	**39.2**	**4.9**	**1.1**
Rawalpindi	**2.7**	**1.1**	**1.9**	**8.8**	**3.1**	**9.0**	**9.3**	**10.2**	**9.8**	**36.4**	**3.1**	**4.7**
Sahiwal	**1.3**	**1.3**	**5.0**	**15.8**	**5.7**	**1.2**	**7.7**	**10.7**	**14.9**	**25.6**	**7.6**	**3.1**
Sargodha	**4.0**	**5.0**	**0.9**	**17.1**	**2.2**	**1.8**	**13.2**	**7.9**	**7.0**	**32.3**	**3.3**	**5.2**
Sheikhupura	**1.8**	**5.1**	**1.7**	**11.0**	**3.9**	**3.0**	**13.6**	**11.8**	**3.3**	**40.9**	**3.8**	**0.1**
Sialkot	**6.5**	**8.3**	**0.6**	**24.2**	**6.9**	**5.8**	**5.7**	**8.1**	**5.9**	**20.7**	**0.5**	**6.7**
Toba Tek Singh	**1.1**	**2.6**	**2.2**	**20.3**	**1.1**	**1.8**	**7.3**	**14.6**	**14.4**	**28.2**	**2.2**	**4.2**
Vehari	**7.4**	**2.3**	**3.2**	**6.5**	**0.04**	**2.3**	**9.9**	**10.2**	**10.0**	**40.4**	**6.7**	**1.0**

Source: Authors' own estimations by using STATA 14.2

Among the household characteristics, Education of household head and household wealth status significantly contribute in IOP across the districts of Punjab. It is observed that the household wealth has most highly significant contribution in inequality of ANC which shows the variation in contribution around 16.22% (Muzaffargarh) to 50.16% (Lahore) across the 36 districts of Punjab. In Sialkot, Khushab and Toba Tek Singh districts, household head education contributes about 24%, 22.64% and 20.3% to IOP while its lowest contribution in inequality is 5.1% in Chakwal. Other two factors of household characteristics i.e. ethnicity and

sex of household head are not providing significant contribution in inequality of ANC in many districts of Punjab except in few districts.

Demographic factors also played substantial role in the contribution of IOP. Birth order of child have significantly contributed in IOP in many southern and central Punjab districts e.g. it leads to the IOP in the districts of central Punjab like 23.68% in Narowal, 14.77% in Nankana and districts of southern Punjab like16.24% in Layyah, 14.51% in D-G Khan. Birth interval have also played important role in contributing to the inequality in the use of ANC service around 24% in Layyah district (southern district) while 23.5%, 21% and 19.3% in the districts of central Punjab namely Hafizabad, Pakpattan and Gujrat respectively. The lowest contribution of birth interval is 5.18% in Okara district. LHW visits make a significant contribution in a few districts like Narowal, Bahawalnagar and Lodharan, though family size and children under five in households do not make a significant contribution in any district of Punjab.

Place of residence[5] (perceived accessibility) played a vital role in determining the IOP and a lot of variation exist in contributing the inequality across the districts of Punjab. It contributes significantly in many districts like district of Faisalbad, Kasur, Bahawalpur, Multan, and Mianwali respectively with the score of 12.61%, 12.85%, 14.30%, 16.32% and 17.33%. Women characteristics include age of woman and media access and it is observed that circumstance of age of woman is not significantly contributing in IOP while the media access contributes around 3.30% to 18.70% in inequality of ANC across the districts of Punjab.

V. Conclusion and Policy Recommendations

We have measured the C-Rate, D-Index and HOI for every district of Punjab by using the data set of MICS Punjab 2017-18 (Pakistan). We have utilized HOI technique by following Barros et al. (2009), to measure C-Rate and the indices. The results of these three indicators are interesting by keeping in view the scenario of districts of Punjab. It is observed that most of the southern districts of Punjab (Rajanpur, Muzaffargarh, Bhakkar and others) have poor coverage rates and low universal access for the ANC and northern districts (Rawalpindi, Gujrat, Lahore and others) have high coverage and universal access for the ANC. Rising trend of dissimilarity index was also observed in southern and some central Punjab districts like Rajanpur, Rahim-Yar Khan, Hafizabad and others.

We can suggest a policy for the Government by bearing in mind these findings that the Government needs to interfere more seriously in the northern and some central Punjab districts in order to improve the C-Rate and reallocate resources among the different groups of women to create equitable opportunities for all women to have access to the ANC.

In the second stage of the analysis, we have used the decomposition procedure by following the Shorrocks (2013) to identify the contribution of the circumstance variables to the inequality. It was found that household wealth status, birth order, birth interval, household head education, media access and residence were the most contributing factors leading to IOP in the accessibility of ANC services across the districts of Punjab.

Contributing factors must be taken into account when suggesting the policies for government. There is need to raise the standard of living of households in all districts of Punjab as there is significant contribution of household wealth status in inequality. Secondly, Government needs to emphasis on family planning as the birth order and the birth interval are contributory variables to inequalities in most of the districts. Thirdly,Government needs to concentrate on reforms in health care centers especially in Multan and Rawalpindi so that the actions of health workers on the basis of ethnicity do not discriminate. Fourthly, Government of Punjab needs to provide the equal media access especially in northern belt of the province because media access is more contributing factor in Rahim Yar Khan, Lodharan and D-G Khan. Overall, this study emphasizes the government to increase distribution of resources especially in southern Punjab.

[5]This factor is not utilized in the model for Lahore district because complete Lahore districts is declared as urban district in population census-2017 of Pakistan.

REFERENCES

1. Abor, P. A., Abekah-Nkrumah, G., Sakyi, K., Adjasi, C. K., & Abor, J. (2011). The socio-economic determinants of maternal health care utilization in Ghana. *International Journal of Social Economics, 38*(7), 628-648.
2. Agha, S. (2000). The determinants of infant mortality in Pakistan. *Social Science & Medicine, 51*(2), 199-208.
3. Ahmad, R. (2010). *Explaining antenatal health seeking behaviour: A sense making perspective* Retrieved from http://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.516500
4. Amooti-Kaguna, B., &Nuwaha, F. (2000). Factors influencing choice of delivery sites in Rakia district of Uganda. *Social Science & Medicine, 50*(2), 203-213.
5. Anand, S. (1983). *Inequality and poverty in Malaysia: Measurement and decomposition* The World Bank.
6. Atkinson, A. B. (1970). On the measurement of inequality. *Journal of Economic Theory, 2*(3), 244-263.
7. Atkinson, A. B., & Bourguignon, F. (2000). Introduction: Income distribution and economics. *Handbook of Income Distribution, 1*, 1-58.
8. Babalola, B. I. (2014). Determinants of urban-rural differentials of antenatal care utilization in Nigeria. *African Population Studies, 28*(3), 1263-1273.
9. Berhan, Y., &Berhan, A. (2014). Antenatal care as a means of increasing birth in the health facility and reducing maternal mortality: A systematic review. *Ethiopian Journal of Health Sciences, 24*, 93-104.
10. Bhutta, Z. A., &Hafeez, A. (2015). What can Pakistan do to address maternal and child health over the next decade? *Health Research Policy and Systems, 13*(1), 13-16.
11. Bhutta, Z. A., Hafeez, A., Rizvi, A., Ali, N., Khan, A., Ahmad, F., Jafarey, S. N. (2013). Reproductive, maternal, newborn, and child health in Pakistan: Challenges and opportunities. *The Lancet, 381*(9884), 2207-2218.
12. Birmeta, K., Dibaba, Y., &Woldeyohannes, D. (2013). Determinants of maternal health care utilization in Holeta town, central Ethiopia. *BMC Health Services Research, 13*(1), 256.
13. Braveman, P., &Gruskin, S. (2003). Defining equity in health. *Journal of Epidemiology & Community Health, 57*(4), 254-258.
14. Braveman, P., &Tarimo, E. (2002). Social inequalities in health within countries: Not only an issue for affluent nations. *Social Science & Medicine, 54*(11), 1621-1635.
15. Bugvi, A. S., Rahat, R., Zakar, R., Zakar, M. Z., Fischer, F., Nasrullah, M., &Manawar, R. (2014). Factors associated with non-utilization of child immunization in Pakistan: Evidence from the demographic and health survey 2006-07. *BMC Public Health, 14*(1), 232.
16. Bureau of Statistics Punjab, Planning & Development Board, Government of the Punjab. (2018). *Multiple indicator cluster survey Punjab, 2017-18, survey findings report. Lahore, Pakistan.* (). Retrieved from https://bos.punjab.gov.pk/mics201718surveyfindingreport
17. Carroli, G., Rooney, C., &Villar, J. (2001). How effective is antenatal care in preventing maternal mortality and serious morbidity? An overview of the evidence. *Paediatric and Perinatal Epidemiology, 15*, 1-42.
18. Chakraborty, N., Islam, M. A., Chowdhury, R. I., & Bari, W. (2002). Utilisation of postnatal care in Bangladesh: Evidence from a longitudinal study. *Health & Social Care in the Community, 10*(6), 492-502.
19. Chakravarty, S. R. (1990). Ethical social index numbers springer-verlag. *New York,*
20. Cohen, G. A. (1989). On the currency of egalitarian justice. *Ethics, 99*(4), 906-944.
21. Dahiru, T., &Oche, O. M. (2015). Determinants of antenatal care, institutional delivery and postnatal care services utilization in Nigeria. *Pan African Medical Journal, 22*(1)
22. De Barros, R. P., Ferreira, F., Vega, J., &Chanduvi, J. (2009). *Measuring inequality of opportunities in Latin America and the Caribbean* World Bank Publications.
23. Desta, M., Getaneh, T., Yeneabat, T., Sharew, Y., Animaw, M., &Tsegaw, H. (2017). Determinants of institutional delivery among mothers who gave birth in the last one year in DejenWoreda, Ethiopia, 2016: A cross sectional study. *Journal of Family Medicine and Health Care, 3*(3), 45-51.
24. Di Cesare, M., Bhatti, Z., Soofi, S. B., Fortunato, L., Ezzati, M., &Bhutta, Z. A. (2015). Geographical and socioeconomic inequalities in women and children's nutritional status in Pakistan in 2011: An analysis of data from a nationally representative survey. *The Lancet Global Health, 3*(4), e229-e239.
25. Dias, P. R. (2014). Equality of opportunity in health. 282-826
26. Dworkin, R. (1981a). What is equality? Part 1: Equality of welfare. *Philosophy & Public Affairs,* 185-246.

27. Dworkin, R. (1981b). What is equality? Part 2: Equality of resources. *Philosophy & Public Affairs,* 283-345.
28. Erci, B. (2003). Barriers to utilization of prenatal care services in turkey. *Journal of Nursing Scholarship, 35*(3), 269-273.
29. Girmaye, M., &Berhan, Y. (2016). Skilled antenatal care service utilization and its association with the characteristics of women's health development team in Yeky district, south-west Ethiopia: A multilevel analysis. *Ethiopian Journal of Health Sciences, 26*(4), 369-380.
30. Gwatkin, D. R. (2009). Reducing health inequalities in developing countries. *Oxford Textbook of Public Health, Volume 3: The Practice of Public Health,* (Ed. 5), 1581-1591.
31. Hong, R., & Ruiz-Beltran, M. (2007). Impact of prenatal care on infant survival in Bangladesh. *Maternal and Child Health Journal, 11*(2), 199-206.
32. Houweling, T. A., Ronsmans, C., Campbell, O. M., &Kunst, A. E. (2007). Huge poor-rich inequalities in maternity care: An international comparative study of maternity and child care in developing countries. *Bulletin of the World Health Organization, 85*, 745-754.
33. Kabeer, N., Mumtaz, K., & Sayeed, A. (2010). Beyond risk management: Vulnerability, social protection and citizenship in Pakistan. *Journal of International Development: The Journal of the Development Studies Association, 22*(1), 1-19.
34. Karkee, R., Lee, A. H., &Khanal, V. (2014). Need factors for utilisation of institutional delivery services in Nepal: An analysis from Nepal demographic and health survey, 2011. *BMJ Open, 4*(3).
35. Khan, M. S., Mehboob, N., Rahman-Shepherd, A., Naureen, F., Rashid, A., Buzdar, N., &Ishaq, M. (2019). What can motivate lady health workers in Pakistan to engage more actively in tuberculosis case-finding? *BMC Public Health, 19*(1), 999.
36. Lambert, P. J., & Aronson, J. R. (1993). Inequality decomposition analysis and the Gini coefficient revisited. *The Economic Journal, 103*(420), 1221-1227.
37. Magadi, M. A., Madise, N. J., & Rodrigues, R. N. (2000). Frequency and timing of antenatal care in Kenya: Explaining the variations between women of different communities. *Social Science & Medicine, 51*(4), 551-561.
38. Marmot, M., Friel, S., Bell, R., Houweling, T. A., Taylor, S., & Commission on Social Determinants of Health. (2008). Closing the gap in a generation: Health equity through action on the social determinants of health. *The Lancet, 372*(9650), 1661-1669.
39. McCray, T. M. (2004). An issue of culture: The effects of daily activities on prenatal care utilization patterns in rural South Africa. *Social Science & Medicine, 59*(9), 1843-1855.
40. Mohmand, S., &Gazdar, H. (2007). Social structures in rural Pakistan. *Thematic Paper Prepared Under TA4319, Determinants and Drivers of Poverty Reduction and ADB's Contribution in Rural Pakistan. ADB, Islamabad,*
41. Mumtaz, Z., Salway, S., Bhatti, A., Shanner, L., Zaman, S., Laing, L., & Ellison, G. T. (2014). Improving maternal health in Pakistan: Toward a deeper understanding of the social determinants of poor women's access to maternal health services. *American Journal of Public Health, 104*(S1), S17-S24.
42. Navaneetham, K., &Dharmalingam, A. (2002). Utilization of maternal health care services in southern India. *Social Science & Medicine, 55*(10), 1849-1869.
43. Nisar, Y. B., & Dibley, M. J. (2014). Determinants of neonatal mortality in Pakistan: Secondary analysis of pakistan demographic and health survey 2006–07. *BMC Public Health, 14*(1), 663.
44. Nuraini, E., & Parker, E. (2005). Improving knowledge of antenatal care (ANC) among pregnant women: A field trial in central java, Indonesia. *Asia Pacific Journal of Public Health, 17*(1), 3-8.
45. Nwosu, C. O., &Ataguba, J. E. (2019). Socioeconomic inequalities in maternal health service utilisation: A case of antenatal care in Nigeria using a decomposition approach. *BMC Public Health, 19*(1), 1493.
46. Obermeyer, C. M., & Potter, J. E. (1991). Maternal health care utilization in jordan: A study of patterns and determinants. *Studies in Family Planning, 22*(3), 177-187.
47. Overbosch, G. B., Nsowah-Nuamah, N., Van Den Boom, G., &Damnyag, L. (2004). Determinants of antenatal care use in Ghana. *Journal of African Economies, 13*(2), 277-301.
48. Pallikadavath, S., Foss, M., & Stones, R. W. (2004). Antenatal care: Provision and inequality in rural north India. *Social Science & Medicine, 59*(6), 1147-1158.
49. Paredes, I., Hidalgo, L., Chedraui, P., Palma, J., & Eugenio, J. (2005). Factors associated with inadequate prenatal care in Ecuadorian women. *International Journal of Gynecology & Obstetrics, 88*(2), 168-172.

50. Pervaiz, Z., &Akram, S. (2018). Estimating inequality of opportunities in Punjab (Pakistan): A non-parametric approach. *Available at SSRN 3213926,*

51. Rahman, A., Nisha, M. K., Begum, T., Ahmed, S., Alam, N., & Anwar, I. (2017). Trends, determinants and inequities of 4 ANC utilisation in Bangladesh. *Journal of Health, Population and Nutrition, 36*(1), 2.
52. Rannan-Eliya, R., &Somanathan, A. (2012). Equity in health and health care systems in Asia. *The Elgar companion to health economics, second edition*. Edward Elgar Publishing.
53. Rawls, J. (1971). A theory of justice. (Oxford university press: Oxford, UK.).
54. Roemer, J. E. (1998). Equality of opportunity. Cambridge: Harvard University Press.
55. Roemer, J. E. (2002). Equality of opportunity: A progress report. *Social Choice and Welfare, 19*(2), 455-471.
56. Ronsmans, C., Holtz, S., & Stanton, C. (2006). Socioeconomic differentials in caesarean rates in developing countries: A retrospective analysis. *The Lancet, 368*(9546), 1516-1523.
57. Rowe, R. E., & Garcia, J. O. (2003). Social class, ethnicity and attendance for antenatal care in the United Kingdom: A systematic review. *Journal of Public Health, 25*(2), 113-119.
58. Rurangirwa, A. A., Mogren, I., Nyirazinyoye, L., Ntaganira, J., &Krantz, G. (2017). Determinants of poor utilization of antenatal care services among recently delivered women in Rwanda; a population based study. *BMC Pregnancy and Childbirth, 17*(1), 142.
59. Sahito, A., &Fatmi, Z. (2018). Inequities in antenatal care, and individual and environmental determinants of utilization at national and sub-national level in Pakistan: A multilevel analysis. *International Journal of Health Policy and Management, 7*(8), 699-710.
60. Sen, A. (1976). Real national income. *The Review of Economic Studies, 43*(1), 19-39.
61. Sen, A. (1980). Equality of what? *The Tanner Lecture on Human Values, 1*, 197-220.
62. Shahabuddin, A., De Brouwere, V., Adhikari, R., Delamou, A., Bardaj, A., &Delvaux, T. (2017). Determinants of institutional delivery among young married women in Nepal: Evidence from the nepal demographic and health survey, 2011. *BMJ Open, 7*(4)
63. Shaheen, S., Awan, M. S., & Cheema, A. R. (2016). Measuring inequality of opportunity in Pakistan. *Pakistan Economic and Social Review, 54*(2), 165-190.
64. Sharma, B. (2004). Utilisation of antenatal care services in Nepal. *Nepal Population Journal, 11*(10), 79-97.
65. Shorrocks, A. F. (2013). Decomposition procedures for distributional analysis: A unified framework based on the shapley value. *The Journal of Economic Inequality, 11*(1), 99-126.
66. Silber, J. (1999). *Handbook of income inequality measurement*. Boston [u.a.]: Kluwer Acad. Publ.
67. Simkhada, B., Teijlingen, E. R. v., Porter, M., &Simkhada, P. (2008). Factors affecting the utilization of antenatal care in developing countries: Systematic review of the literature. *Journal of Advanced Nursing, 61*(3), 244-260.
68. Tariq, J., Sajjad, A., Zakar, R., Zakar, M. Z., & Fischer, F. (2018). Factors associated with undernutrition in children under the age of two years: Secondary data analysis based on the Pakistan demographic and health survey 2012–2013. *Nutrients, 10*(6), 676.
69. Tekelab, T., Chojenta, C., Smith, R., & Loxton, D. (2019). Factors affecting utilization of antenatal care in Ethiopia: A systematic review and meta-analysis. *PloS One, 14*(4), e0214848.
70. Terefe, A. N., &Gelaw, A. B. (2019). Determinants of antenatal care visit utilization of child-bearing mothers in kaffa, sheka, and bench maji zones of SNNPR, southwestern Ethiopia. *Health Services Research and Managerial Epidemiology, 6*, 1-11.
71. Theil, H. (1967). *Economics and information theory*. Amsterdam [u.a.]: North-Holland [u.a.]. Retrieved from http://www.econis.eu/PPNSET?PPN=022058176
72. Thind, A., Mohani, A., Banerjee, K., &Hagigi, F. (2008). Where to deliver? analysis of choice of delivery location from a national survey in india. *BMC Public Health, 8*(1), 29.
73. Tiruaynet, K., &Muchie, K. F. (2019). Determinants of utilization of antenatal care services in benishangulgumuz region, western ethiopia: A study based on demographic and health survey. *BMC Pregnancy and Childbirth, 19*(1), 115.
74. Vallieres, F., Hansen, A., McAuliffe, E., Cassidy, E. L., Owora, P., Kappler, S., &Gathuru, E. (2013). Head of household education level as a factor influencing whether delivery takes place in the presence of a skilled birth attendant in busia, Uganda: A cross-sectional household study. *BMC Pregnancy and Childbirth, 13*(1), 48.

75. Wagstaff, A. (2004). *The millennium development goals for health: Rising to the challenges* World Bank Publications.
76. Wagstaff, A., & Van Doorslaer, E. (2000). Equity in health care finance and delivery. *Handbook of Health Economics, 1*, 1803-1862.
77. Waiswa, P., Kemigisa, M., Kiguli, J., Naikoba, S., Pariyo, G. W., & Peterson, S. (2008). Acceptability of evidence-based neonatal care practices in rural uganda–implications for programming. *BMC Pregnancy and Childbirth, 8*(1), 21.
78. Wang, H., Naghavi, M., Allen, C., Barber, R. M., Bhutta, Z. A., Carter, A., . . . Coates, M. M. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the global burden of disease study 2015. *The Lancet, 388*(10053), 1459-1544.
79. World Health Organization. (2008). Global health workforce alliance. pakistan's lady health worker programme: Global health workforce alliance. *World Health Organization, Case Study.Geneva: World Health Organization,*
80. World Health Organization. (2014). World health statistics, 2014. Geneva, Switzerland: WHO, 2014. *Http://Www.Who.Int/Whosis/Whostat/2010/En/Index.Html, 38*, 39.
81. World Health Organization. (2018). *World health statistics 2018: Monitoring health for the SDGs sustainable development goals* World Health Organization.