



## COMMENTARY



## ART utilization: an indicator of access to infertility care

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### ABSTRACT

This commentary outlines the importance of utilizing assisted reproductive technology (ART) as an indicator of access to infertility care and provides a standard way of reporting utilization to facilitate international comparisons. Factors that influence ART utilization as well as underlying inequalities and inequities in access to care are discussed. The relevance of a marker that can inform and evaluate policy initiatives, monitor progress and document change is emphasized.

### INTRODUCTION

Improving access to infertility care and reducing related inequalities within and between countries is a growing endeavour of the World Health Organization (WHO) and fertility organizations. This is rooted in several factors: a recognition that infertility is a global health problem that carries a high social burden, especially where access to care is lacking; the United Nations Sustainable Development Goals that call for universal and equal access to care; the growing promotion and protection of sexual and reproductive health and

rights, of which infertility and fertility care is a core component; and regional Declarations of Human Rights, which all recognize the human right to found a family and have children.

Globally, many barriers to infertility treatment exist related to, among others, availability, cost, geographical accessibility, health literacy as well as societal and religious norms. Often these are unequally distributed, resulting in access inequities. Measuring progress in overcoming barriers requires the ability to document change, i.e. it requires an *indicator* of access to

infertility care. This commentary seeks to promote utilization of assisted reproductive technology (ART) as this indicator, discusses its variations, and highlights its use as a metric of access, inequality and progress.

ART utilization, expressed as the number of cycles per million population (c/mp) per annum, is reported annually by national and regional ART registries and globally by ICMART, the International Committee for Monitoring ART. No other infertility intervention is similarly registered; hence ART utilization is currently the only candidate marker

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### KEYWORDS

Access  
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to serve as an access to infertility care indicator at a global level. Furthermore, the systematic documentation of this variable by ICMART allows for appropriate comparisons between countries and over time. To increase the reliability and utility of this important indicator, ICMART has revised the method of reporting utilization in its World Reports. Documenting these changes is our additional objective.

### HEALTHCARE UTILIZATION

Access to care has multiple dimensions and is not a single, measurable entity. As articulated by the WHO, the right to the highest attainable standard of health is a human right recognized in international human rights law. This compels governments to put health systems in place without discrimination, providing citizens with the freedom to access care in case of need. Equitable health systems should harmonize four characteristics: availability, accessibility, acceptability and quality. The use of health services is termed ‘realized access’ or ‘utilization’ (FIGURE 1) (UN Office of the High Commissioner for Human Rights, 2008). Utilization is, therefore, an indicator of access to care. Although utilization is not a marker of the overall functioning of a health system, it is reasonable to expect that the more the criteria of availability, accessibility, acceptability and quality are met, the greater will be the ability of each individual to equally enjoy the best possible health.

Since utilization is an indicator of access to care, it follows that ART utilization is an indicator of access to infertility care. This concept is reflected in the algorithm developed the ESHRE (European Society of Human Reproduction and Embryology) *Capri Workshop Group (2001)*, according to which the treatment of 1500 couples per million population per annum would meet the *demand* for ART. Although any changes in the underlying assumptions of this model, together with evolving changes in ART practices, may alter the actual estimate, the concept remains pertinent and, put simply, is this: if the prevalence of infertility (taken at 10% in the algorithm) is considered to be the exposed cohort and all infertile people are treated according to their wishes and clinical needs (noting that some will choose not to pursue fertility treatment), the number of ART cycles or persons needed to treat in order to meet demand can be derived. The Group has stated that in the absence of information on ‘conventional infertility diagnosis and treatment services ... [it is assumed] that IVF is an indicator of the presence of high-quality infertility services’.

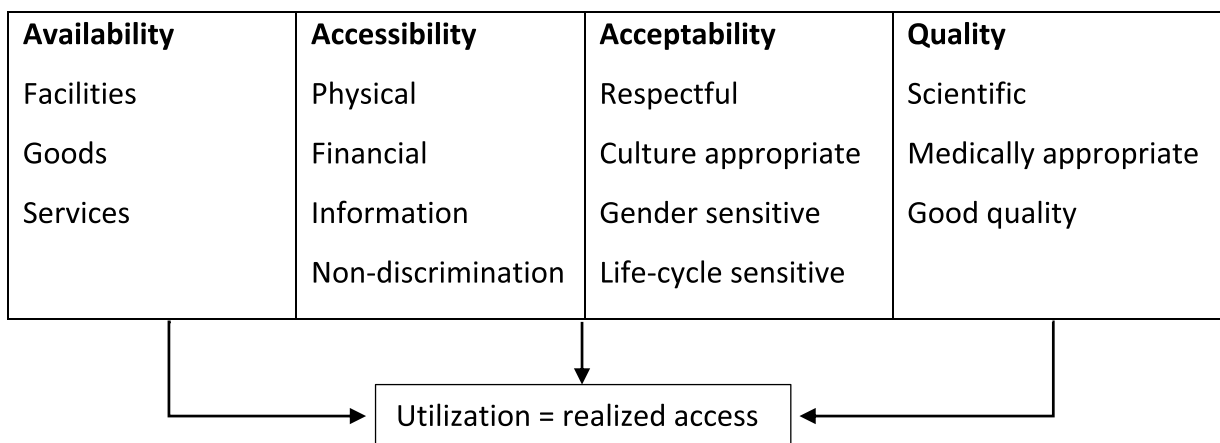
We similarly promote the use of ART utilization as an indicator of access to infertility services, because infertility care requires both ART and non-ART treatment. Surveillance data are less available for non-ART treatments than ART treatments; however, it can be assumed that, in countries with high ART

utilization, access to non-ART care is similarly favourable. Although the reverse does not necessarily apply, low ART utilization raises a flag regarding overall access to infertility care. Some countries with well-structured health systems might have good non-ART services in place despite limited access to ART; however, evidence from low-resource settings in Africa indicates that poor access to ART is usually paralleled by poor access to non-ART care (Botha et al., 2018).

### DOCUMENTING ART UTILIZATION

ART utilization as indicator of access to infertility care should ideally be reported as the number of persons treated; currently, however, it is generally expressed as the number of initiated cycles per million population or million women of reproductive age per annum. Some registries do not have the ability to report cycles per person, whereas others may face regulatory restrictions relating to the collection or sharing of patient-level data. The International Glossary on Infertility and Fertility Care has, as yet, not provided a definition of utilization, and different registries vary in how they report utilization (Zegers-Hochschild et al., 2017). This highlights the need for standardization.

ICMART has reported global data on ART availability, utilization, effectiveness and safety since 1991. Historically, ICMART has calculated utilization as *all* initiated



1. Adapted from UN Office of the High Commissioner for Human Rights, Fact Sheet No. 31, **The Right to Health**, June 2008.

FIGURE 1 The four domains of health care<sup>1</sup>.

ART cycles (e.g. all fresh and frozen autologous and heterologous cycles plus preimplantation genetic testing transfer cycles) divided by the population size in million people applicable to the year of reporting. The measure was calculated by dividing the number of cycles reported annually to ICMART by the ratio of ART centres participating in data monitoring to all ART centres reported to exist in a country.

ICMART acknowledges the limitation of this formula: it assumes that the number of non-reporting centres is known, and, when known, that the number of initiated cycles in non-reporting centres is similar to that in reporting centres. These assumptions are subject to random and systematic error and thus strongly influence the accuracy of the estimate. To improve the accuracy of this indicator, utilization should be based directly on the best available evidence regarding the total number of initiated cycles rather than imputed from participating and non-participating centres. ICMART will therefore begin reporting ART utilization based on the 'rate of reporting' of cycles depending on the best available data.

In addition, ICMART will start to document the degree of confidence in the data based on the level of data coverage for each participating county. Four categories will be reported, expressed as 'utilization' (rate of reporting of  $\geq 95\%$ ), 'utilization estimated with high confidence' (rate of reporting of 66–94%), 'utilization estimated with moderate confidence' (rate of reporting of 34–66%) and 'non-estimated utilization based only on reported cycles' (rate of reporting of  $\leq 33\%$ ). Further details of these changes will be presented in the 2014 ART World Report.

## VARIATIONS IN ART UTILIZATION

In 2014, the freedom of access to infertility care was 500 times higher in Japan, the country with the highest rate of ART utilization (3212 c/mp), compared with Senegal, the country with the lowest rate (6 c/mp). Historically, ART utilization has been highest in Israel; however, Israel did not report to the ICMART Registry in 2014; regional utilization ranged from 74 c/mp in Africa to 2642 c/mp in Australia/New Zealand (ICMART, unpublished data). Using an indicator for access to infertility care allows us to highlight these

differences, evaluate influencing factors and monitor progress to more equitable access.

### Disease prevalence

Variation in ART utilization may be partially explained by differences in disease prevalence, but this is unlikely to account for large discrepancies in utilization among countries and regions. True estimates of infertility prevalence and possible variations remain uncertain due to the absence of reliable data and ongoing discourse regarding measurement.

### Financial accessibility

Financial accessibility (e.g. affordability) is a central factor influencing access to care. Three broad funding models for ART exist globally: full reimbursement by governments or health insurance schemes; partial reimbursement with co-payment from patients; and full out-of-pocket payment by patients (*Chambers et al., 2014*).

A case study from Argentina, the first country in Latin America to pass regulations facilitating free access to infertility care including ART, in 2013, illustrates how affordability changes utilization: in 2014, ART utilization was approximately three times higher than that in Brazil, where ART is almost exclusively funded out of pocket (381 versus 128 c/mp). This difference increased over time. A related but opposite dynamic was visible in Germany, where the introduction of 50% patient co-payment in 2004 resulted in a 43% reduction of ART cycles at national level, with economically weak federal states being disproportionately affected (*Griesinger et al., 2007*). The independent association between utilization and affordability has been confirmed by a more sophisticated analysis showing that a decrease in the cost of a single ART cycle of 1 percentage point of disposable household income predicted a 3.2% increase in utilization (*Chambers et al., 2014*).

### Sociocultural factors

The decision to access ART is embedded in a matrix of multiple sociocultural factors that act as barriers or facilitators. These include religious norms, reproductive health literacy and societal acceptance of ART. Gender inequality is a further example, since gender norms create pathways –

through stereotypes and unequal power between men and women – to health outcomes, particularly reproductive outcomes.

Specifically, access to infertility care may be low in settings where infertility is considered a female condition, women's reproductive health and financial means are largely under male authority, and societal systems are governed by men. To explore this hypothesis, we investigated the relationship between ART utilization and the Gender-Inequality Index, a composite index introduced by the United Nations Development Program. The Gender Inequality Index comprises three domains: female reproductive health (measured by maternal mortality and adolescent birth rates), female labour force participation, and female empowerment (measured by levels of education and parliamentary representation). There was a significant association between higher gender inequality and lower ART utilization. This association held both between countries and, over time, within countries. Indeed, measures of gender inequality reasonably explained a significant proportion of a country's ART utilization, and the strongest driver of gender equality was reproductive health (*Chambers et al., 2018*). In other words, while gender equality is associated with better access to infertility care, better reproductive health also drives gender equality.

### ART availability and practice

Lack of availability of ART or access restrictions may result in patients crossing borders, provided they have the necessary resources. This may inflate ART utilization in countries that treat many foreign nationals. Where local populations struggle to access ART or are even displaced by foreign nationals, cross-border care, unless captured by registries, may mask access inequities.

While influenced by many variables, it is important to recognize that access to ART may in turn influence ART practice. When analysing the relationship between ART utilization and fresh, non-donor single-embryo transfer (SET), countries with greater ART utilization tend to have higher rates of SET (correlation coefficient 0.715; ICMART unpublished data). Although SET may increase ART utilization (based on *all* cycles) through cycle fragmentation, the relationship is confounded by financial accessibility,

that is, countries with affordable ART treatment tend to have both higher utilization rates and higher rates of SET. It is also known that, in countries with poor access to infertility care, more embryos tend to be replaced (*Adamson et al., 2018; Chambers et al., 2014; Dyer et al., 2019; Zegers-Hochschild et al., 2019*). This practice is driven by both health workers and patients who prioritize the immediate and often only chance of pregnancy over cumulative singleton births and safety. Financial accessibility, utilization and SET practices are evidently interrelated and move in the same direction: greater accessibility, utilization and the percentage of SET go together while the reverse also applies.

## CONCLUSION

Both published data and new data from ICMART have been used to make the case for utilization of ART as indicator for access to infertility care. The former indicates that ART utilization is already being used in the role we propose. This paper seeks to contribute to what is currently missing: a more formal recognition of the importance of this marker, consensus of its definition and interpretation, and its wider use to produce the kind of evidence that is required to generate sound public policies aimed at reducing inequalities and inequities in access to infertility care.

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