Global Journal of Reproductive Medicine
ISSN: 2575-8594

Juniper Publishers
key to the Researchers

Review Article
Volume 10 Issue 2 - July 2023
DOI: 10.19080/GJORM.2023.10.555784

Glob J Reprod Med

Addressing the Optimal Infant and Young Child Feeding Ecosystem to Improve the Status of the Outcome of Reproductive Interventions; No 'Breastmilk Substitutes'

Charles Osayande Eregie*

Institute of Child Health, University of Benin, Benin City, Nigeria

Submission: June 01, 2023; **Published:** July 13, 2023

***Corresponding author:** Charles Osayande Eregie, Institute of Child Health, University of Benin, Benin City, Nigeria

Abstract

This Review highlights the Components of Optimal Infant and Young Child Feeding (OIYCF) Ecosystem with a view to re-focusing attention to Reproductive Interventions that can improve the Status of the Newborn and Young Child as Outcomes of such Interventions. The Ecosystem is defined in order to outline the 'OIYCF Ecosystem Components' which are then discussed and some briefly albeit. Highlighted in the 'OIYCF Ecosystem' are, among others: WHO Recommendation for OIYCF, Mother-Child Dyad, IYC Foods Industries, The Code, Healthcare Professionals/ Associations, Governments, National Code Regulatory Authorities, UN Systems, Litigations-Adjudications Complex and Breastfeeding/ Breastmilk-Bottle Feeding/ Breastmilk Substitutes Dichotomy. Breastfeeding and Bottle-Feeding are disposed as distinct Dichotomous Feeding Interventions with the former laden with 'Epigenetic Imprints and Implications' that cannot be provided by the latter. A new technicality is disposed: The First 1400 days of life in view of the peculiarities of the first three years after birth. The implications of Breastfeeding and Breastmilk for the Infant Microbiome are also exposed as are the distinct advantages of their 'Galactokinetic Mechanics and Viscoelasticity' when compared to Pump Expression. Women Care Work is highlighted for better appreciation, regard and reward including formal capture in National Budgetary Computations and Allocations. Considering the detailed treatise concerning Breastfeeding and Breastmilk, the term 'Breastmilk Substitutes' is considered a 'Technical Programmatic Inexactitude'.

Keywords: Ecosystem; Optimal Infant and Young Child Feeding; First 1400 days of life; Cafeteria Code Implementation

Abbreviations: WHO: World Health Organization; EBF: Exclusive Breastfeeding; CBF: Continued Breastfeeding; OIYCF: Optimal Infant and Young Child Feeding; ART: Assisted Reproductive Technologies; SRIM: Self-Reported Insufficient Milk; IYC: Infant and Young Child;

Introduction

Reproductive Medicine is the Branch of Medicine dealing with the prevention, diagnosis and management of Reproductive Issues and involves the morphology and anatomy, physiology, endocrinology, molecular biology and pathology of the male and female reproductive systems towards improving the choice over when and how they have their offspring with assured prevention of pregnancy and achieving same when desired and addressing fertility and lactation [1-3]. The outcome of Reproductive Medicine Interventions and Technologies, including Assisted Reproductive Technologies (ART), is a newborn baby whose ultimate status is determined by, in addition to several others, Optimal Infant and Young Child Feeding (OIYCF) and the Components of the determinant Ecosystem. This Communication intends to critically explore the Components of the Determinant Ecosystem and the relationship with OIYCF which ultimately contributes to the Status of the Newborn-Young Child Dyad: The Outcome of Reproductive Medicine.

Optimal Infant and Young Child Feeding (OIYCF)/ WHO Recommendation

The World Health Organization (WHO) Recommendation for OIYCF includes: Early Initiation of Breastfeeding (EIB) within the 1st Hour of Life, Exclusive Breastfeeding (EBF) for the first 6 months of Life, Introduction of Safe, Age-appropriate and Nutritious-Diverse Complementary Foods from 6 months with Continued Breastfeeding (CBF) until two years or beyond [4,5]. The recent '2023 Lancet Breastfeeding Series Papers' [6-8] indicate that the IYCF Ecosystem has been negatively altered with the revealed Uncomplimentary Data including, among others: Less than 50% of children are fed according to WHO Recommendations [4,5], Less than 50% of babies are breastfed within the 1st Hour of Life, 45% receive formula within the first 6 months of Life and One-third of children prematurely stopped Breastfeeding. A major 'Determinant' was Self-Reported Insufficient Milk (SRIM) by the

mothers [6]. The use of prelacteals was also associated with low EIB, EBF and Breastfeeding Duration [6]. The IYCF Ecosystem will be explored further to direct Programmatic Interventions towards the Ecosystem Components and Determinants for improving the Status of the Outcome of Reproductive Interventions.

IYCF Ecosystem

The lexicon defines Ecosystem as Everything in a particular Environment and the National Geographic Society indicates it consists of Biotic (Living) and Abiotic (Non-living) Factors with Interconnectedness working together to form a Bubble of Life [9]. The Bubble of Life implies Precious and Fragile requiring attention to determinants to assure Vitality-Stability-Sustainability. The Ecosystem is the geographical area consisting of the Plants, Animals and other Organisms as well as the Weather and Landscapes working together to form a Bubble of Life [9]. Included in the IYCF Ecosystem are, among several others: The Mother, Infant and Young Child (IYC), Breastfeeding and Breastmilk, IYC Foods, IYC Foods Industries, The Code, Code-related Industry Products, Bottle-Feeding, Healthcare Professionals/Associations, Governments, Politicians and Policy-Makers, United Nations Systems, Code-Relevant Non-Governmental Organizations, Code Regulatory Authorities, Judiciary and Judicial Officers etc. These Ecosystem Components have been disposed for attention but only some will be distilled further.

Mother-Child Dyad

The mother is expected to initiate Breastfeeding within the 1st Hour after birth but there are Breastfeeding Technicalities and Difficulties which they have to learn and surmount albeit with manifest Parental Anxieties as breastfeeding is reportedly a Complex Biopsychosocial System [10]. Similarly, the newborn who is nursed at the breasts is not Developmentally Matured to cope with the breastfeeding demands with manifest Immature Sleep Trajectory-Behavioural Patterns [11]. The Mother-Child Dyad deserve expert professional attention to support them and optimize the limitless benefits of Breastfeeding to the Mother and to the Child. These Mother-Child Dyad Issues are disposed in 'IYCF Difficulties Overdiagnoses' and reportedly further exploited by the IYC Foods Industries by medicalizing the aggressive marketing of their Products as solutions to these Issues which, therefore, undermine Breastfeeding [12].

IYC Foods Industry

With the Pressure on mothers to combine Productive Work (Working) with Reproductive Work (Nursing), the IYC Foods Industry entered the IYCF Ecosystem by commercial production, marketing and distribution/ sale of IYC foods. There reportedly quickly emerged the 'Unacceptable Aggressive Exploitative Marketing' of their Products with the resultant 4Ms: Milk-Marketing-Malnutrition-Mortality. Amplifying this bothersome disposition was the emergence of the Publications: Milk and Murder [13] and Commerciogenic Malnutrition [14]. There were subsequently Actions and Counter-Actions involving Industries and other Interested and Concerned Stakeholders in IYCF and Child Health leading ultimately to the United Nations convening the United Nations Meeting on IYCF in 1979 (1979 UNMIYCF) [15] with the Director-General of the World Health Assembly (WHA) mandated to develop a Draft Code for the Regulation of Marketing of Breastmilk Substitutes (BMS) to be considered at its 1980 Meeting. The Draft Code was reportedly considered with several Revisions and Modifications and ultimately adopted in 1981 as the International Code of Marketing of Breastmilk Substitutes by the WHA Resolution 34.22 (1981) [16]. The Adopted 1981 Code was to be implemented by Member States as the MINIMUM and in its ENTIRETY. The '5 Groups' present at the 1979 UNMIYCF were: UN Systems, Governments, Experts, Non-Governmental Organizations (NGOs) and Industries. With subsequent implementation by Governments and 'Reported Data' of monitored compliance by Industries, it has become expedient for this Author to conceptualize and technicalize thus: Those positively disposed to Make the Code Work as Pro-Code (UN Systems and NGOs), those not really implementing or complying with the Code as Anti-Code (Industry-Government Dyad) and those not really committed to the Code and possibly also conflicted by Industry Funding as Toti-Code (Experts) [17]. The Anti-Code (Industry-Government Dyad (Ind-Gov Dyad)) is addressed with the 'INAGOSICI Phenomenon' intellectually and imaginatively coined by this Author from 'INdustry And GOvernment Similar In Code Implementation' [17,18]. The Toti-Code (Experts) will be addressed further vide infra.

Healthcare Professionals

Healthcare Professionals (Part of the Experts) were at the 1979 UNMIYCF which adopted the 1981 Code but have largely elected to commit to Cafeteria Code Implementation: Pick and Mix and Pick and Choose resulting in having Conflicted Professionals/ Associations from unhealthy Healthcare Professionals/ Associations-Industry Funding Relationships with the attendant Conflicts of Interest (COIs). The COI is a Monstrosity that is better avoided and has been consistently addressed by several WHA Resolutions: WHA 34.22/ 1981, 58.32/2005, 61.20/2008, 65.60/2012, 67.9/2014 before the 2016 WHA 69.9/ WHO Guidance which Expressly Prohibits any Industry Sponsorship of Meetings of Healthcare Professionals [19]. With Conflicted Professionals, the IYCF Difficulties become replete with IYCF Overdiagnoses and Medicalization with Industry Products as Solutions to IYCF Difficulties resulting from Unacceptable Exploitative Marketing Practices [6]. Healthcare Professionals desired in the IYCF Ecosystem are those who are Competent, Compassionate and Committed to the Code to Protect, Promote and Support OIYCF.

The Code

The International Code of Marketing of Breastmilk Substitutes

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[16] adopted in 1981 was a significantly weakened Document compared with the Original Draft Code developed by the WHA Director-General but was, therefore, to be implemented as the MINIMUM and in its ENTIRETY. With 2-yearly Implementation Reports, the WHA has adopted Subsequent Relevant WHA Resolutions to strengthen the 1981 Adopted Code towards achieving the True Aim, Spirit and Intendment of the Original Draft Code. Therefore, The Code, as it is currently known, is the 1981 Adopted Code read and implemented in conjunction with ALL Subsequent Relevant WHA Resolutions which have Statutory and Legal Parity with the Provisions of the 1981 Adopted Code. Industries and Governments have also preferred Cafeteria Code Implementation of The Code and have been supported by Conflicted Healthcare Professionals/ Associations. Unfortunately, some United Nations Systems are gradually finding this Cafeteria Code Implementation attractive and this is quite bothersome. Strict implementation of, and compliance with, The Code is the assurance for the Protection, Promotion and Support for OIYCF including EBF.

Governments

At the Adoption of the Code in 1981, 118 voted in favour, 3 abstained and 1 was against. Currently, only 34 Countries of 144 (Of 194 UN Countries) have Substantial Code-compliant Provisions in their National Legislations (WHO-UNICEF-IBFAN 2022) [20]. It is, therefore, evidently uncomplimentary that Governments are not Programmatically Committed to Making the Code Work and hence they are part of the Anti-Code (Ind-Gov Dyad for which the INAGOSICI Phenomenon is advocated as a Programmatic Intervention) [17,18]. More Countries are expected to domesticate The Code to which they are signatories as the Starting Locus for effective disposition to Make the Code Work and avoid it being a Mere Cosmetic Meaningless Document. It is also expected that Code-compliant National Legislations must take cognizance of the 2016 WHA Resolution 69.9/ WHO Guidance which Expressly Prohibits Industry Sponsorships of Meetings/ Conferences of Healthcare Professionals/ Associations [19].

United Nations Systems And International Organizations

The 1979 UNMIYCF culminated ultimately in the 1981 Adopted Code [16]. Several powerful Member States of the WHA have reportedly strategically and consistently undermined the efforts to achieve the True Spirit and Intendment of the Original Draft Code and Some Subsequent Relevant WHA Resolutions [21]. These Powerful Countries reportedly work collaboratively with Big Transnational Industries to undermine the Programmatic Trajectory geared towards Making the Code Work and in tandem with the Anti-Code (Ind-Gov Dyad). Some United Nations Systems are now reportedly receiving Donations from Systemic and Systematic Violators of The Code as an Intervention to Addressing Underfunding. This, with Stiff Moral Rectitude, is unacceptable as it fails the Moral Litmus Test.

Code Regulatory Authorities

As previously indicated, only 34 of 144 (Of 194 UN Countries) [20], have Substantial Code-compliant National Legislations but Enforcement and Monitoring Compliance are yet other important determinants of Making the Code Work. Several Publications [20,22-24], including State of the Code, Breaking the Rules-Stretching the Rules, reveal Code Violations to be widespread and to be Systemic and Systematic and not accidental, incidental or one-off occurrences. Therefore, National Code Regulatory Authorities are expected to be effective and functional as Legislations that are not enforced are as good as non-existent. Such Regulatory Authorities obviously have Determinant Influence in the IYCF Ecosystem towards Making the Code Work.

Code Violations and Litigations-Adjudications and Legal Personnel/ Judiciary

With widespread Systemic and Systematic Code Violations, it is expected that National Code Regulatory Authorities should be busy with Litigations against Code Violators but herein lies another Code Implementation Difficulty. There is a seeming Disconnect between and among Those who drafted and adopted The Code well-informed with its True Spirit and Intendment, Those who enacted the National Code Legislations and Those who interpret and adjudicate on Code Litigations which is thus a Huge Determinant of Making the Code Work [25]. All those involved in Code Violations Litigations-Adjudications need further Capacity-building Interventions for more productive Code Implementation to really Make the Code Work.

Breastfeeding-Breastmilk, Bottle-Feeding/Breastmilk Substitutes And Nutritional Epigenetics

The Reproductive Interventions address, among several others, the Fertility, Pregnancy and Lactation and Feeding/Nutrition of the Outcome of Reproductive Medicine [1-3]. Breastfeeding ordinarily is the Feeding and nourishment of the offspring with milk from the breasts of the mother but it is much more than that. Breastfeeding and OIYCF reportedly dispose a Complex Human System Biology with the plethora of benefits for the IYC and Mother as Breastmilk is More than Food, Breastfeeding is More than Feeding and OIYCF effects Nutritional Epigenetics [26-30]. Breastfeeding and Bottle-Feeding are Two Different Feeding Methods that reportedly reflect Two Dichotomous Mechanisms with a Yawning Gap Apart! Ontologically, the Human Foetus-Newborn-Infant-Young Child Tetrad is reportedly equipped with the Anatomical and Physiological Armoury for Breastfeeding in contradistinction to Bottle-Feeding and involves: Embryological Neuromuscular and Bone-Cartilage Development of the Oral-Motor Complex reportedly manifesting with the Growth,

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Maturation, Function and Coordination of the Jaws-Lips-Tongue-Gums-Hard Palate-Soft Palate Complex and, reportedly during Breastfeeding, the Peristaltic Movement of Breastmilk within the Breast, into the mouth and Within the Oral Cavity and to the Back of the Mouth for Swallowing at a Slow-Milk Flow reportedly disposes a Complex Coordinated Suckling Process: Breathing-Suckling-Swallowing [31-34]. This is clearly different from Bottle-Feeding which reportedly involves Sucking Milk from the Bottle with Fast-Milk Flow, and also, the Suckling Process reportedly facilitates Cranio-Facial Complex Formation with Breastfeeding as a Tool for Natural Postnatal Prophylaxis against Cranio-Facial Abnormalities and also it facilitates the Normal Speech-Language Development [31-34].

Use of Feeding Bottles reportedly creates Nipple Confusion [35]. The Human Infant is born with Normal Immature Oral-Motor Complex Which reportedly progressively matures and functions better with Breastfeeding. Introduction of Bottle-Feeding reportedly mitigates against the Normal Postnatal Breastfeeding-Induced Functional Maturation and with less Demand on the Anatomical and Physiological Armoury results in Bottle-Feeding being reportedly preferred as a Feeding Option by the Human Infant. This is reportedly termed Nipple Confusion, and for Product Marketing Purposes is now reportedly termed Nipple Preference with Extreme Confusion possibly resulting in Nipple Refusal. The Industry is sufficiently familiar with these Scientific Facts [31-36] concerning SUCKLING-Breastfeeding and SUCKING-Bottle-Feeding Dichotomy and, therefore, Feeding Bottles and Teats are reportedly NOW Digitally Marketed with Claimed Technological Innovations to SIMULATE the BREAST and BREASTFEEDING: Slow-flow Nipples, Wide-base, Flexible and Soft Nipples for Easy Latch, Non-leaking Venting Mechanism to prevent Gassiness/Fussiness, Anti-Colic Valve Design, Wide-Neck for Easy Cleaning, Silicone and BPA-free Materials, Breastmilk Nutrients-Preserving Bottle, Transition Bottles with different Flow Levels, Bacteria-growth Reducing Storage, What Baby Prefers, Breast-like, Bottles for Breastfed Babies [26-36]. As far back as 1997 at the 2nd Training Course on Code Implementation at the International Code Documentation Centre (ICDC) in Penang, Malaysia, we were already exposed to Industry-claimed Technological Innovations concerning Humanizing Feeding Bottles and Teats.

With these Health and Nutrition Claims (Health and Nutrition Claims are Prohibited; WHA 58.32/2005), Digital Marketing is reportedly replete with the following, among others: Baby Bottle Complete Feeding, Ultimate Newborn Baby, Breastmilk Baby Bottle, Newborn Natural Feeding Bottle Starter Set and Best Breastmilk Bottle [36]. A more Fundamental Issue is Breastfeeding is reportedly a Complex Human Biological System that has Breastmilk and Breastfeeding Process each with Epigenetic Imprints and Implications: Nutrigenetics-Nutrigenomics and Nutritional Epigenetics [6,26-28]. The Lancet Papers [6-8] excite further excursion into Nutrigenetics-Nutrigenomics and Nutritional Epigenetics [26-28]. The former is How Metabolic Processes of Nutrients affect Health Depending on Genotype (How Genetic Variations affect responses to Nutrients Intake (Nutriome)) and the latter: How Diet Changes Gene Expression (How Nutrients Intake impact on Gene Expression). Nutritional Epigenetics reportedly concerns Environmental Factors (Nutrients and Bioactive Food Constituents (Bioactives)) and Epigenetic Regulation (Altered Gene Expression from Change in DNA Segment not affecting DNA Sequence) [26-28]. Breastfeeding reportedly achieves Personalized Nutrition. Therefore, even if Feeding Bottles and Teats are HUMANIZED as CLAIMED [35,36], the Breastfeeding Process with its Epigenetic Implications and Protean Benefits for the Mother-Child Dyad cannot be SUBSTITUTED.

Ascribed to Barker [37], Much of Human Development is completed during the first 1000 days after Conception: Prenatal and Early Postnatal Periods. Therefore, Pregnancy-related Exposures-Events-Lifestyles (Exposome-Exposomics) and Breastmilk-Breastfeeding-IYCF affect the First 1000 days re: Health and Development in the first two years of life and can now possibly be extended to the first three years of life. This disposes the conceptual importance and relevance of a new Technical Capture: The First 1400 Days of Life. The Under-Five has also reportedly been disposed as the First 2000 Days of Life. Breastmilk is reportedly a Complex Dynamic Constantly Transmuting Biological System containing Nutrients, Epigenomes, and Other Bioactive Factors. The Epigenomes reportedly include Exosome-containing microRNAs. The Epigenetic Mechanisms reportedly reflect DNA Methylation-Histone Modification-Chromatin Remodelling-microRNAs with several Regulatory Pathways including AMP-activated Protein Kinase (AMPK) Signalling [26-28].

Other Breastmilk Epigenomes reportedly include Leptin-Ghrelin regulating Energy Balance-BMI Growth, Stress Modulators influencing Neurodevelopmental-Mental Status and Immunomodulators affecting Infection Proneness. Indeed, Breastmilk-Breastfeeding reportedly affects BMI Growth in a Dose-dependent Pattern in the Early Postnatal Period up to six years with extension to 17 years [26-28]. These Unique Attributes of Breastmilk (And Breastfeeding) are highlighted to further justify as previously indicated: There is no Breastmilk Substitutes (BMS) (My Presentation at the 2007 Paediatrics Association of Nigeria Conference; 'Breastmilk Substitutes: Myth or Reality?','Breastmilk is not Formula' (A Presentation at the 20th Academy of Breastfeeding Medicine Meeting in 2014 in Cleveland, USA) and 'Commercial Milk Formula' (2023 Lancet Papers suggested Replacement for BMS).

Milk Expression From Breastfeeding, Manual And Pump Expressions

Breastfeeding, Breastmilk Expression (Hand Expression and Pump Expression) and Breastmilk (Quality and Quantity) will be briefly exposed through the Conceptual-Contextual Technicalities: Mechanics of Galactokinesis, Rheological and Rheometric Factors

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in Milk Expression, Viscoelasticity of Obtained Breastmilk and Galactopoeisis and Determinants. Some Tantalizing Teasers [38-40] vide infra reportedly include:

i. The Forces for Breastmilk Movement (Mechanics) are: Compression and Suction. Hand Expression is by Compression, Pump Expression is by Suction and Breastfeeding employs both Compression and Suction. The reported Hierarchy of Effectiveness is: Breastfeeding, Hand Expression and Pump Expression in descending order!

ii. The Breastmilk Content from Breastfeeding is reportedly Homogeneous at every Phase of Suckling (Fore-, Mid- and Hind-Milk!) while Pump Expression yields disproportionately More Watery Content with the Residual Fat Content in the Breast predisposing to Breast Difficulties (Plugged Ducts, All Areas not Uniformly Drained etc!)!! The Differential Viscoelasticity of Expressed Breastmilk reportedly results in Adsorption to Receptacle in Pump Expression!! Hand Expression yields Fat-rich Breastmilk which with the Non-Bile Salt Stimulated Lipase Component produces Increased Free Fatty Acids (FFA) with Protective Antimicrobial Activity!!!

iii. The Suckling Process with the Neuroendocrine Implications reportedly facilitates Effective Galactopoeisis and Enhanced Production and Maintenance of Lactation compared with Pump Expression!! As usual, Industries NOW reportedly CLAIM production of Breast Pumps with Combined Galactokinetic Mechanics (Compression and Suction!)!! Such Digital Breast Pump Marketing may deceive mothers to believe the New Breast Pumps are as Effective as Breastfeeding; a False Health Claim!!!

iv. The Epigenetic Implications of the Breastfeeding Process cannot be provided by Pump Expression!!! There certainly is a Plethora of Benefits to the Mother-Child Dyad which Breastfeeding confers and cannot be replaced by Pump Expression!!!!

Breastfeeding combined with Hand Expression is reportedly the BEST re: Breastmilk Output (Quality and Quantity), Nutritional Epigenetics, Nutrigenetics-Nutrigenomics and Mother-Child Dyad Benefits.

Peanut Allergy and Prevention

Childhood morbidity and mortality remain bothersome Public Health Challenges globally particularly in the Developing Countries! It is reported that Peanut Allergy has tripled in recent decades in the UK particularly in children with Severe Eczema and Egg Allergy [41]. It is also reported that there was a 77% reduction in Peanut Allergy when Peanut Products were added to all Babies Diets at 4 to 6 months [42]. This certainly will compromise the practice of Exclusive Breastfeeding (EBF) for the first six months of life!! It is, therefore, salutary that the most recent Guidelines recommend EBF for the first six months with introduction of Peanut Products between 6 and 12 months [43].

This Author is a very ardent Proponent and Advocate of EBF and firmly supports the delay of the Introduction of Peanut Products till after the first six months and, therefore, is strongly supportive of the period of Between 6 and 12 Months for Peanut Products Introduction for the Prevention of Peanut Allergy!! The Triple Exposure is another explored Interventional Strategy: Mother consumes Peanut Products, continues Breastfeeding with Early Peanut Products Introduction at 4 to 6 months [44]. The 2017 Revised NIAID Guidelines reportedly recommend Early Peanut Products Introduction at 4 to 6 months for those with High-risk (Severe Eczema/ Egg Allergy) already On Solid Foods [45]. Being Already on Solids at 4 to 6 months is Inappropriate IYCF [4,5] and a Fundamental Programmatic Flaw in the Revised Guidelines [45]; Between 6 and 12 months Peanut Products Introduction is the imperative to Protect-Promote-Support EBF.

Breastfeeding, Breastmilk And Microbiome

Breastfeeding and Breastmilk reportedly confer a unique Infant Microbiome on the Human Infant. The Microorganisms (including Bacteria) in Human Breastmilk, as previously communicated in a Rapid Response (https://www.bmj.com/content/364/bmj.l1279/rr-6 of 4th April 2019) but with only a few Issues re-emphasized and further highlighted in this treatise, reportedly contribute significantly to the establishment of the Infant Microbiome which is the Total Population of Microorganisms (Microbiota) living within and on the body of an individual and their Comprehensive Genetic Make-up existing in a synergistic equilibrium with the individual and resultant positive Health Outcomes for the Life Span and potentially Across Generations [46]. The Infant Microbiome in relation to Breastfeeding and Formula-Feeding, has reportedly been greatly investigated and explored in recent Communications [47-49]. Breastfeeding and Human Breastmilk reportedly contribute to the Last 2 Stages in the Infant Microbiome Evolution reportedly documented through the following Stages: Prenatal, During Delivery, Immediate Postnatal, Birth to 6 months and Beyond 6 months. A Microbiome Diversity is reportedly facilitated by Breastmilk and beneficial for long-term Health Outcomes [47,48].

Bifidobacteria Species and Lactobacillus Species, among others, in Breastmilk Microorganisms Composition are reportedly absent in BMS with no possibilities for Fortification. A reported stable equilibrium between the Protective Organisms/ Commensals and the Potential Pathogens is Eubiosis with positive Health Outcomes while a disequilibrium is Dysbiosis with untoward sequelae. The Microbiome Taxonomy/ Phyla in Breastfed Infants, not achieved through Formula-feeding or Fortification, reportedly include a Rainbow of Possibilities: Actinobacteria (Bifidobacteria, Corynebacterium etc), Bacteroidetes (Bacteroides etc), Firmicutes (Lactobacillus, Enterococcus, Clostridium, Streptococcus, Staphylococcus etc), Proteobacteria (Enterobacter Species). The Firmicutes/ Bacteroides (F/B) Ratio, reportedly

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determined by Breastmilk Microorganism Composition, correlates with the Fat/ Lean Mass Composition with the Obese having higher Firmicutes and reduced Bacteroides [47,48]. The Breastfed Infant Microbiome F/B Ratio is altered by Formula-feeding with untoward health sequalae and the impact of the Infant Microbiome is reportedly mediated via the Bidirectional Microbiome-Gut-Brain Axis [50,51] with resultant integration of the regulatory Psychoneuroimmunological (PNI) Pathway to connect the Gut with the Brain and Immune Status through Local Process and Systemic Process. The F/B Ratio correlates with Body Composition: A Determinant of the predisposition to Adult Disease Induction (ADI) including Obesity and other Metabolic Syndrome Components as disposed by the FOAD Hypothesis/ Barker Hypothesis/ Maternal Thrifty Phenotype Hypothesis! 'Pre-FOAD Hypothesis' conceptualized by this Author, starting with Exclusive and Optimal Breastfeeding coupled with the Child Survival Interventions harnessing the Two Growth Spurts (First 6 months and Pre-Puberty) assure optimal Pre-Pregnancy Maternal Phenotype and Developmental Plasticity for Trans-generational optimal Birth Body Composition [17,18].

The Microbiome reportedly generates Pro-Inflammatory Cytokines (Interleukin (IL)-6, Tumour Necrosis Factor (TNF)-α) to establish and activate the Immune System. The Microbiome also reportedly interacts, via Cortisol Production, with the Endocrine Pathway (Hypothalamus-Pituitary-Adrenal Axis (HPA)) and the Neural Pathway (Vagus Nerve) with the development and regulation of Gut Health [50]. Also, the Microorganisms reportedly interact with Gut Wall Cells to release Bioactive Substances, including Vasoactive Intestinal Peptides (VIPs), which reportedly stimulate the afferent fibers of the Vagus Nerve which regulate the Gut, assures Systemic Homeostasis, promotes Anti-Inflammatory Response and influences Central Nervous System establishing the Sickness Behaviour (Depression, Insomnia, Anorexia and Fatigue) undergirding the Individual Behaviour-Social Formation and the Microbiome-related Neurocognitive Development of the infant [52].

Breastfeeding And Chestfeeding/Gender Issues

All relevant Stakeholders in the IYCF Ecosystem should be involved in Breastfeeding which Complex Human Biological System is certainly Not for Women Alone. The Issues of Breastfeeding and Women were reportedly disposed in the Three 2023 Lancet Breastfeeding Series Papers for Brevity believing most who Breastfeed identify as Women recognizing that not all People who Breastfeed or Chestfeed are Women [6-8]. For Non-Binary Gender Identity and Construct, Chestfeeding and Breastfeeding require further detailed discourse not exposed further in this treatise but this definitely has implications for optimizing the OIYCF Ecosystem for enhancing the Holistic Health and Status of the Outcomes of Reproductive Interventions.

Women Care Work is reportedly not appropriately regarded, rewarded and also disposed in National Economics to guide Computation of Contributions to National GDP and drive Government Budgetary Provisions and Allocations to support Women Care Work Determinants and Logistics [8] and Breastfeeding must be recognized as Archetypal of Work [53]. The International Labour Organization has focused global attention on Gender Equal World of Work [54]. The Maternity Entitlements Rights of Working Nursing Mothers are other matters within the Jurisdictional Responsibility and Management of the International Labour Organization to assure the Workplace is favorably disposed to the IYCF Ecosystem [55]. The Triad of Place-Time -Support remains the determinant to Make the Code Work in the Workplace.

IYC Foods, Diversification and Commodification

Industry has reportedly expanded its Aggressive Exploitative Marketing Practices and Frontiers to dispose Products Diversification and Commodification to introduce into the IYCF Ecosystem a Range of Products addressing ALL Components and Ages in the IYCF Ecosystem viz: Infant Formula for 0-6 months, Follow-up Formula for 6 months and older infants, Growing-up Milk for 12 months and older, Products for Pregnant and Lactating Women [56,57]. This is reportedly intended to facilitate Re-branding, Re-packaging and Re-naming Products with a view to circumventing The Code Provisions and having a hold on the IYC Foods Market.

Breastfeeding, Fertility, Family Planning and Reproductive Longevity

Breastfeeding and the Composite IYCF Ecosystem certainly have implications for Fertility, Family Planning and Reproductive Longevity but this nexus is not explored further in this discourse and would most plausibly by distilled as a treatise in future Communications!

Conclusion

This Communication has exposed the Components of the IYCF Ecosystem in an effort to excite and invite rational IYCF Ecosystem-related Interventions that will guarantee achieving OIYCF towards optimizing the Status of the Outcomes of improved Reproductive Interventions. This hopefully should contribute to eclipsing the Negatively altered IYCF Ecosystem. It is palpably disposed that there are No Breastmilk Substitutes and the term is a Programmatic Conceptual Technical Inexactitude.

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How to cite this article: Charles Osayande Eregie. Addressing the Optimal Infant and Young Child Feeding Ecosystem to Improve the Status of the Outcome of Reproductive Interventions; No 'Breastmilk Substitutes'. Glob J Reprod Med. 2023; 10(2): 555784. DOI: 10.19080/GJORM.2023.10.555784

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DOI: 10.19080/GJORM.2023.10.555784

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